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Actualités Tunisiennes d'Odontologie

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Traumatic Dental Injuries



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Faculté de Médecine Dentaire de Monastir ADEE Recognition ISO 21001 Certification

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Articles Scientifiques

Hend Ouertani Nada Alouani Arij Ghodhbani Brahim Boukadida Chaima Hajri Emna Garouachi Emna Smati Ghada Neji Hajer Zaghdoudi Hamed Harbi Hatem Hamouda Khouloud Ben Mansour Lilia Ben Zid Malek Ben Amor Marwa Chatti Mohamed Ali Hedhli Molka Jenhani Nouha Fakhfekh Ons Ezzeddini Soumaya Abid Soumaya Kachti

Formation continue

Quiz by Pr. Latifa Berrezouga Traumatic Dental Injuries (TDIs)

Success Story d'un confrère au-delà de nos frontières

Dr. Malek Kallel Souayah From the Faculty of Dental Medicine of Monastir (Tunisia) to Colorado School of Dental Medicine (USA): A Huge Achievement

Espace des Institutions et Associations By Soumaya Abid

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EDITORIAL

Pr. Latifa Berrezouga

Faculté de Médecine Dentaire de Monastir



ARTICLES SCIENTIFIQUES

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SUCCESS STORY D'UN CONFRÈRE AU-DELÀ DE NOS FRONTIÈRES

115

Dr. Malek Kallel Souayah

From the Faculty of Dental Medicine of Monastir (Tunisia) to Colorado School of Dental Medicine (USA): A Huge Achievement

ESPACE DES INSTITUTIONS ET ASSOCIATIONS

Certificats d'Etudes Complémentaires 2024-2025

Bases Fondamentales et pratiques en chirurgie parodontale et implantaire	116
NEW : Lancement du Certificat d'Etudes Complémentaires : Expertise et Responsabilité Médicale en Médecine Dentaire en collaboration avec des intervenants internationaux (Décembre 2024)	118
XXI South Europe, North Africa and Middle East international conference SENAME en mémoire à A.Simonperi, Napoli, Italie 18-19-20 janvier 2024	119
5ème congrès francophone d'orthodontie & 9ème congrès de l'ATREO, 4-5-6 Octobre 2024	121
11ème Congrés Annuel de la Morroccan Orthodontic Society et l'ATREO Casablanca, 13-15 février 2025	122
32èmes Entretiens Odontologiques de Monastir, 1-2-3 mai 2025	123
20ème Anniversaire de l'Université de Monastir , 4 décembre 2024	124
Accréditation ADEE et Certification ISO 21001: Une Double Reconnaissance pour la Faculté de Médecine Dentaire de Monastir	125
Classement ARU : 13ème place	127
The International Association of Dental Traumatology-IADT	128
The International Association of Dental, Oral, And Craniofacial Research-IADR, The Tunisian Section	129

d'Odontologie Vol 14 - N° 1 & 2 - Décembre 2024

Tunisian Dental Journal Actualités Tunisiennes d'Odontologie

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>>> EDITORIAL



Dr. Latifa Berrezouga Professor, DDM, MSc, PhD

Dear readers, dear colleagues,

Allow me to first thank our chief editor, Professor Faten Ben Amor, for offering me the position of guest editor of the ATO Journal, which I accepted with great enthusiasm. I thank you for having been numerous in submitting articles concerning traumatic dental injuries (TDIs). As a cause of damage to the dental organ, TDIs occupy the second place after dental caries. These injuries are characterized by their epidemiological, clinical, radiographic, therapeutic and outcome features, and require multidisciplinary interventions in complex situations. The existence of an International Association of Dental Traumatology (IADT), of which I have been a member since 2011, is only one embodiment of the richness of this discipline whose guidelines are translated into several languages including the Arabic language. The Emblematic Figure or the Father of modern evidence-based treatment of TDIs is Professor Jens Ove Andreasen, to whom I pay tribute. Professor Andreasen was the first president of the IADT that he has founded in 1989. He passed away on September 26th 2020 and left for the international dental trauma community the following legacy: 400 publications and 12 textbooks, interactive internet based Dental Trauma Guide (founded in 2008), and The Copenhagen Symposia and the Copenhagen Webinars. May his soul rest in peace. Indeed, I had the opportunity and the great privilege, to invite the Eminent Professor Lars Anderson, who willingly agreed to give his first course in dental traumatology in 2010 in Tunisia at the faculty of dental medicine of Monastir. Professor Anderson was at that time President of the IADT and the Editor-in-Chief of the Journal of Dental Traumatology (IF: 3.3). Raising awareness about adequately preventing, diagnosing and treating TDIs, according to IADT guidelines and the core outcome set (COS), would enable dentists to reach a better outcome of TDIs management and improve patients' and families ' quality of life. Furthermore, clinical and biological research is the pillar of the development of the dental trauma field.

Finally, I would like to thank my colleagues who took part in the review of the submitted articles. I wish you a very good reading of most of the clinical cases where the decisions to keep or not to keep the traumatized tooth come together. Also, I invite you to browse our different sections including the TDIs quiz, activities of our associations and the success story of the Tunisian dentist and colleague Melek Kallel Souayah in the USA, who pursued dental studies because of and thanks to a tooth traumatized in childhood.

Thank you very much.

Source about Prof. Jens Ove Andreasen: https://iadtdentaltrauma.org/, https://dentaltraumaguide.org/

Dr. Latifa Berrezouga

L'équipe de l'ATO vous souhaite une Bonne et Heuveuse Année 2025

Actualités Tunisiennes

2

d'Odontologie

>>> ARTICLES SCIENTIFIQUES



Extrusion chirurgicale d'une dent traumatisée chez un enfant : A propos d'un cas clinique

Surgical extrusion of traumatized tooth in a child : a case report

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Résumé

Les fractures des dents antérieures sont les plus fréquentes. Dans le cas de fracture coronoradiculaire avec une limite sous gingivale, le pronostic de la dent devient sombre. Chez l'enfant, la décision d'extraction reste difficile à prendre et le praticien se doit de trouver toutes les alternatives possibles. Dans cette observation clinique nous présentons la prise en charge par extrusion chirurgicale comme technique d'élongation d'une 12 fracturée dans le cadre d'un traumatisme chez un enfant de 14 ans, permettant de rétablir l'esthétique et la fonction dans ce cas où le remplacement par une prothèse définitive n'est pas possible.

 $\underline{Key \ words}: fracture \ dentaire - extrusion \ dentaire - réimplantation \ dentaire - \ell longation \ coronaire - esthétique longation \ dentaire - longation \ coronaire - esthétique longation \ dentaire - longatire - longation \ dentaire - longation \ dentaire - longatio$

Abstract

Anterior tooth fractures is the most common type of trauma. In the cases of complicated crown-root fracturing below the gingival level, tooth prognosis will be very poor and tooth extraction will be most likely the outcome. In young population, the decision making of permanent tooth extraction is very hard to take and dentist should bring all the possibilities to keep the tooth. The clinical report presented here explains the surgical extrusion as a crown lenghening technique performed on tooth #12 of a 14-year-old-boy fractured.

Mots clés: tooth fracture - dental extrusion - tooth reimplantation - crown lengthening - esthetics

INTRODUCTION

Les traumatismes dento-alvéolaires sont des accidents fréquents, leur gestion est complexe et se fait au cas par cas. Les dents antérieures sont les plus touchées. Les fractures des tissus dentaires peuvent être de différents types et à différents niveaux(1). Selon l'orientation, le niveau du trait de fracture par rapport à l'attache gingivale et le niveau osseux, les possibilités de réhabilitation prothétique de la dent sont parfois compromises(2). L'objectif de cet article et de présenter la technique d'extrusion chirurgicale comme moyen de gestion d'une fracture coronoradiculaire avec une limite infra-gingivale chez un enfant de 14 ans.

OBSERVATION

Un enfant âgé de 14 ans, accompagné de son père, a consulté notre service suite à un traumatisme occasionné par une chute de vélo. A l'anamnèse le patient était en bon état général sans antécédents particuliers. Il a déclaré être victime d'une chute de vélo avec réception sur le menton survenue la veille au soir. Le temps écoulé depuis le traumatisme étant de 14 heures. Le patient a déjà été examiné dans un service d'urgence et il a reçu un traitement médical à base d'antalgique.

A l'inspection et l'examen exo-buccal nous avons noté un hématome au niveau de la lèvre inférieure avec une écorchure au niveau du menton (Figure 1).

Figure 1

Aspect exobuccal d'un patient âgé de 14 ans ayant subit un traumatisme avec réception sur le menton : hématome au niveau de la lèvre inférieure et une légère écorchure au niveau du menton

La palpation des rebords osseux et des articulations temporo-mandibulaires n'a pas révélée de points d'appels douloureux, le chemin d'ouverture et de fermeture était normal.

L'examen endo-buccal a montré une fracture corono-radiculaire avec exposition pulpaire sur la 12, une fracture amélo-dentinaire sans exposition pulpaire sur la 11. Le niveau du trait de fracture sur la 12 était infra-gingival du côté palatin (fracture ouverte) (Figure 2).





Aspect endo-buccal du patient : fracture corono-radiculaire avec exposition pulpaire sur la 12 avec une limite sous gingivale du trait de fracture, fracture amélo-dentinaire sans exposition pulpaire sur le 11

L'examen radiographique rétro-alvéolaire n'a pas montré de fracture radiculaire et le support osseux était en bon état (Figure 3). Le sondage parodontal a permis de conclure que le niveau du trait de fracture était situé à 2 mm en infra-gingival nécessitant donc une élongation d'au moins 2 mm pour réaménager un espace biologique viable autour de la dent. La dent a été jugée non conservable vu le niveau du trait qui était sousgingival et ne permettait pas une élongation pour aménager un espace biologique viable autour de la dent.

d'Odontologie Vol 14 - N° 1 & 2 - Décembre 2024

Vu l'âge du patient et la longueur de la racine qui semblait être suffisante, nous avons décidé de réaliser une extrusion chirurgicale le jour même de la 12 pour récupérer un niveau palatin du trait de fracture permettant la reconstitution de la dent tout en gardant un rapport couronne/ racine radiologique supérieur à 1. Ceci dans le but de préserver la dent comme support pour le maintient de l'os vu le jeune âge du patient et l'impossibilité de réaliser un traitement prothétique définitif à cet âge. Cette proposition a été présentée au père qui a donné son consentement oral pour cette thérapeutique.

Sous anesthésie locale, la 12 a été délicatement extrudée chirurgicalement à l'aide d'un davier et repositionnée dans une position plus basse. Une contention par de la résine composite en mésiale et en distale de la dent a été mise en place et un traitement endodontique avec mise en place d'hydroxyde de calcium comme médication interséance a été réalisé. (Figure 4).



Figure 4

Rétro-alvéolaire sur la 12 après extrusion chirurgicale, mise en place de la contention par la résine composite et mise en place de médication inter-séance à l'hydroxyde de calcium.

Le patient a été revu après deux semaines, pour finaliser le traitement endodontique et obturer le canal définitivement et une reconstitution de la couronne par de la résine composite a été mise en place (Figure 5). Les contrôles à 1 mois et 3 mois n'ont pas révélé de signes infectieux ou de mobilité avec une bonne intégration de la dent sur le plan biologique (profondeur de sondage normale et pas



Figure 3

Rétro-alvéolaire sur le secteur antérieur droit du patient objectivant les traits de fracture et leurs niveaux avec absence de fracture osseuse ou radiculaire de mobilité) et radiologique (cicatrisation osseuse autour de la racine et espace desmodontal normal). (Figure 6). Le patient est toujours sous contrôles réguliers en vue d'une future réalisation prothétique qui sera faite à l'âge de 20 ans.





Vue endo-buccale après 2 semaines : dépose de la contention et restauration de la dent à la résine composite avec une limite supra-gingivale du côté palatin



Figure 6

Rétro-alvéolaire sur la 12 montrant une bonne cicatrisation osseuse, absence d'élargissement desmodontal, absence de signes de résorption ou d'inflammation périapicale.

DISCUSSION

Les traumatismes dento-alvéolaires constituent un motif de consultation assez fréquent dans notre pratique quotidienne. Chaque situation clinique est unique. En effet, même si les guidelines existent, ils traitent chaque type de fracture et de lésion des tissus à part (1). Mais devant un patient traumatisé, on peut avoir la survenue de plusieurs types de fractures coronaires, radiculaires et des tissus supports combinés sur une même dent (1). Le médecin dentiste doit donc jongler avec ces recommandations afin de les adapter à chaque situation.

Un choix judicieux, bien réfléchi conditionnera la réussite de la prise en charge du patient.

Le choix thérapeutique doit prendre en compte l'âge du patient, son état général ainsi que les facteurs de bon pronostic tel que le temps extra-oral dans le cas de luxation totale, le temps d'exposition pulpaire, l'état de la dent et de l'alvéole, le degré d'édification radiculaire et de maturation de la dent (1,2). Dans notre situation clinique la décision d'extraire la dent, vu le niveau du délabrement a été indiquée au départ. Mais vu le jeune âge du patient et l'impossibilité de passer directement à une solution implanto-portée ou prothétique fixe (plus mutilante), nous avons préféré réaliser une extrusion chirurgicale de la dent.

Vol 14 - Nº 1 & 2 - Décembre 2024

En effet, l'extrusion chirurgicale a été décrite pour la première fois par Tegsjö et al en 1987 (3) puis modifié par Kahnberg (4). Elle permet d'avoir un niveau des limites de la fracture compatible avec la reconstitution prothétique tout en respectant un espace biologique viable (3,5). Ceci dans le but de préserver la dent avec son support osseux le maximum de temps possible (6). Pour notre situation clinique, jusqu'à ce que le patient atteigne un âge permettant une restauration définitive.

L'autre solution qui s'offrait à nous était de faire une extrusion orthodontique de la dent. Mais dans notre situation cette solution a été discutée avec le père, qui faute de moyens financier a préféré une solution moins couteuse et plus rapide(5). L'élongation coronaire chirurgicale par gingivectomie ou par déplacement coronaire d'un lambeau avec ostéotomie et ostéoplastie a été contre indiquée d'emblée pour notre patient en raison de la nécessité de résection osseuse dans ce cas avec les complications esthétiques (récessions- perte des papilles) et fonctionnelles (inversion du rapport couronne racine) (5).

Selon la revue systématique de Das et Muthu en 2013, l'extrusion chirurgicale peut être indiquée avec succès dans les cas de fractures coronoradiculaires. Elle constitue un traitement rapide en une seule étape et ne nécessite pas de compétences particulières de la part du médecin dentiste(7). Cette technique a été largement indiquée au niveau des dents maxillaires antérieures vu la forme de leurs racines. En effet, elle est contre indiquée dans le cas de dent pluriradiculées (4,5). Une luxation douce et atraumatique, dans le but de préserver les cellules du ligament desmodontal, représente le principal garant de réussite de la procédure (2,3,8). Une contention semi-rigide est souhaitée pour stabiliser la dent et permettre une stimulation lors des forces masticatoires essentielles pour une bonne cicatrisation du ligament desmodontal (1,8). Cette contention doit être maintenue pendant 2 semaines selon l'International Association of Dental Traumatology (1).

Les signes de réussite de la procédure sont les mêmes que dans les cas de réimplantation ou de

Actualités Tunisiennes

Vol 14 - Nº 1 & 2 - Décembre 2024

repositionnement suite à une luxation partielle ou totale (1,3,5,8) :

- Espace desmodontal normal,

- Absence de signe de résorption radiculaire ou d'ankylose,

- Absence de complication péri-apicales et de perte osseuse autour de la racine,

- Profondeur de sondage normale,

- Absence de mobilité.

Les risques de résorption ou d'ankylose restent possibles. Mais pour le moment pour notre situation clinique il n'y a pas eu de signes de résorption. Sachant que cette solution nous a permis de préserver le capital osseux pour le cas échéant prévoir une solution implantaire à long terme est possible (9). Alors que l'extraction à un si jeune âge aurait pour conséquence l'atrophie osseuse et le risque de compromettre une future prothèse implanto-portée avec le risque de recourir à une greffe pour rattraper la perte osseuse (9). Le taux de succès de l'extrusion chirurgicale est satisfaisant. Il est de 95 % à 100 % des cas selon les différentes études (2,8). Les critères de réussite se traduisant par une cicatrisation favorable avec absence d'ankylose durant les cinq dernières années. Cependant il y a un manque d'étude sur le long terme.

CONCLUSION

Ce cas nous a permis de constater qu'il faut adapter en fonction des guidelines la prise en charge de nos patients particulièrement pour les patients jeunes où le traitement prothétique définitif n'est pas toujours possible.

La technique d'extrusion chirurgicale peut constituer une bonne alternative à l'extraction dentaire avec des taux de succès satisfaisants.

Pour notre situation clinique, cette technique a permis de préserver la racine dentaire, l'os support et surtout le sourire du patient avec les répercussions psychologiques, économiques, esthétiques et fonctionnelles qui découlent d'une éventuelle extraction dentaire à un jeune âge.

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5

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d'Odontologie



Extensive post-traumatic root resorption of the maxillary lateral incisor: clinical and radiological analysis of a case report

Résorption radiculaire étendue post-traumatique de l'incisive latérale maxillaire : Analyse clinique et radiographique d'un cas clinique

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Abstract

Introduction and Aim: Traumatic dental injuries are a common reason for dental consultations and can lead to root resorption, which may manifest in various forms. This case presentation highlights the importance of clinical examination and imaging techniques (CBCT) in diagnosing extensive root resorption. Observation: A 16-year-old patient presented to our department with pain in the left maxillary lateral incisor. The patient had a history of dental trauma at the age of 10, which led to the extrusion of the left maxillary lateral incisor. The tooth was re-implanted by his physician 30 minutes after the incident.

Upon clinical examination, the patient exhibited pain upon percussion and apical palpation of the affected tooth, suggesting ongoing complications. A CBCT scan was performed revealing a large periapical lesion (CBCTPAI>8mm, D) associated with the tooth, along with significant root resorption. The investigation of the root canal, under operative microscope, using a K-file failed to show hemorrhage due to a granulomatous tissue or pus. Extraction was performed with surgical debridement of the periapical lesion. Upon extraction, the tooth exhibited severe cervical and root resorptions. Conclusion: This condition underscores the vital role of clinical examination and radiological investigation in therapeutic decision making.

Key words : Dental trauma, root resorption, clinical examination

Résumé

Introduction et objectif : Les lésions dentaires traumatiques sont un motif fréquent de consultation dentaire et peuvent entraîner une résorption radiculaire, qui peut se manifester sous diverses formes. Ce cas clinique met en évidence l'importance de l'examen clinique et d'imagerie (CBCT) dans le diagnostic d'une résorption radiculaire étendue. Observation Clinique : Un patient de 16 ans s'est présenté dans notre service avec une douleur à l'incisive latérale maxillaire gauche. Le patient avait des antécédents de traumatisme dentaire à l'âge de 10 ans ayant entraîné l'extrusion de l'incisive latérale maxillaire gauche. La dent a été réimplantée par son médecin 30 minutes après l'incident. À l'examen clinique, le patient a présenté une douleur à la percussion et à la palpation apicale de la dent affectée suggérant des complications persistantes. Un cone beam a été réalisé révélant une large lésion périapicale (CBCTPAI> 8 mm, D) associée à la dent, ainsi qu'une résorption radiculaire importante. L'exploration du canal radiculaire, au microscope opératoire, à l'aide d'une lime K, n'a pas mis en évidence d'hémorragie due à un tissu granulomateux ou du pus. L'extraction a été réalisée avec débridement chirurgical de la lésion périapicale. Lors de l'extraction, la dent présentait de graves résorptions cervicales et radiculaires. Conclusion : Cette pathologie souligne le rôle vital de l'examen clinique et de l'investigation radiologique dans la prise de décision thérapeutique.

Mots clés: Traumatisme dentaire, résorption radiculaire, examen clinique

INTRODUCTION

Oral trauma comprises 5% of all traumatic injuries according to the International Association of Dental Traumatology (1). Traumatic dental injuries in children aged 8 to 14 years occur in approximately 6.1% to 27.6% of cases. The maxillary central incisors are the most frequently affected teeth, comprising 53.2% to 88.1% of all injured teeth, with a higher incidence observed in male patients (2,3). Pathological resorptive processes in permanent

teeth lead to the destruction of mineralized root structures, such as cementum and dentin, due to the activity of clastic cells. Root resorption be identified through several methods, including visual examination for changes in the tooth crown's color, radiographic imaging, conventional and cone beam computed tomography, as well as light and electron microscopy (4,5). A common dilemma in dental practice is deciding whether to perform endodontic treatment on a tooth with a questionable prognosis or to extract it and proceed with implant placement. This paper insights a case report involving perforating internal and external resorption with poor prognosis.

OBSERVATION

A 16-year-old patient presented to our department with pain in his left maxillary lateral incisor. The patient had a history of trauma at the age of 10, which resulted in the avulsion of the left maxillary lateral incisor (#22). The tooth was re-implanted by his physician after 30 minutes, with no history of root canal treatment. No particular storage medium was reported by the patient's father. On clinical examination, the tooth was ectopic in a buccal position.

d'Odontologie Vol 14 - N° 1 & 2 - Décembre 2024

The patient exhibited pain upon percussion and apical palpation. A slight metallic tone on percussion was recorded. A CBCT was performed, and revealed a large periapical lesion (CBCTPAI>8mm, D) associated with extensive external-internal root resorption and no root canal filling (Figure 1 A-C). The investigation of the root canal, through the access cavity and under operative microscope, with a K-file failed to show hemorrhage due to a granulomatous tissue or pus (Figure 2A and B). Upon evaluation, extraction of the tooth was recommended, along with surgical debridement of the associated periapical lesion. The extracted tooth showed extensive cervical and root resorption. The external resorption on the palatal side was communicating with the necrosed root canal (Figure 3 A-C).





A: Axial section of the CBCT showing the extension of the palatal resorption of the tooth; B and C : Sagittal sections of CBCT showing the extention of the resorption associated with a large periapical lesion and destruction of periapical cortical bone (CBCTPAI>8mm, D) (CBCT slices by Pr. Latifa Berrezouga).





A and B: Clinical views under operating microscope show no pus or hemorrhage from the necrosed root canal (Photos, Pr. Latifa Berrezouga).



Figure 3

A, B and C: Buccal, palatal and lateral views, respectively, of the extracted tooth showing the extent of the resorption and the substance loss (Photos, Pr. Latifa Berrezouga).

DISCUSSION

After dental trauma, root resorption, interruption in root formation and periapical lesion may be frequently observed (3). Clinical sequelae of traumatized teeth may include tooth mobility, crown discoloration, and sensitivity to percussion. Radiographic follow-up is crucial for the early detection of these changes in traumatized teeth (6). Root resorption is a process that can be either physiological or pathological, primarily caused by the activity of activated osteoclasts. It is characterized by the gradual or temporary loss of cementum, or both cementum and dentin (7). It can be caused by both traumatic and infectious factors. Dental trauma is a significant etiological factor, but it can also result from a chronic inflammatory process affecting the pulp and periodontal tissues. Dentin, cementum, and bone are all mineralized hard tissues, but while bone undergoes continuous remodeling, the hard tissues of the tooth do not. As a result, the presence of the periodontal ligament plays a crucial role in protecting the root from resorption (8).

Andreasen JO has made significant contributions to the understanding of root resorption over the past 40 years. He developed a widely used classification that divides resorptions into internal (replacement and inflammatory) and external (superficial, replacement, and inflammatory) types (9). Resorption occurs in two phases: first, the breakdown of the inorganic mineral structure, followed by the disruption of the organic matrix. Internal inflammatory resorption is characterized by the gradual loss of dentin, while root canal replacement resorption involves the deposition of hard tissue resembling bone or cementum, but not dentin. Internal inflammatory resorption can be classified as either perforating or non-perforating root resorption (10).

Research on extensive post-traumatic dental resorption has highlighted the importance of 3D CBCT in assessing resorption, particularly in cases involving large apical periodontitis similar to our case report (11). Resorption can occur on either the internal or external surface of the tooth, but distinguishing between the two can be challenging with conventional radiography.

Since traditional radiographs provide only a twodimensional view, they are limited in accurately assessing the type and location of resorption (12). Cone beam computed tomography (CBCT) provides images allowing three-dimensional visualization of dental structures and thus providing more accurate comprehension of teeth structure and its environement (13). In the present case report, the conditions of replantation of the tooth were not precised. Given the external cervical resorption, we think that the tooth was picked up by the root and that no appropriate storage medium was reported. Indeed to the extra-oral time, the presence of a necrotic pulp and the absence of an adequate root canal treatment, were at the origin of the external inflammatory resorption and the periapical lesion. The duration of the resorptive process (8 years) and the slight metallic tone was in favor of a replacement resorption. We conclude that the tooth presented a combination of two types of resorptions: an inflammatory and a replacement replacement.

Actualités Tunisiennes

CONCLUSION

The treatment of dental resorption following dental trauma is challenging both for the practitioner and the patient. Information gathered from accurate clinical and radiological investigations will guide the practitioner to take the most appropriate decision.

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Conflict of Interest

None

Informed Consent

Informed consent was obtained from the patient.

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d'Odontologie

>>> ARTICLES SCIENTIFIQUES



Fragment re-attachment for uncomplicated coronal tooth fracture : a case report

Ré-attachement du fragment dentaire après une fracture coronaire sans complication : à propos d'un cas clinique

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Abstract

The reattachment of the fractured tooth is a conservative and inexpensive treatement that is quick, offers immediate relief and a positive psychological reaction because it gives better aesthetics, while conserving the tooth structure. Additionally, it restores the function when the restored tooth receives shear forces and in terms of resistance to fracture

Aim : This article aims to demonstrate the fragment re-attachment in the management of a fractured tooth, emphasizing the clinical procedure, material choices, and outcomes.

Observation : A 42-year-old male presented with a fractured maxillary central incisor following a facial trauma. The tooth was fractured inclunding enamel and dentin without pulp exposure, with the fragment being largely intact. Clinical and radiographic evaluations confirmed the vitality of the tooth and the absence of significant pulpal or periodontal damage.

Discussion : This case highlights fragment reattachment as an effective, conservative treatment for fractured anterior teeth when the fragment is intact and the fracture level is favorable. Key factors influencing long-term success include the technique, material used, fragment rehydration, and the use of intermediate materials

Conclusion : As demonstrated in this case, fragment reattachment is an effective treatment modality that preserves tooth structure and aesthetic restoration.

Key words : tooth fragment reattachment, dental injuries, uncomplicated coronal tooth fracture, adhesif bonding materials

Résumé

Le ré-attachement du fragment d'une dent fracturée est un traitement conservateur et peu coûteux qui est rapide, offre un soulagement immédiat et provoque une réaction psychologique positive grâce à une meilleure esthétique, tout en préservant la structure dentaire. De plus, ce traitement rétablit la fonction de la dent restaurée lorsqu'elle est soumise à des forces de cisaillement et améliore la résistance à la fracture.

Objectif : Cet article vise à démontrer l'utilisation du ré-attachement de fragment dans la prise en charge d'une dent fracturée, en insistant sur la procédure clinique, les choix de matériaux et les résultats.

Observation : Un homme de 42 ans s'est présenté avec une fracture de l'incisive centrale maxillaire à la suite d'un traumatisme facial. La fracture est amélo-dentinaire, sans exposition pulpaire, et le fragment était intact. Les évaluations cliniques et radiographiques ont confirmé la vitalité de la dent et l'absence de dommages pulpaires ou parodontaux importants.

Discussion : Ce cas met en évidence la réattache de fragment comme un traitement conservateur efficace pour les dents antérieures fracturées lorsque le fragment est intact et que le niveau de fracture est favorable. Les facteurs clés influençant le succès à long terme incluent la technique, les matériaux utilisés, la réhydratation du fragment et l'utilisation de matériaux intermédiaires.

Conclusion : Comme démontré dans ce cas, la réattache de fragment est une méthode de traitement efficace qui préserve la structure de la dent et restaure son esthétique.

Mots clés : Réattache de fragment dentaire, traumatismes dentaires, fracture coronaire non compliquée, matériaux adhésifs de collage

INTRODUCTION

Dental trauma frequently results in coronal fractures of the front teeth. In order to restore, two main procedures are offered, either resin composite stratification or reattachment of the fractured piece to the tooth.

In fact, the reattachment of the fractured tooth is a conservative and inexpensive treatement that is quick, offers immediate relief and a positive psychological reaction because it gives better aesthetics,while conserving the tooth structure [1]. Additionally, it restores the function when the restored tooth receives shear forces and in terms of resistance to fracture.

However, The following are some factors that affect how coronal tooth fractures are treated : The level of the fracture (the level of the dental fracture relative to the superficial and deep periodontal tissues), the integrity of the fragment and its suitability for usage (fit between fragment and the remaining tooth structure), the tooth's fracture pattern and ability to be repaired (biological width, endodontic involvement, alveolar bone fracture) and occlusion.

This article aims to demonstrate the fragment reattachment in the management of a fractured tooth, emphasizing the clinical procedure, material choices, and outcomes.

OBSERVATION

A 42 years old patient presented at the dental medicine departement of Sahloul hospital after a facial trauma. The accident happened 6 days before the patient's visit.

At the first consultation, the clinical examination revealed swelling of the lower lip and ulceration of its inner side. Also, an enamel-dentinal fracture without pulpal exposure on right central maxillary incisor tooth (#11) with the fracture line running obliquely from the incisor third of the tooth from labial to palatal aspect (class II according to Ellis and Davey's classification) [2] (fig.1, fig.2).





Vol 14 - Nº 1 & 2 - Décembre 2024

Figure 2 Pre-operative photography showing the palatal view of the tooth"

The tooth fragment was available and intact (fig.3). Thus it was kept in milk. The course of action during this session was to temporary obturate the tooth by glass ionomer cement and to postpone the fragment reattachment in order to wait till the inflammation on the lips and the gingiva decreases.



Figure 3 The tooth fragment

Before the reattachment procedure, cleaning of the surface of the teeth (#11-#21-#12) was performed and then we proceeded as follows : We started by isolating the tooth using a rubber dam and a sectional matrix band (fig4) then a dentinal groove preparation was performed on both the fragment and the tooth using a tungsten carbide bur mounted on a turbine. This created on the fragment a groove 1 mm deep, sacrificing dentin and leaving 1 mm of enamel on the sides. On the tooth, the groove was made in the enamel to avoid pulp exposure [2,3] (fig 5, fig 6).



Figure 4 Isolation of the tooth

Figure 1

Pre-operative photography tooth sealed with glass ionomer cement'



Figure 5 Preparation of the fragment dentinal groove



Figure 6 Preparation of the tooth dentinal groove

After that both the tooth and the fragments' margins were spot etched with 37% phosphoric acid for 15seconds on the dentin and 30 seconds on the enamel which was rinced and then dried. The bonding agent used is Meta P & Bond, a 5th generation product from META BIOMED, was applied and light cured for 20 seconds. A thin layer of flowable composite Nexcomp Flowable from META BIOMED was placed on both margins and we located the coaptation line, at which position we photopolymerized the composite resin after removing the excess material.

Finally the occlusion was checked using articulating paper (fig 7)

The re-attached fragment demonstrated satisfactory esthetic and functional results. (fig 8)







Figure 8 Final result

DISCUSSION

Reattaching a fractured tooth has become a widely accepted treatment method that consistently yields excellent outcomes.

Initially, the decision to proceed with fragment reattachment as the preferred treatment was based on the level of fracture that is supragingival within the middle third of the tooth, as well as the availability and integrity of the fragment

Furthermore, several factors have been identified as influencing the long-term success of fragment reattachment, including the rehydration of the fragment prior to reattachment, the technique used plus the material chosen and the presence or absence of an intermediate material 2,3

In fact, It has been demonstrated that the bond strength between the fragment and the tooth is impacted by how the fragment is stored before being reattached. If it was kept dry the bond strength is diminished. The authors advise preserving the fragment in hydrated media before reattaching it if it is kept in a dry environment 2,3

In fact, a range of storage media, including dry storage, fresh tender coconut water, Hanks' Balanced Salt Solution, milk, and propolis are mentionned for keeping the fragment2,3

According to Hegde and Kale in 2017, fragments kept in milk show the best fracture resistance. On top of that milk is easily available with an inexpensive cost, making it the top choice for this case.2,3

Since its initial documentation in 1964, numerous modifications to the tooth reattachment procedure have been suggested. While there isn't a definitive agreement on the single best technique, certain methods do offer notable advantages over others 2,3. (table 1 2,3,4)

The advancement of adhesive materials has created new possibilities for the matter that is now possible to achieve satisfying results when reattaching a broken tooth fragment 4.



Inc	lications	Type of preparation	Technique	Advantages	Disadvanatges
L	ess cervial level of fracture	Simple reattachment	-No additional preparation is used. -A straightforward approach utilized when the tooth and fragment adapt together without intersegment interference and none of the occlusal impact points coincide with the fracture line	-According to Srilatha et al this procedure recovers fracture strength by nearly 36.6% compared to a sound tooth - Non invasive with the benefit of greater aesthetics,	
		Internal dentinal groove	-Made in the fractured fragment and in the fractured tooth using a tungsten carbide bur mounted on a turbine. -The dimensions are 1 mm in depth and 1 mm in width	-Shows more fracture resistance due to the groove, which provides more fracture strength and a greater adhesion area. -In comparison to a sound tooth, it can regain fracture strength by 89.2%. Due to these advantages, we chose to employ this technique in the treatment of this case.	
		V-shaped internal enamel groove	Both the tooth and the fragment have their labial enamel prepared with a V-shaped notch internal bevel, keeping their outer enamel surface intact	According to a study by Reis et al it increases the bond strength by 60% when compared to a straightforward reattachment procedure	Less
	Adapted Fragment	Enamel beveling	-Put forth by Simonsen in 1979. -This entails a 45° bevel preparation circumferentially on the fragment's enamel margin as well as on the tooth	This technique is claimed to improve fragment retention by altering the orientation of enamel prisms through enamel beveling and achieving a more effective acid etching pattern (Simonsen, 1979; Bagheri & Denehy, 1983). It also improves short-term esthetics by concealing the fracture line beneath a layer of composite (Fahl, Denehy & Jackson, 1995; Fahl, 1997).	conservative approach
		Vertical groove	-Two vertical grooves, each 2 mm deep and wide, are created on the tooth's labial surface after reattachment. -They accommodate fiber-reinforced composites placed extra-coronally to enhance fragment retention	Karre et al. achieved a 62% fracture strength recovery in proportion to a sound tooth	
		Pinholes	-Two bilateral pinholes, 1.5 mm in width and depth, made inside the dentin fragment, 1 mm from the dentin-enamel junction. -The pinholes are connected together by a shallow dentinal groove	Beltagy reported that the pinhole technique showed the highest fragment strength as compared to the other techniques used	May be the cause of crown crack
	Non Adapted Fragment	Overcontour	After bonding the fragment, a 0.3- mm deep preparation is made on the buccal surface with a cylindrcal diamond bur, extending 2.5 mm coronally and apically from the fracture line. This area is then covered with a thin layer of composite	This technique is useful when the fracture line is still evident after reattachment	-long term aesthetic may diminsh due to discoloration and abrasion of the resin exposed to the oral environment
More cervical level of fracture		External chamfer	After the reattachment process, the charmfer is created along the fracture line particularly if the area integrating into the fracture line is still visible after a week.		(Peumans & others, 1997 ; Andreassen & others, 1995).

CONCLUSION

Advancements in adhesive technology have enabled clinicians to employ less invasive techniques in their practice. Fragment reattachment, a relatively straightforward method for reattaching fractured teeth, has seen several proposed modifications to the preparation process on the fragment and the tooth6. While no treatment can fully restore a tooth's fracture resistance to its original, healthy state, selecting the appropriate technique and adhesive material can achieve satisfactory results in both aesthetics and retention.7,8

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>>> ARTICLES SCIENTIFIQUES



Guided bone regeneration in the anterior maxilla following trauma utilizing tenting screws. Case Report

Régénération osseuse guidée post traumatique dans le maxillaire antérieur utilisant des vis d'ostéosynthèse (à propos d'un cas clinique)

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Abstract

Following tooth loss, the alveolar ridge undergoes significant dimensional changes, compromising dental implant placement. Guided Bone Regeneration (GBR) is a technique used to reconstruct alveolar bone, but it faces challenges such as membrane collapse. The "Tent-Pole" Grafting Technique, using titanium screws to support the membrane, prevents collapse and promotes stable bone regeneration.

A clinical case involving a 23-year-old female with severe dental trauma and insufficient bone volume was successfully treated using this technique. The procedure included the extraction of compromised teeth, placement of titanium screws, and the use of autogenous and xenograft materials. The results showed successful bone regeneration with no complications.

The technique offers advantages such as reduced surgical time, minimal morbidity, and effective space maintenance. However, limitations include soft tissue concerns, such as the potential for screw exposure and graft contamination, especially in cases with thin gingival biotypes. The "Tent-Pole" Technique is a viable alternative to traditional GBR methods, offering predictable results and minimal adverse effects. It facilitates effective augmentation of the alveolar ridge, supporting successful implant placement. The method is cost-effective and prevents graft migration, making it a valuable option in implant dentistry.

Overall, the "Tent-Pole" Grafting Technique is a promising approach for addressing insufficient bone volume in implant dentistry. <u>Key words</u> : Implantology, Tenting screws, Guided bone regeneration, aesthetic region

Résumé

Suite à la perte dentaire, la crête alvéolaire subit des changements dimensionnels significatifs, compromettant le placement des implants dentaires. La Régénération Guidée de l'Os (RGO) est une technique utilisée pour reconstruire l'os alvéolaire, mais elle rencontre des défis tels que l'effondrement de l'espace de régénération. La « Tent-Pole » technique, utilisant des vis en titane pour soutenir la membrane, prévient cet effondrement et promet une régénération osseuse stable.

Une patiente de 23 ans ayant subi un traumatisme dentaire sévère et une insuffisance de volume osseux a été traitée avec succès en utilisant cette technique. La procédure chirurgicale a inclus l'extraction des dents compromises, la pose de vis en titane et l'utilisation de matériaux autogènes et xénogènes. Les résultats ont montré une régénération osseuse réussie sans complications.

La technique offre plusieurs avantages, tels qu'une réduction du temps chirurgical, une morbidité minimale et un maintien efficace de l'espace. Cependant, des limites incluent des préoccupations relatives aux tissus mous, telles que le risque d'exposition des vis et de contamination du greffon, particulièrement dans les cas de phenotypes gingivaux fins. La « Tent-Pole » technique est une alternative viable aux méthodes traditionnelles de la ROG, offrant des résultats prévisibles et des complications minimes. Elle facilite la reconstruction de la crête alvéolaire, favorisant ainsi la réussite de la phase implantaire. La méthode est rentable et prévient la migration du greffon, ce qui en fait une option précieuse en implantologie dentaire.

Globalement, la technique de greffe « Tent-Pole » est une approche prometteuse pour résoudre le problème du volume osseux insuffisant en implantologie dentaire.

Mots clés: Implantologie, Vis d'ostéosynthèse, Régénération osseuse guidée, Secteur esthétique.

Actualités Tunisiennes 15 d'Odontologie

INTRODUCTION

Following tooth loss, the healing process of the alveolar ridge involves dimensional changes in both soft and hard tissues, which can potentially compromise the optimal positioning of dental implants. These changes are primarily observed during the initial three months post-extraction (1) and are particularly noticeable on the buccal side of the ridge. After six months, a loss of 29 to 63% in width and 11 to 22% in height can be anticipated (2)(3). Despite the existence and extensive investigation of ridge preservation procedures aimed at minimizing these dimensional changes, they are unable to completely prevent alveolar ridge remodeling (4). To address this issue, Guided Bone Regeneration (GBR) is a widely employed regenerative technique for reconstructing alveolar bone. GBR has demonstrated good predictability and high survival rates for implants placed after augmentation, making it a reliable method for enhancing bone volume and facilitating successful implant placement (5). The biological principle of Guided Bone Regeneration (GBR) involves the use of a membrane as a physiological barrier to safeguard the blood clot beneath, ensuring healing with minimal interference from connective and epithelial cell ingrowth (6). The success of GBR also relies on maintaining space to facilitate blood clot formation and the colonization of osteoprogenitor cells (7)(8).

Despite the advancements achieved with granulated biomaterials, preventing particle displacement during flap management and suturing remains a challenge (9). To address this issue, Tenting screws have been proposed as a supplementary device for GBR in various case reports, case series, and a retrospective cohort study (8). These studies indicate that tenting screws can help prevent membrane collapse, protect the augmented site from mechanical stress, and promote the stability of the underlying bone or bone substitute material.

Vol 14 - Nº 1 & 2 - Décembre 2024

CLINICAL OBSERVATION

A 23 years old female, with no significant general medical history, who was a victim of a road traffic accident, presented to the dental medicine department of Sahloul Hospital for the replacement of her lost teeth.

Clinical and radiological examinations revealed that both maxillary central incisors were avulsed, the lateral incisors were fractured, the canines were ectopic, and the premolars were rotated (Figure 1A).

The patient was referred to an orthodontist to explore the possibility of aligning the canines and premolars, but declined any orthodontic treatment.

As the patient agreed to teeth replacement with implant retained prosthesis, a panoramic radiograph and cone beam computed tomography (CBCT) scan were requested for the patient and showed that implant placement in correct three-dimensional positions was almost impossible (Figure 1B,1C,1D). Furthermore, they revealed that the right maxillary first premolar presented an apical root fracture (Figure 1E) and the right maxillary canine was ectopically positioned, lying outside its normal bony envelope (Figure 1F).



Figure 1

Clinical Observation A:Clinical intra oral view B: Right lateral incisor site C: Left central incisor site D: Left lateral incisor site E: Right maxillary first premolar F: Right maxillary canine

Vol 14 - Nº 1 & 2 - Décembre 2024

Bone reconstruction in a staged manner, extraction of both the premolar and canine and implant placement after healing period were thoroughly explained.

The time required to complete the treatment with the costs involved was agreed in consent the patient.

The surgical procedure was performed under local anesthesia using 2% medicaine with 1:100,000 epinephrine. A full-thickness mucoperiosteal flap was raised in the anterior maxilla, with bilateral releasing incisions made one tooth away from the bone canines. All remaining soft tissue was then removed from the underlying bone. Fractured lateral incisor, right premolar, and left canine were extracted atraumatically using periotomes to minimize postextraction resorption (Fig 2A).

Titanium thin screws (1.5 mm × 6 mm,8mm, BT SCREW, BTK) were screwed vertically and other screws(2 mm × 6 mm, BT SCREW, BTK) horizontally. Approximately 3-4 mm of screw threads were left exposed (Fig 2B). Autogenous particulate bone was harvested from the patient's maxilla by Auto Bone Collector (Osstem®) and was mixed with xenograft particules (Ubgen RE-BONE®) to cover the defect site. The overcorrection with graft material was done in anticipation of future resorption (Fig 2C). Two resorbable membranes (OssMem Hard®) were placed over the grafts without tacks (Fig 2D). Passive primary closure with judicious releasing incisions at the level of the mucogingival junction where both the vertical incision ended made the flap completely passive, which covered the entire graft. The sutures were given horizontally (mattress) 5 mm from the incision line (Fig 2E) and interrupted in between them with 5-0 sutures (Novocyne ®) sutures (Fig 2F). Sutures were removed after ten days, and the use of dentures was prohibited until at least one month. The results after 6 month showed a successful bone regeneration with no complications (Fig 2G,2H,2I).



Surgical procedure



DISCUSSION

Guided Bone Regeneration (GBR) leverages the physiological principle that cells from native bone will grow into a maintained space and form new bone. GBR has revolutionized implant dentistry, particularly in cases where implants are placed using a delayed approach due to insufficient bone volume. The objective of GBR is localized ridge augmentation with new bone formation, facilitating future prosthetically-directed implant placement.(10)

The primary factor for successful Guided Bone Regeneration (GBR) is maintaining space over the residual bone. As most membranes lack the rigidity to prevent collapse, support must be provided beneath the barrier membrane. An appropriate supporting device is necessary when the buccal wall is compromised (11).

The success of this case report suggests that, in cases when the buccal wall is compromised, the Screw "Tent-Pole" Grafting Technique, combined with Guided Bone Regeneration (GBR), can be an alternative to on-lay block grafts. This method involves inserting titanium screws into the grafting site to maintain sufficient space under the membrane for bone regeneration and prevent its collapse. By offering mechanical support, these screws act as "tent poles" for the surrounding bio-oss graft, keeping the soft tissue from invading the graft area.

To repair severe hard tissue defects, auto-genous block grafts has long been considered the gold standard. It can improve bone quality, ensure the initial stability and the right tri-dimensional insertion location(12)(13). Furthermore, the histological outcomes, including revascularization and bone remodeling, of the block grafts techniques is effective (14). However, autogenous block graft produces high risk in post-surgical complications in both donor and receptor sites(15). Meanwhile, the resorption of the auto-genous block grafts is unpredictable. Its resorption rate can range from 0 to 60% (16). Cordaro showed that to minimize graft resorption during healing, the use of bone substitutes and barrier membranes around and over a mandibular bone block graft is essential(17). Also, its limited availability affects its use.

On the contrary, the Screw "Tent-Pole" Grafting offers several advantages, including reduced time and ease of screw placement, minimal morbidity, a single surgical site, and effective space maintenance for GBR materials. At the same time, the bone gain from the Screw "Tent-Pole" Grafting Technique is promising. As for the patient, the surgical risk is prominently reduced with little chance of post-surgical sequellae or complications, such as severe pain and swelling, infection or exposure of block graft.

Vol 14 - Nº 1 & 2 - Décembre 2024

Since the membrane plays a key role and acts as a physical barrier, there are a wide range of bioresorbable and non-resorbable membrane materials; these include polytetrafluoroethylene (PTFE), high-density polytetrafluoroethylene (dPTFE), expanded PTFE (ePTFE), titanium mesh membranes, collagen, polylactic acid, polyglycolic acid, and their copolymers.

To preserve and maintain the space under the membrane and prevent its collapse, positioning bone graft materials under the membrane can provide mechanical support (18). Bone graft materials including auto-grafts, allografts, xenografts and alloplasts are widely used in clinical trials. Compared to auto-genous bone, allografts are readily available and free from a second surgery. The tent pole technique, when utilized alongside resorbable collagen membranes and screws, presents a reliable method characterized by straightforward manipulation and a reduced incidence of complications. This technique is particularly advantageous for bone regeneration, offering predictable outcomes in clinical settings. Studies indicate that the integration of these elements facilitates effective augmentation of the alveolar ridge, ultimately supporting successful implant placement with minimal adverse effects (19).

The method is crucial for promoting bone growth and minimizing the resorption of graft material. This effectiveness can be attributed to the observation that bone formation extends to the heads of the screws, or even completely covers them (20). It is always advisable to overdraft the desired horizontal gain in a way above the screw head to compensate for the resorption of grafting materials. The sizes of the screws were 1.5 mm and 2mm in diameter and 6/8 mm in length and had smooth surfaces, thus no osseointegration. They were also placed at an incline on the exposed ridges, not in perpendicular to have an ideal ridge shape.

Deeb et al. made a comparison of different horizontal bone ridge augmentation techniques for three-dimensional implant placements (21).

The study examined three methods for ridge augmentation: tent pole-assisted bone regeneration, tunnel technique, and open ridge augmentation. Results indicated that the use

d'Odontologie Vol 14 - N° 1 & 2 - Décembre 2024

of E-PTFE/D-PTFE membranes was associated with complications and insufficient bone growth, leading to issues such as wound dehiscence, membrane exposure, graft loss, and the necessity for secondary surgeries. The authors noted that the tent pole technique presented several advantages, including reduced exposure due to the frequent use of resorbable membranes, which in turn led to fewer wound complications, fewer postoperative visits, earlier implant placement, and a decreased requirement for antibiotics compared to titaniumreinforced membranes.

Additional benefits of tenting screws include costeffectiveness and prevention of graft migration, particularly in cases where the ridge to be augmented is flat. In a randomized controlled trial by Alessandro Cucchi et al, it was emphasized that early exposure or infection (within four weeks) significantly increases the risk of failure in bone regeneration compared to late complications (22).

The exposure of the membrane is minimal, as it does not adversely affect the newly formed bone. Merli et al. reported favorable outcomes for both horizontal and vertical bone regeneration using resorbable and non-resorbable membranes (23). However, complications were associated with them.

The documentation for the use of tenting screws is still scarcely reported. There exists only one retrospective comparative cohort study evaluating the influence of tenting screws associated with GBR using collagen membranes. This apporach was compared to a tunnel technique and GBR with PTFE membranes for horizontal ridge augmentation. Authors reported a higher frequency of implant placement after grafting with tenting screws, a lower rate of membrane exposure, graft loss and the need for postoperative visits (21).

Limitations of TST and GBR are associated primarily with soft tissue concerns. Gingiva with a thin biotype, under tension to obtain primary closure, has the potential for tenting screw exposure and graft contamination during the healing period.

The soft tissue maintenance concept for the case presented was confirmed by clinical bone sounding at the time of flap reflection and uncovering of the tenting screws (24). It was revealed that the bone graft material maintained at the approximate level of the screw heads and the soft tissue contour followed the underlying bony architecture.

The surgical complications reported in the analyzed articles were rare. Mucosal reopenings are observed, leading to membrane exposure. However, these minor complications are often treated within a few weeks using chlorhexidine mouth rinses. If the wound remains open for too long, partial or complete loss of the graft due to infection may occur. It would be beneficial to compile all cases of graft failure in order to attempt to determine the various possible causes of these failures. Potential factors mentioned include tobacco use or the wearing of a prosthesis too close to the graft, but the small sample size of patients in the studies does not allow for definitive conclusions.

CONCLUSION

The clinical outcomes from this case indicate that the Tent Pole Technique (TST) for implant site development can effectively enhance severely deficient ridges and extraction sites. This approach can successfully increase alveolar dimensions while offering the benefits of limiting the surgical intervention to a single site and reducing morbidity. It is advisable for clinicians to incorporate tenting screws into their toolkit for extractions and ridge augmentations when optimal three-dimensional bone reconstruction is sought. However, more extensive and long-term clinical evaluations are required to confirm the positive effect of screw "tent-pole" grafting technique.

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Vol 14 - Nº 1 & 2 - Décembre 2024

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d'Odontologie

>>> ARTICLES SCIENTIFIQUES



Drafting an Initial Medical Certificate of a Clinical Case of Dental Trauma

Rédaction d'un Certificat Médical Initial d'un Cas Clinique de Traumatisme Dentaire

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Résumé

Le certificat médical initial (CMI) est un document crucial dans le domaine de la santé, essentiel pour la prise en charge des patients, la documentation légale et les processus d'indemnisation.

Objectif : Cet article examine le processus de rédaction d'un CMI, en se concentrant sur un cas clinique impliquant un traumatisme dentaire chez une jeune femme. Il vise à mettre en lumière les défis rencontrés et les considérations éthiques liées à l'élaboration de tels certificats.

Observation : Cet article analyse un cas clinique spécifique d'une jeune patiente de 25 ans qui a consulté suite à un traumatisme ayant entraîné l'avulsion de trois dents, et pour qui une consultation détaillée a été réalisée afin de délivrer un CMI, comme elle en a fait la demande.

Discussion : Le CMI est délivré après une consultation médicale pour documenter l'état de notre patiente et affirmer ses droits. Il a été rédigé de manière claire et rapide, en évitant le jargon médical. Il décrit les blessures en détail et évalue l'incapacité temporaire totale (ITT) en fonction de l'impact et de l'évolution probable des blessures. En tant que médecins, nous devons éviter les préjugés et les pressions, tout en respectant la confidentialité et en obtenant le consentement éclairé. Aborder ces questions améliore la qualité des CMI et soutient une prise en charge équitable des patients.

Conclusion : Les principaux défis dans la rédaction des certificats médicaux initiaux résident dans l'assurance d'une documentation précise des blessures, une évaluation rigoureuse de l'ITT et la gestion des pressions externes.

Key words : Certificat médical initial, Documentation médico-légale, Évaluation de l'incapacité temporaire, Traumatisme dentaire

Abstract

The initial medical certificate (IMC) is a crucial document in healthcare, essential for patient management, legal documentation, and compensation processes.

Aim: This article investigates the process of drafting an IMC, focusing on a clinical case involving dental trauma of a young woman. It aims to highlight the challenges faced and the ethical considerations involved in creating such certificates.

Observation: This article analyses a specific clinical case of a young patient aged 25 years old who sought consultation following a trauma that resulted in the avulsion of three teeth and for whom a detailed consultation was conducted in order to issue IMC following her request.

Discussion: The IMC is issued after a medical consultation to document our patient's condition and assert her rights. It was prepared promptly and clearly, avoiding medical jargon. It described injuries in detail and assessed total temporary incapacity (TTI), based on the impact and likely progression of the injuries. We, as physicians, must avoid bias and pressure while maintaining confidentiality and obtaining informed consent. Addressing these issues enhances the quality of IMCs and supports fair patient care.

Conclusion: Key challenges in drafting initial medical certificates involve ensuring accurate documentation of injuries, precise assessment of TTI, and addressing external pressures.

 $Keywords: \ \ \ Initial \ medical \ certificate, Medico-Legal \ \ Documentation, Temporary \ \ Incapacity \ \ Assessment, Dental \ \ Trauma$

INTRODUCTION

In dental trauma cases, the Initial Medical Certificate (IMC) is a critical document that provides a formal record of the injuries sustained and plays a key role in subsequent medical and legal processes1. As the first official documentation following an incident, the IMC is essential for capturing a detailed and accurate account of the patient's condition. It not only validates the extent of dental injuries but also supports the management of the patient's care and any related claims or legal matters2.

Creating an IMC for dental trauma presents unique challenges, including the need to accurately describe a range of injuries from minor abrasions to severe damage to dental structures1. The process requires careful attention to detail, objectivity, and adherence to both medical and legal standards.

This article explores the complexities involved in drafting IMCs within the context of dental trauma, focusing on best practices for documentation, ethical considerations, and the impact of precise reporting on patient care and legal outcomes.

OBSERVATION

A 25-year-old female patient in good general condition was referred to the dental medicine department at Sahloul University Hospital with a referral letter from the emergency department due to maxillofacial trauma caused by blows to her entire body, which occurred one day prior.

On extraoral examination, there is noted an open wound on the nose, edema around the upper and lower lips, and a bluish discoloration under the lower eyelid. A labial wound that has been sutured previousely at the emergency departement.(fig1)



Figure 1 Extraoral image

On intraoral examination, there is total avulsion of the upper right central incisor and the upper left central and lateral incisors (11, 12, and 22) ; physiological mobility of the upper right and left canines and the upper right lateral incisor (13, 12, and 23). Additionally, a periodontal pocket of 5 mm is noted on a mesial point of tooth 23. Palpation to check for alveolar fracture was not possible on the first day of consultation due to intense pain (fig.2).

Vol 14 - Nº 1 & 2 - Décembre 2024



Periapical radiographs (dental radio visio graphy (RVG)) were performed to examine the sites of the missing teeth, as well as labial radiographs. In fact, the X-rays were very difficult to perform due to the pain and swelling, which has resulted in their poor quality. However, they helped us determine that the sockets were completely vacant confirming the total avulsion of the three teeth (the 11,12 and 22) and that there were no dental fragments present at the lips.

A panoramic radiograph was requested to confirm the diagnosis.

The patient was already on antibiotics (amoxicillin 1000mg and clavulanic acid 125 mg twice daily for 07 days) and nonsteroidal anti-inflammatory drugs (NSAIDs: 400 mg three times a day for 5 days). Therefore, a liquid diet was recommended, and a follow-up appointment was scheduled. She was also referred to the psychiatric department with a referral letter due to the psychological trauma from the assault.

Three days later, the patient brought the panoramic radiograph and consulted for the continuation of investigations. The incisor-canine region was not clear on the radiograph.

However, palpation is now possible due to the regression of symptoms, which reveals a collapse of the buccal cortical bone in the area of the displaced teeth. For confirmation, a cone beam computed tomography (CBCT) was requested. A fracture of the buccal cortical plate and a slight displacement were confirmed by the CBCT that the patient provided on the same day. (fig.3)

Actualités Tunisiennes 22 d'Odontologie

Vol 14 - Nº 1 & 2 - Décembre 2024



Figure 3 CBCT

The decision was to perform a debridement flap and, if possible, a reduction of the cortical plate. Flap access from the canine to the lateral incisor without debridement. After detachment, it turned out that the entire vestibular table was fragmented (fig.4).



Figure 4 Fragmented vestibular table

Some fragments were detached with the flap and some were removed with dental tweezers (fig.5).



Figure 5 Removed fragmented bone

Only one fragment of the table near the site of the 21, slightly mobile, was decided to be retained. On the mucosal level, the laceration of the gum made edge capture difficult, hence the use of PRF (Platelet-Rich Fibrin) (fig.6) and an upper labial frenectomy (fig.7).



Figure 6 PRF



Figure 7 Frenectomy

Following the surgical procedure, additional antibiotics (amoxicillin 1000mg and clavulanic acid 125 mg twice daily for 07 days), Unidex Fort (08 mg) for 3 days, analgesics (1 g every 4 to 6 hours as needed for 5 days) , and mouthwash were prescribed. An apposition graft is planned.

The patient wants to file a complaint against the individual who assaulted her and requests an initial medical certificate for this purpose.

Here is the text of the issued IMC:

Actualités Tunisiennes 23 d'O

d'Odontologie

Sousse, August 6, 2024

Initial Medical Certificate

I, Dr. Kikly Amira, hereby certify that on 02/08/2024, I examined patient "X," a 25-year-old in generally good health, who reported being the victim of an assault involving blows from a third party. The incident occurred on 01/08/2024 at 10:00 PM.

The patient consulted the emergency department of Sahloul Sousse Hospital the following day. A referral letter for further management at the dental medicine service was sent to us. The patient consulted us on the same day (02/08/2024).

The extraoral clinical examination revealed: an open wound on the nose, edema around the upper and lower lips, a bluish discoloration under the lower eyelid, and a labial wound that had been sutured in the emergency department.

The intraoral clinical examination revealed: total avulsion of the upper right central incisor and the upper left central and lateral incisors, with vacant sockets and painful palpation of the vestibular ridge at these sites. The periapical and panoramic radiographs confirmed the absence of these three teeth. The emergency procedure involved exploratory surgery, which revealed nearly complete fragmentation of the vestibular cortical bone at the site of the missing teeth. A removable partial denture to replace the lost teeth will be necessary before considering implant options, possibly following bone grafting in the best-case scenario. The described initial injuries may lead to permanent and partial disability.

This certificate is issued to the requesting authority upon requisition no. 1000 dated 01/08/2024.

DISCUSSION

What is an initial medical certificate and what is it used for?

The Initial Medical Certificate (IMC) is the first document issued to an injured person, or their legal representative, following the very first medical consultation or after an accident or assault, so that they can assert their rights1. It establishes a pathological condition immediately following the events that caused harm. It must be drafted promptly in a clear, rigorous, methodical manner and without medical jargon1. Indeed, the IMC is intended to be reviewed by individuals who are neither doctors nor dentists. It is a medico-legal act2 and it is essential to uphold the rights of the victim of an accident or an assault3.

Who can legally issue an initial medical certificate (IMC)?

Only holders of a Doctor of Medicine or Doctor of Dental Medicine degree can legally issue an initial medical certificate (IMC)4.

"Residents who are not doctors in medicine are authorized to issue medical certificates other than IMCs", as specified in Article 10 of Decree No. 93-1440 of June 23, 1993, concerning specialization in medicine and the legal status of residents.4,12 In the clinical case the professor overseeing the patient with me, who is a licensed dental doctor, issued it.

What information should be included in an initial medical certificate?

The information we included when drafting the IMC are as follows: "the identity of the physician and their handwritten signature", "the precise identity of the patient", "the date of the trauma", "the date of the examination", "the date of the certificate's issuance", "'the intraoral and extraoral examinations,' 'the operative report of emergency care provided,' and 'the radiographic examinations'. This is in line with the recommendations of the French High Authority for Health (HAS)5. Indeed, it is recommended to include dated and identified diagrams and photographs with the IMC, provided that the victim's consent is obtained and a copy of these photos is retained5. For the identification of traumatized teeth, numbers might not be understood since the IMC can be read by individuals outside the medical field6. It is therefore recommended to designate the teeth using both numbers and letters. It should also detail the circumstances that prompted the request for the certificate, the patient's complaints1 that are basically the psychological, aesthetic, and functional harm, and the patient's medical history or prior condition. As mentioned in the issued IMC.

In reality, it has to be descriptive, providing a detailed inventory of the lesions, even minor ones, using appropriate terminology7. It should also specify the locations of the lesions relative to anatomical landmarks, as well as their shape, dimensions, and color5 as described earlier.

It must also include additional examinations and conclusions as hospitalization5 which is not the case here since the patient was referred to us from the emergency department, and we referred her to psychiatry, but she was not hospitalized under any circumstances.

In this case, drafting the report took time due to its complexity. We had to wait for radiological exams, which ultimately proved inconclusive. As a result, we proceeded with a surgical intervention to accurately evaluate the extent of the damage. In deed, issuing an IMC should not be considered an emergency for the issuing physician8. We should take all the time needed to prepare this document, thoroughly examine the victim, review all supplementary examinations, and seek specialized opinions if

Vol 14 - Nº 1 & 2 - Décembre 2024

necessary. However, it must be written as quickly as possible after the traumatic event. The longer the delay, the more uncertain the causal link between the observed injuries and the reported facts becomes.8 Although we don't always have a pre-written IMC document in the majority of public health hospital services, the Circular No. 114 from the Minister of Health, dated December 4, 2008, states that the IMC should be written in triplicate in public healthcare facilities, using forms from a duplicate book according to the model outlined in Circular 72-2000 dated September 11, 2000.9

Total Temporary Incapacity (TTI)

The TTI can be defined as the assessment of the period, expressed in number of days, during which a person, a victim of physical injury, will experience a state of incapacity1. This corresponds to a loss of autonomy in daily activities10 that are in our case the inability to eat normally, speak clearly, properly pronounce words, and thus effectively communicate, as well as any other masticatory functions. However, in other situations, we might find cases where victims lose their autonomy in areas such as personal hygiene, dressing, and mobility. 11

Actually, it is important to remember that the TTI is not a medical concept but a legal one1. It is unrelated to work stoppage as it applies to everyone: children, retirees, homemakers, unemployed individuals, or those out of work.5

Our patient, in the other hand, was granted a 15-day work rest period, which we deemed necessary for symptom relief, site healing, and to benefit from prosthetic rehabilitation in order to resume work. However, this assessment is made from an oral health perspective, separate from the psychological impact.

Challenges Encountered

During the surgical intervention, a nodule was noted on the inner surface of the upper lip, which we feared might be a complication of the trauma. However, according to the patient's statements, it turned out to be merely a complication from the filler injected just before the damage.

Besides, it is important to consider the direction of the impact and the initial condition of the periodontium to identify the main cause of tooth loss. In our case, the trauma was clearly to the face, with significant damage to the nose and facial area. The patient's periodontium was healthy, as confirmed by the panoramic radiograph, the physiological mobility of the remaining teeth, and periodontal probing. While the situation is clear in this case, other scenarios may involve a pre-existing poor periodontal condition that could explain tooth loss.

In such cases, the trauma might only worsen an already existing problem.

One of the main challenges we faced as well in drafting the IMC is ensuring that all relevant information about the injuries is accurately documented. Inadequate or inaccurate documentation can harm the appropriate management of the patient, complicate administrative processes, and potentially affect legal or compensation decisions.11

Also, accurately assessing the duration of work rest is actually complex. This assessment must consider not only the current state of the patient but also the possible progression of the injuries. Incorrect assessment can lead to difficulties for the patient in obtaining adequate coverage for lost income and medical expenses, as well as potential conflicts with employers.

We, as physicians, may face pressures from patients to issue a certificate that favors their personal or financial interests. In fact, yielding to these pressures can compromise the objectivity of the certificate and lead to ethical and legal consequences. Fortunately, this is not the case here, as the damage is evident and we did not face any pressure from the patient, who did only request to file a complaint against the perpetrator.

Clearly we had also to differentiate between allegations and observations13. Allegations are obtained through questioning the patient and include both the patient's history and their account of events , as well as their reported symptoms. These are recorded with phrases like 'according to the patient's statements' or 'as reported by the patient.' Observations, on the other hand, are objective facts collected during the examination of the subject. They must be thorough, detailed, and accurate, and are presented as observed by the practitioner.13

Ethical Considerations

The IMC is drafted while strictly maintaining patient confidentiality. Sensitive information should be protected and only shared with authorized parties. Any breach of confidentiality can undermine the patient's dignity and lead to legal penalties for the healthcare professional.14

We have also to maintain absolute objectivity in

Actualités Tunisiennes 25

d'Odontologie Vol 14 - N° 1 & 2 - Décembre 2024

drafting the IMC, avoiding any bias that could influence the description of the injuries or the assessment of incapacity.

An impartial draft ensures that the certificate is a true representation of the patient's medical condition, which is crucial for justice and fairness, especially in legal contexts.

In fact, the patient should be informed about the nature of the IMC, its intended use, and the possible implications for their rights and obligations. Informed consent must be obtained before the certificate is drafted. Informed consent protects the patient's rights and ensures that the certificate is used transparently and ethically.

By addressing these challenges and ethical considerations, healthcare professionals can improve the quality of initial medical certificates and support a more just and equitable approach to patient care.

CONCLUSION

The drafting of an IMC requires meticulous attention to detail and a comprehensive approach to accurately capture the patient's condition. A precise and complete IMC not only supports effective patient care but also plays a crucial role in legal and administrative contexts. Proper documentation can facilitate appropriate treatment, aid in legal proceedings, and ensure fair compensation for the patient. By adhering to best practices and ethical standards, healthcare professionals can enhance the quality and impact of initial medical certificates, thereby contributing to more equitable and effective healthcare delivery.

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>>> ARTICLES SCIENTIFIQUES



Complications and management of intrusive luxation in mature permanent teeth: a case report

Gestion des complications et la prise charge de l'intrusion dentaire des dents permanentes matures : à propos d'un cas clinique

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Abstract

Introduction: Intrusive luxation is a rare dental injury, comprising 0.3%-1.9% of traumatic injuries in permanent teeth, predominantly affecting children aged 6-12 years. This injury involves the apical displacement of a tooth into the alveolar bone, risking damage to surrounding structures and complicating treatment outcomes. Optimal management is crucial to mitigate long-term complications such as pulpal necrosis and root resorption. Observation: This article presents a case report of permanent anterior teeth with intrusive luxation. The case involves a 10-year-old boy with central incisors intrusion of 4-5 mm, treated through surgical repositioning and endodontic treatment. At follow-up appointments, tooth 21 developed external inflammatory resorption and replacement resorption. Discussion: The outcomes in the case presented underscore the importance of timely intervention, complete repositioning, and effective endodontic treatment. Factors such as the degree of intrusion, root development stage, and concomitant injuries significantly influence prognosis. This highlights the need for tailored treatment strategies and ongoing monitoring to enhance long-term results for intruded teeth.

<u>Key words</u> : dental injury, permanent tooth, intrusive luxation, prognosis, root resorption.

Résumé

Introduction : L'intrusion dentaire est l'un des traumatismes les moins fréquents, représentant 0,3 % à 1,9 % des traumatismes dentaires des dents permanentes, touchant surtout les enfants de 6 à 12 ans. Cette blessure se caractérise par le déplacement apical d'une dent dans l'os alvéolaire, pouvant endommager les structures environnantes et compliquer les résultats thérapeutiques. Une prise en charge optimale est essentielle pour limiter les complications à long terme, telles que la nécrose pulpaire et la résorption radiculaire. Observation clinique : Il s'agit d'un patient âgé de 10 ans consultant suite à un traumatisme bucco-dentaire occasionnant une intrusion des incisives centrales de 4 à 5 mm, traitée par repositionnement chirurgical et traitement endodontique. Lors des suivis, la dent 21 a développé une résorption inflammatoire externe et une résorption de remplacement. Discussion : Les résultats de ce cas soulignent l'importance d'une intervention rapide, d'un repositionnement complet et d'un traitement endodontique adéquat. Des facteurs tels que le degré d'intrusion, le stade de développement radiculaire et les blessures concomitantes influencent le pronostic, mettant en évidence la nécessité de stratégies thérapeutiques adaptées et d'un suivi régulier pour améliorer les résultats à long terme des dents intruses.

Mots clés: traumatisme dentaire, dent permanente, intrusion, pronostic, résorption radiculaire.

INTRODUCTION

Intrusive luxation is a rare type of dental injury, accounting for 0.3%1.9% of all traumatic injuries in the permanent dentition. The incidence is greatest in patients aged 6-12 years. (1,2) Intrusion is defined as the apical displacement of a tooth into the alveolar bone, leading to potential damage to the periodontal ligament, root cementum, neurovascular bundle, and surrounding alveolar bone, which can significantly impact the long-term prognosis of the affected permanent teeth (3). Notably, 97.2% of these cases occur in the anterior maxilla (upper canine-canine region) (2). Due to the rarity of dental intrusion injuries, management protocols are based on limited evidence, and various guidelines exist for treatment (4). Improved outcomes of treatment have correlated with timely and appropriate management (5). However, even with optimal immediate and long-term management, intrusive luxations are associated with a high risk of complications during healing, including pulpal necrosis and calcification, external inflammatory resorption, replacement resorption, gingival retraction, and marginal bone loss (6). Treatment approaches often fail to reliably predict clinical outcomes, likely because injury characteristics, intrusion severity, and root growth stage significantly influence results, making predictions difficult (6).

The present case report describes the management and follow-ups of traumatized permanent intruded anterior teeth with further complications. We will be discussing the factors that influence the tooth's prognosis and the strategies to improve it. Additionally, we will explore how early intervention, tailored treatment planning, and ongoing monitoring can potentially enhance the long-term outcomes for the affected teeth.

OBSERVATION

A 10-year-old boy patient was referred to the Department of dentistry at Sahloul university hospital, with the chief complaint being trauma of the central incisors following a fall at school 24 hours ago.

The general medical, dental, and traumatic incident histories were recorded. There was no systemic disease history. Extraoral examination revealed abrasion on the skin of the chin and a sutured wound on the lower lip. Intraoral examination revealed inflammation and bleeding of the labial gingival of the central incisors, uncomplicated crown fracture of the central incisors with no mobility and percussive metallic sound, indicating intrusion, which is associated with palatal displacement of tooth 21 (Fig.1).



Figure 1 Clinical photographs showing intrusion of tooth 11 and 21 with uncomplicated crown fractures

The fractured fragments have not been recovered. Periapical radiographic examination revealed that teeth #11 and #21 penetrated their alveolar sockets by 4 mm and 5 mm, respectively.

Vol 14 - Nº 1 & 2 - Décembre 2024

Both teeth had complete root formation and no root fracture. (Fig.2) Diagnoses based on these findings confirmed that both teeth had intrusive luxation with uncomplicated crown fracture.



Figure 2 Periapical radiographs suggesting apical displacement of the maxillary central incisors

Treatment and follow-up:

After local anesthesia, the intruded permanent maxillary central incisors were surgically repositioned with extraction forceps and provision of a flexible trauma splint bonded to all maxillary incisors. The reduction of tooth 21 was incomplete due to the lack of compliance of the patient. (Fig.3)



Figure 3 Provision of trauma splint following surgical repositioning of maxillary central incisors

No gross contamination of the wound was evident and thus antibiotic prescription was not administered.

Endodontic treatment of the teeth #11 and# 21 was initiated 2 weeks following trauma. An inter appointment non-setting calcium hydroxide dressing was provided. Five weeks following trauma, the splint was removed. The endodontic treatment was completed after 3 months; with no rubber dam isolation and using a eugenol basedsealer. Two months later, the patient returned for a follow-up appointment. The intraoral examination revealed a sinus tract associated with tooth 21 and a high-pitched metallic sound, suggestive of external replacement root resorption (ERRR), was exhibited on percussion testing. Radiographic examination indicated inadequate endodontic treatment for both teeth, as well as external inflammatory resorption in the apical distal region and replacement resorption in the middle mesial region of tooth 21. (Fig.4)



Figure 4

Periapical radiograph at 4 months following injury showing external inflammatory resorption and replacement resorption of tooth 21

We decided to perform an endodontic retreatment. The treatment was carried out under rubber dam isolation. The root canals were desobturated and thoroughly irrigated with sodium hypochlorite. A calcium hydroxide intracanal medicament was then applied. Four weeks later, the treatment was completed. The final irrigation protocol consisted of 2.5% sodium hypochlorite, distilled water, 17% EDTA, followed by a final rinse with distilled water. Ultrasonic activation of the irrigants was used to enhance disinfection. The root canals were then filled with gutta-percha and sealed with a bioceramicbased sealer. (Fig.5)





The patient was recalled at 5 weeks and 3 months post-endodontic retreatment. Complete healing of the sinus tract was observed, and the periapical radiograph showed no progression or new resorption lesions. (Fig.6)



Figure 6 Periapical radiographs (a) 5 weeks after endodontic retreatment, (b) 3 months after endodontic treatment

DISCUSSION

Intrusive luxation is a type of severe trauma that results in injury to the tooth structure, cells and fibers of periodontal ligament, pulp tissue, and alveolar bone (7). Intrusive luxation is a challenging injury to treat, with a high risk of complications during healing, and there is no clear agreement on the best treatment approach (8). While the survival rate of teeth affected by intrusive luxation is certainly influenced by the severity of the injury, other contributing factors also play a role. These can be categorized into patient-related factors and treatment-related factors.

Injury related factors

The degree of intrusion plays a significant role, with deeper intrusions being associated with more severe periodontal damage and root resorption (RRR, IRR, and surface root resorption) due to greater compression and ischemia of the periodontal ligament (9,10). In this case, intrusion was moderate (3-7 mm). Concomitant injuries, like fractures or lateral luxation, add complexity to healing (11). Here, the left maxillary incisor also sustained an uncomplicated crown fracture and lateral luxation, which raised the risk of pulp necrosis and the need for endodontic treatment. Lateral luxation also complicates repositioning and elevates the risk of pulp necrosis, root resorption, and delayed healing.

Patient-related factors

Root development significantly influences treatment prognosis, as studies show it affects pulp survival. Teeth with complete root formation have a higher risk of pulp necrosis (9,10). In this case, both central incisors had complete root formation. Age also impacts outcomes, with older individuals experiencing more bone loss due to denser bone and lower healing capacity, while younger patients face

d'Odontologie Vol 14 - N° 1 & 2 - Décembre 2024

Vol 14 - Nº 1 & 2 - Décembre 2024

a higher risk of rapid root resorption. In adults, resorption can take up to 20 years, but in children, tooth loss may occur within 3 to 7 years due to resorptive processes (12,13).

Treatment related factors

The most important considerations that may impact the survival rate include the delay between the occurrence of an intrusive injury and tooth repositioning, the mode of repositioning, and the endodontic intervention.

<u>The delay:</u>

The timing of repositioning after an intrusive injury is crucial for prognosis. Andreasen (5) notes that delays in surgical repositioning increase the risk of external root resorption, while Kinirons and Sutcliffe (14) found that teeth repositioned after 24 hours have lower retention rates. In this case, repositioning occurred within 24 hours. Delays can also complicate the procedure due to blood clot formation, making manipulation harder. Here, tooth 21 required more forceful repositioning due to palatal displacement, whereas tooth 11 was repositioned more delicately.

The mode of repositioning:

Moderately displaced teeth (3–6 mm) with mature roots require active repositioning, either surgically or orthodontically. AlKhalifa & AlAzemi (10) found no strong evidence favoring one method, though orthodontic extrusion is often considered slightly safer. Minimal differences in root resorption, bone healing, and tooth survival exist between the methods (5). Orthodontic traction may not better preserve the periodontal ligament (15). Surgical repositioning can enhance periodontal healing, though complete versus incomplete repositioning shows no significant difference (5). In our case, we performed complete repositioning for tooth 11; however, repositioning was incomplete for tooth 21 due to its non-axial displacement.

The endodontic intervention:

Endodontic treatment is critical, as pulp necrosis occurs in 88% to 98% of intruded teeth with complete root development (16). Early intervention, ideally within 2 weeks, is advised. In this case, endodontic treatment began within this timeframe (17). Severe intrusions may lead to external infection-related root resorption (EIR) due to cementoblast damage. Endodontic management ranges from avoiding root canal treatment if pulp preservation seems likely (rare in fully developed intruded teeth) to early intervention when EIR risk is high (18). Here, a nonsetting calcium hydroxide dressing was applied to prevent inflammatory resorption (17).

Complications and management

Root resorption after an intrusion is a commonly occurring scar complication. External root resorption has been reported and cited to be between 28% and 66%. Andreasen et al. reported a total incidence of 86% of external resorption (38% inflammatory, 24% surface, and 24% replacement resorption). (2) For our patient, both EIR and RR occurred at 4-month follow-up.

External inflammatory root resorption (EIR) or infection-related root resorption is caused by severe damage to the cementum layer and pulp infection, with bacteria and toxins maintaining resorption through open dentinal tubules. Studies show CBCT is more effective than 2D radiography in early detection of EIR. Initially asymptomatic, EIR can later cause increased mobility, dull percussion, and sensitivity, as seen in our case (18). For teeth with closed apices, timely root canal treatment within 2 weeks can prevent EIR. Inadequate early endodontic care in one case-where treatment started 3 months post-injury-explains the EIR occurrence. Controlling EIR requires thorough canal debridement, sodium hypochlorite irrigation, and EDTA for smear layer removal, aiding intracanal medicament diffusion. Calcium hydroxide is the standard intracanal dressing, raising pH in resorption sites; however, the optimal duration remains unclear, though recommendations vary from 4 weeks to several months (18). For EIR, antibiotic-corticosteroid dressings like Ledermix or Odontopaste may reduce inflammation but have not shown added benefits over calcium hydroxide alone. Bioceramic-based sealer was chosen in this case for its bioactive properties, supporting healing by increasing pH, sealing well, and aiding periodontal ligament repair, which can inhibit resorption (21).

External replacement resorption refers to the resorption on the root surface and subsequent replacement by bone tissue, which may result in ankyloses. It occurs when the periodontal ligament is damaged, allowing the root to fuse directly to the alveolar bone (7). In our case, ERR is likely due to several factors: improper repositioning may have worsened ligament damage, increasing the risk of ankylosis, while inadequate repositioning left the tooth in an abnormal position, stressing the periodontal structures. Palatal displacement during intrusion may also have disrupted healing, contributing to ERR risk. There is no definitive treatment for ERR; it may stop on its own or continue, gradually replacing the root with bone. In older patients, ERR progresses slowly, allowing the tooth to remain functional for years without intervention. Management depends on the patient's age: adults typically require conservative treatment with periodic reviews or aesthetic restorations, while severe cases may need extraction and prosthetic replacement. For children and adolescents, more active treatments like decoronation or regenerative endodontic procedures (REP) are often necessary. Due to the lack of evidence-based guidelines, treatment plans should rely on clinical judgment and a multidisciplinary approach (22).

Follow ups:

In cases of established external inflammatory root resorption (EIR) and replacement resorption (RR), diagnosing whether the process has stopped involves various methods. Regular radiographs are crucial to track resorption, with stable or decreasing radiolucency near the root apex suggesting the process may have ceased. Periodontal assessments help identify ongoing inflammation that could contribute to resorption. Follow-up appointments are typically scheduled every 3 to 6 months, with the interval extending to 6 to 12 months if the condition is stable. Clinical signs, such as reduced mobility, improved symptoms, or no tenderness, may indicate that resorption has stopped, though follow-up timing should be tailored to each case and clinical judgment (23).

CONCLUSION

The prognosis of intruded teeth following trauma, as observed in the presented case reports, is influenced by multiple factors. These include the severity of the intrusion, which in our case was moderate, the maturity of the teeth, and the presence of concomitant trauma. However, the primary factors contributing to the complications observed, were related to the treatment approach.

Incomplete repositioning of the tooth, improper endodontic management, and irregular follow-up intervals played a significant role in the unfavorable outcomes. These findings highlight the importance of timely, precise repositioning, appropriate endodontic care, and consistent follow-up to minimize complications and improve the long-term prognosis of intruded teeth.

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d'Odontologie

>>> ARTICLES SCIENTIFIQUES



Tunisian Dental Students' Knowledge and Attitudes about Tooth Avulsion

Connaissances et Attitudes des étudiants Tunisiens en Médecine Dentaire sur l'Avulsion de la Dent

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Abstract

Objective: To investigate students' first-aid knowledge and attitudes about tooth avulsion.

Methods: The survey was conducted at the Faculty of Dental Medicine of Monastir, Tunisia. A sample of 844 dental students, from the 1st (n=234), the 2nd (n= 245), the 3rd (n=156) and the 4th (n=209) level was included. Data was collected using a four-part closed-ended questionnaire. Questions concerning knowledge and attitudes were evaluated dichotomously (right=1, wrong=0) and used to calculate an individual score. All Data were analyzed using the Chi-Square test; the level of significance was set at p<0.05. Results: The students' mean age was 20.62+1.46 with a female to male sex ratio of 3.7. For 70.4% of the students, the nearest dentist was the ideal facility to receive emergency treatment. Regarding emergency management of tooth avulsion only 10.9% suggested the immediate replantation. Only 58.9% knew that a temporary tooth shouldn't be replanted. The transport of the avulsed tooth to the

dentist was reported by 45.1% of students; indeed, they, correctly, selected milk, saliva and saline as the appropriate storage media in 37.4%, 29% and 25.7% of the cases, respectively.

Only 5.9% knew the ideal extra-alveolar time for replantation. There was a significant increase of knowledge level from the first to the second cycle (p=0.000), nevertheless the mean score attributed to knowledge remained low (3.64±2.058). Conclusion: These results suggest a lack of information about emergency management of dental avulsion among dental students at the faculty of dentistry in Monastir. Therefore, better education about dental trauma emergencies and its management guidelines is necessary. **Key words**: Tooth Avulsion, Questionnaire, Dental Students, Knowledge, Attitude

Résumé

Objectif : Étudier les connaissances et les attitudes des étudiants en matière de premiers secours en cas d'avulsion dentaire. Méthodes : L'enquête a été menée à la Faculté de Médecine Dentaire de Monastir, Tunisie. Un échantillon de 844 étudiants en médecine dentaire, du 1er (n=234), 2ème (n= 245), 3ème (n=156) et 4ème (n=209) niveau a été inclus. Les données ont été recueillies à l'aide d'un questionnaire fermé en quatre parties. Les questions concernant les connaissances et les attitudes ont été évaluées de manière dichotomique (juste=1, faux=0) et utilisées pour calculer un score individuel. Toutes les données ont été analysées à l'aide du test Chicarré ; le niveau de signification a été fixé à p<0.05. Résultats : L'âge moyen des étudiants était de 20.62+1,46 ans, avec un sexe ratio F/H de 3.7. Pour 70.4 % des étudiants, le dentiste le plus proche était l'établissement idéal pour recevoir un traitement d'urgence. En ce qui concerne le traitement d'urgence de l'avulsion dentaire, seuls 10.9 % ont suggéré la reimplantation immédiate. Seuls 58.9% savaient qu'une dent temporaire ne devait pas être reimplantée. Le transport de la dent avulsée chez le dentiste a été rapporté par 45.1% des étudiants ; en effet, ils ont correctement sélectionné le lait, la salive et le sérum physiologique comme moyens de conservation appropriés dans 37.4%, 29% et 25.7% des cas, respectivement. Seuls 5.9% connaissaient le temps extra-alvéolaire idéal pour la reimplantation. Il y a eu une différence significative du niveau de connaissance entre le premier et le deuxième cycle (p=0,000), néanmoins le score moyen attribué à la connaissance était faible (3.64±2.058). Conclusion : Ces résultats suggèrent un manque d'information sur la gestion d'urgence de l'avulsion dentaire parmi les étudiants en médecine dentaire à la faculté de médecine dentaire de Monastir. Par conséquent, une meilleure formation sur les traumatismes dentaires d'urgence et sur les directives de prise en charge est nécessaire.

Mots clés: Avulsion Dentaire, Questionnaire, Étudiants en médecine dentaire, Connaissance Attitude

Vol 14 - Nº 1 & 2 - Décembre 2024

INTRODUCTION

Traumatic dental injuries (TDIs) are reported as a public dental health problem (1, 2) with a probable increase of prevalence in the future.

Although tooth avulsion of permanent teeth is not very frequent, 0.5-3% of all dental injuries (3, 4), its prognosis and probable physical and psychological consequences makes it one of the most serious dental injuries that requires immediate and adequate emergency treatment.

Therefore specialized guidelines are provided, reviewed and updated by the International Association of Dental Traumatology (IADT) to help dentists, healthcare givers and lay people take appropriate measures (5, 6).

Most of the studies held to assess first-aid knowledge about tooth avulsion among dentists (7-

10), non-dental professionals (11, 12), parents (13) and teachers (14,15) showed insufficient knowledge. Only a few studies investigating this issue among dental students were carried out (16-21). Findings revealed statistical significant differences between first cycle and second cycle students. This is where the present study is situated to assess the first-aid knowledge about tooth avulsion among Tunisian dental students.

MATERIAL AND METHODS

Study sample

The survey was conducted at the Faculty of Dentistry in Monastir-Tunisia. Considering that there's only one faculty for dental studies in Tunisia, the number of students is large compared to other universities around the world. Students of each grade are divided into 12 groups, of around 24 students each, for the practical/clinical lessons. The study was conducted in order to cover the majority of students, not just a random sample, taking into account that different groups have different instructors and only few students attend collective courses.

Questionnaire design

Data were gathered using a four-part questionnaire written in French, with a total of 23 closed-ended questions (Table 1a, b). The questionnaire was inspired from similar previous studies (12, 16).

The first part included basic demographic information, sport practice, use of mouth guard and whether the respondents had acquired any information about emergency management of dental trauma. The second part consisted of questions about individual past traumatic injuries and witnessing dental trauma. The third part dealt with knowledge regarding dental avulsion.

The fourth part included self-assessment, questions about the source of information, contentment and whether the respondents will seek for more information about dental trauma.

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03: 0	Gender	: ()	Male) F	emale	
04:	What k	ind of sp	ort do y	ou prac	tice?		
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()N	fartial	arts (Judo)	()0	ther (I	Precise)	
()D	oes no	t do any :	sport				
Q5:1	Do you	use mou	th guar	d durin	g spor	t practic	e?
()Y	es		()No			
Q6:]	Did yo	a have fin	st-aid c	ourses	about	dental t	auma?
()Y	es		()N	io			
2nd p	art: Pa	ist traum	natic de	ental in	juries	1	
Q1:]	Have y	ou ever e	xperier	iced a d	ental t	rauma?	
()Y	es		()]	No			
If yes	s, when	i was that	t (days,	months	, year	s)?	
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If yes	s, what	kind of t	reatmen	nt was o	lone b	y the de	ntist?
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Q6:]	Did you	a witness	a denta	al traum	a		
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Table 1bClosed-ended questionnaire about tooth avulsion
and students' self-assessment

A1. T	case of dental trauma, what would be the best first-aid facilit
() Pi	olic hospital () Emergency room
()N	arest Doctor () Nearest Dentist () I don't kno
Your	years old neighbor has fallen while playing, unfortunately
lost h	s upper central incisor (UCI)
Q2: Y	hat would be the best immediate first-aid?
() St	p the bleeding, calm the kid then consult a dentist
() Fi	d the tooth +consult a dentist
()Fi	id, replant the tooth +consult a dentist
()10	on't know
Q3: I	replantation recommended for temporary teeth?
()Y	s ()No ()I don't know
Q4: F	om which part would you hold the tooth if you search for it?
() Its	crown () Its root () Any part () I don't know
Q5: V	nat would you do if the UCI has fallen and is covered in dirt?
() W	sh it with tap water
()CI	an it with a piece of paper
()C	an it with clean clothing
()W	ash it with antiseptic (Alcohol)
()N	thing
()I	on't know
06: F	or how much time can an avulsed tooth be conserved ?
() 30	min () 1h () Few hours
() 24	n () I don't know
07: 1	vou're going to take the UCI to the dentist, which medi
would	you use?
()T;	water () Saline () The kid's mouth (saliva
()A	lean clothing () A piece of paper () Ice
()A	cohol () Antiseptic () Milk
() St	ecial medium () Other (Precise) () I don't kn
4th na	t: Self assessment:
01 I	o you consider your level of knowledge?
()I	w () Average () High
02: V	hat was your source of information?
()c	purses () Clinical practice () Family dentist
Frien	s
() In	ernet () Books and scientific articles () nor
() In	ernet () Books and scientific articles () nor re you satisfied? () Yes () No

Data collection

The questionnaire was distributed and collected within 10 min, at the beginning of the same practical studies for each grade after a brief explanation of the study purposes. As only 2 groups attend the practical course a day, collecting the survey took a week per grade. In total, collecting data took one month; split between December 2014 and February 2015 (2 weeks in each) due to the fall holidays and the exams during January.

Statistical analysis

Excel 2007 and SPSS v21 were used for all the descriptive analysis and graphics. Chi-square test was used to test significant differences between different variables with a level of significance set at p<0.05.

Third part questions were evaluated dichotomously (0=wrong answer, 1=right answer).

Except for Q7 "storage medium", for which there were four correct answers, and 1 point was given if any of the right media was chosen. The sum of points was considered as an individual score and used to assess the level of knowledge.

RESULTS

Part I

Out of 1003 students, 844 answered the survey with an overall response rate of 84.1%.

Respondents from the first cycle represented 56.8% of the students who took the survey. Most of the students were females (78.6%) with a mean age of 20.62±1.469 years old. Regarding sport practice, 26.7% of the students declared the practice of at least one sport, football was the most frequently reported sport (Table 2). Only a few students 2.3% reported the use of a mouthguard. First-aid training of dental trauma was reported by 5.1% of the students (not shown). The relation between grade and first-aid training was statistically significant (p=0.014) (Table 3).

Part II

For the second part which treated dental trauma history, 12% of the students reported having at least one past traumatic injury and 25.6% of them witnessed one. When the dental trauma occurred, 90.2% of the respondents were under 19 years old with a mean age of 11.11±5.27.

Domestic accidents were reported in 48.5% of the cases, compared to violence and school accidents (14.8%), sport and road traffic accidents, 18.8% and

13.8% of the cases, respectively. No statistical relation was found between age and trauma circumstance or dental injury (p> 0.05). Dental avulsion was reported only by 5 students (4.9%), on the other hand fractures were reported in 50 cases (49.5%). Just one tooth was injured in 64 cases (63.4%).

The upper central incisors were reported to be injured in 75 cases (70.1%) (Fig.1). Regarding treatments, 40.6% of the students reported receiving treatments. However 53.5% of the respondents disclosed being untreated after trauma and 5.9% didn't precise.

Table 2Demographic characteristics of respondents.

	Subjects population N. (%)	Respondents N. (%)	Age	N. (%) Respondents	Sport activity	N. (%) Respondents	
27.0							
Gender	249 (24.8)	181 (21.4)	18	44 (5 2)			
14101C	210 (21.0)	101 (21.1)					Multiple
Female	754 (75.2)	663 (78.6)	19	174 (20.6)	Football	88 (33.8)	activities
			20	191 (22.6)	Baskethall	47 (18 1)	N. (%)
Cycle/Grade			20	151 (22.0)	Dasketoan	47 (10.1)	
			21	184 (21.8)	Tennis	43 (16.5)	
1 st	538 (53.6)	479 (56 8)	22	188 (22.3)	Martial arts	27 (10.4)	>1 162
1	200 (2010)	472 (20.0)		100 (22.5)	MELLER BIS	27 (10.1)	(17.2)
2011.0			23	43 (5.1)	Other	55 (21.2)	=1 63
1"year	280 (27.9)	234 (27.7)	24	13 (1.5)			(7.5)
2 nd year	258 (25.7)	245 (29.0)	24	15 (1.5)			None 619
			25	3 (0.4)			(73.3)
			26	2 (0.2)			
2 nd	465 (46.4)	365 (43.2)		2 (0.2)			
			27	1 (0.1)			
3 rd year	200 (19.9)	156 (18.5)	28	1 (0.1)			
4 th vear	265 (26.4)	209 (24.8)					

Table 3

Distribution of first-aid knowledge answers

			First-aid N. (%)	
		Yes	No	Didn't answer
	1st	3 (1,3)	217 (92,7)	14 (6,0)
Conda	2nd	11 (4,5)	224 (91,4)	10 (4,1)
Grade	3rd	15 (9,6)	133 (85,3)	8 (5,1)
	4th	14 (6,7)	183 (87,6)	12 (5,7)
X^2	/ p		15.919 / 0.014	




Dental trauma and dyschromia distribution according to injured teeth

Part III

In the 3rd part, the nearest dentist was selected as the ideal first-aid facility by 70.4% of the students, yet an emergency room was stated by 10% of them and the nearest doctor was only suggested by 1.5% (Fig .2a). In the case where a 9 year old child fell and lost his upper central incisor, only 10.9% suggested the immediate replantation of the tooth however 45.1% suggested finding it and taking it to the dentist and 32.8% chose to stop the bleeding (Fig.2b).

Regarding Q3, 58.9% of the respondents suggested not to replant temporary teeth but 8.4% recommended replanting them, 25.7% didn't answer (not shown).

When asked about how to handle the avulsed tooth, 54.9% participants recommended grabbing it by its crown and 7.2% suggested touching its roots. However 6.4% didn't recommend a specific part, while the rest either declared that they didn't know (25.1%) or didn't answer. Concerning their attitude in case the avulsed tooth has fallen, 13.3% of the students recommended washing it using tap water while 33.3% suggested using an antiseptic instead and 31% declared they didn't know what to do (Fig.2c)

As for the ideal extra-alveolar time, only 5.9% of the respondents suggested it to be 30min, 7.8% answered 1h, 26.3% chose a few hours and 11% reported it to be 24h. On the other hand, 41.6% of the participants declared that they didn't know the answer. The last question of this part was about the storage medium used to transport the tooth to the dentist; 37.4% of the participants recommended milk, 29% suggested saliva and 25.7% reported saline instead.

Alcohol and antiseptic were selected in 6.6%. Special medium was only reported by 2.1% of the

respondents (Fig. 2d). Grade and answers to all the questions of this third part were significantly related (p<0.05). The students scored from 0 to 9 with a mean score of 3.64±2.058. Most of the respondents 71.8% had a score 4, many of them 52.% had a score 3 (Fig. 3). It was found that grade, cycle, age, sport practice and previous dental trauma witnessing were significantly related to the score (p<0.05), while gender and the experience of dental trauma were not statistically related to the level of knowledge (p>0.05). The results revealed that the overall number of correct answers was significantly higher (p<0.000) among students in the 4th year (Table 4).







Storage medium distribution. Percentages may exceed 100% as some respondents suggested more than one medium





Score distribution of students' knowledge and attitudes regarding dental avulsion

	N. (%)					a such as
	1 st	2 nd	3 rd	4 th	Response rate	p value
Q1	137 (58.5)	175 (71.4)	111 (71.2)	171 (81.8)	792 (93.8)	0.000
Q2	20 (8.5)	33 (13.5)	9 (5.8)	30 (14.4)	793 (94.0)	0.000
Q3	127 (54.3)	155 (63.3)	94 (60.3)	121 (57.9)	627 (74.3)	0.000
Q4	92 (39.3)	134 (54.7)	98 (62.8)	139 (66.5)	790 (93.6)	0.000
Q5	17 (7.3)	27 (11.0)	21 (13.5)	47 (22.5)	783(92.8)	0.000
Q6	11 (4.7)	12 (4.9)	4 (2.6)	23 (11.0)	782 (92.7)	0.000

Table 4

Distribution of correct answers regarding dental avulsion from the 1st to the 4th grade

Part IV

Concerning the last part, 43.2% of the participants considered their level of knowledge low while 3.1% reported it as high (not shown). Courses were reported by 55.5% of the students to be the first source of information followed by internet (28.9%), clinical practice and family dentist in 9.9% and 7.6% of the cases, respectively (not shown). Finally, most of the students, 79.4%, were not satisfied with their knowledge and 79% of them stated that they will search for more information regarding emergency management of avulsed teeth (not shown).

DISCUSSION

The findings of the present study revealed a low level of knowledge about the emergency management of avulsed teeth among Tunisian dental students, mainly in immediate first aid, handling and adequate extra-alveolar time which are determinant factors for the prognosis of the avulsed tooth and the periodontal ligament healing (22-24). In this survey, the level of knowledge was assessed using a closed-ended guestionnaire with respect to anonymity, since it offers many advantages such as the efficiency of gathering data on a large-scale basis, and analyzing information in a straightforward way. Indeed, the rate of responses is higher, when the questionnaire is administered during tutorials than sent by post or electronic mail. Nevertheless, this type of questionnaire presents some limits since there's no room left for other suggestions or answers and some students can give random answers or pick the wrong answer by fault (25).

Given that 1st year students have only started their dental studies and were still receiving general courses, they could be considered as lay people and may reflect the level of knowledge of the general population. It's worth pointing out the predominance of the female gender in this study; this feminization is also true for the medical field in Tunisia. One of the explanations would be that females are more likely to be motivated to pursue long years of university education than men. As courses and practical works related to dental traumatology are very limited in dentistry among 5th and 6th year students, only two grades from each cycle were included.

Findings concerning past dental trauma reflect data reported by Ulf Glendor in his 12-year review (1). In fact, most TDIs (71-92%) occurred before the age of 19 years and involved a maxillary central incisor. In addition, tooth avulsion occurred less frequently (10%) compared to coronal fractures (61%) and luxations (30%)/ (26). These results were confirmed by a recent study from Lauridsen et al (27).

Regarding the ideal first aid facility, most of the students suggested going to the nearest dentist. The percentage of right answers was better than among other professionals, such as teachers and firefighters (12, 14). This could be explained by the fact that for dental students, TDIs should require a dentist's intervention.

However, students failed to show a positive attitude

Vol 14 - Nº 1 & 2 - Décembre 2024

concerning the immediate tooth replantation (10.9%) as recommended in the guidelines for the management of dental trauma published by the International Association for Dental Traumatology (IADT) (6).

In the other hand, most of the students recommended controlling the bleeding or finding the avulsed tooth and taking it to the dentist, this result is consistent with a previous survey in which most non-dentists, including 1st and 2nd year dental students, were concerned either about bleeding or choose to transport the tooth to the dentist (10).

Deciduous teeth replantation is not recommended due to the possible sequelae that may occur to the germ of the successor, more than half of the respondents gave the right answer to the related question (Q3). This finding illustrates better knowledge among students in comparison to another survey held among dentists in Kathmandu (7), nevertheless, results were match better among teachers and Chinese dentists (14, 8). About half the students knew that they should handle the tooth by its crown as recommended to avoid further damage to the periodontal ligament (PDL) cells (6), while a few of them suggested washing it using tap water. This result is in contrast to the one reported by Japanese dental students who gave a higher response rate (55.4%) (16). In addition, better results were found among firefighters and teachers regarding extra-alveolar time (12, 14) one of the 4 main factors that influence the PDL healing and the treatment success of the avulsed. It is worth to mention that by the time of the study (2014-2015) washing the avulsed tooth using tap water was the recommended measure in the previous version of the IADT guidelines (5). These guidelines were later (2020) revised and updated. It is now recommended to rinse the avulsed tooth gently using milk, saline or the patient's saliva (6).

It's well known that an appropriate storage medium is also one of the most important factors in maintaining the viability of PDL cells for better prognosis after replantation. Tissue culture/ transport medium, Hank's balanced salt solution (HBSS/saline), saliva and milk are the most suitable storage media recommended. This is not the case for water since its ph and osmolality are incompatible with the PDL cells viability (6)

In the present study, most of the students recommended adequate transport media as reported in other investigations (17,18). Although the 2nd cycle students showed significantly better knowledge than the 1st cycle students, the overall knowledge remains low. The study reported by Abu-Dawoud et al (28) revealing a thorough knowledge among dentists graduated in Kuwait may reflect students' knowledge regarding emergency management of avulsed teeth.

Fortunately most of the students, in the present study, showed interest in learning more about dental trauma and emergency management. Even though courses remained the most selected source of information, the internet was, surprisingly, less reported. As an internet-based knowledge, the interactive dental trauma guide (29), in addition to courses and clinical practice should be included in the curriculum, which is currently being revised, to provide students and young dentists with evidencebased trauma management.

CONCLUSION

In Tunisia, dental traumatology is an orphan in dentistry as previously stated by Andreasen et al who pointed out the scarcity of publications (3%) in paediatric dentistry (30). The findings of the survey demonstrate poor knowledge among Tunisian dental students concerning first-aid management of avulsed teeth, particularly in key factors for successful replantation and good long-term prognosis of avulsed teeth. First-aid training and dental trauma courses should offer more information about the present guidelines for firstaid management of dental avulsion along with other dental injuries. The curriculum should be revised in order to provide students and young dentists with evidence-based trauma management. Campaigns are also needed to improve knowledge of dental trauma management among laypeople.

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Actualités Tunisiennes 37

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>>> ARTICLES SCIENTIFIQUES



Pre-Implant Guided Bone Regeneration in the Anterior Maxilla Following Trauma: A case report

Régénération osseuse guidée pré-implantaire dans le maxillaire antérieur à la suite d'un traumatisme : A propos d'un cas clinique

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Abstract

Pre-implant guided bone regeneration (GBR) in the anterior maxilla is a critical procedure, especially following traumatic injury, where significant bone loss often complicates implant placement. This approach focuses on reconstructing the alveolar ridge to create a stable and sufficient bone foundation for implant placement. By utilizing synthetic bone graft materials and resorbable membranes, GBR effectively enhances bone volume and quality, allowing for more predictable implant outcomes.

The success of this technique is underscored by its ability to address both functional and aesthetic concerns, particularly in the anterior maxilla, where the preservation of ridge width and contour is crucial.

The aim of this paper is to explore, through a clinical case report, the efficacy of pre-implant guided bone regeneration (GBR) in the anterior maxilla following traumatic injury.

Key words : guided bone regeneration - trauma - implant - alveolar ridge defect - allograft

Résumé

La régénération osseuse guidée (ROG) pré-implantaire dans le secteur maxillaire antérieur est une procédure essentielle, en particulier après un traumatisme, où une perte osseuse importante complique souvent la mise en place de l'implant. Cette approche se concentre sur la reconstruction de la crête alvéolaire afin de créer une base osseuse stable et suffisante pour la mise en

place de l'implant. En utilisant des matériaux de greffe osseuse synthétiques et des membranes résorbables, la ROG améliore efficacement le volume et la qualité de l'os, ce qui permet d'obtenir des résultats plus prévisibles en matière d'implant.

Le succès de cette technique est souligné par sa capacité à répondre aux préoccupations fonctionnelles et esthétiques, en particulier dans le secteur maxillaire antérieur, où la préservation de la largeur et du contour de la crête est cruciale.

L'objectif de cet article est d'explorer, à travers un cas clinique, l'efficacité de la régénération osseuse guidée pré-implantaire (ROG) dans le secteur maxillaire antérieur suite à une lésion traumatique.

Mots clés: Régénération osseuse guidée, Traumatisme, Implant, Défaut osseux, Allogreffe

INTRODUCTION

Traumatic dental injuries (TDIs) are predominantly observed in children and young adults, who are at the highest risk for such incidents. Although older adults can also experience TDIs, their occurrence in this age group is significantly less frequent compared to the younger population. (1)

Dental implants are not recommended after traumatic injuries in childhood and adolescence due to ongoing facial growth and the risk of infraocclusion (2). Therefore it is recommended to keep these teeth for as long as possible, though removal may become necessary if irreversible pathology occurs.

After dental extractions, the vestibular cortical bone suffers the greatest resorption, mainly due to the nature of bundle bone, which receives its blood supply from the periodontal ligament. (3). The impact's nature can inflict further trauma on the alveolar bone and soft tissues, leading to both horizontal and vertical bone atrophy.

The use of hard and soft tissue augmentation

d'Odontologie Vol 14 - Nº 1 & 2 - Décembre 2024

techniques and ensuring precise implant positioning are then essential to achieving a successful aesthetic and functional result with the final implantsupported restoration. (4)

Placing implants immediately into fresh extraction sites offers several advantages, such as minimizing the number of surgical procedures, shortening the overall treatment time, and improving soft tissue preservation. (5)

Although immediate implant placement can theoretically prevent hard tissue resorption after tooth extraction, it may have a higher overall failure rate, and morphological changes to the alveolar ridge may still occur. (6) (7).

Consequently, the timing of implant placement remains a widely debated topic in the literature.

The aim of this report is to present a therapeutic approach used in a case involving trauma to the anterior maxilla. This report will detail the clinical decision-making process, treatment steps, and outcomes to provide insight into the management of similar cases.

CASE PRESENTATION

A 28-year-old male patient with no significant health issues consulted the Outpatient and Implantology Department of the dental clinic in Monastir/Tunisie to replace his central incisor. He was concerned about the appearance and functionality of the affected area following trauma from a road traffic accident 8 years ago and wanted a treatment plan to restore both the aesthetics and structural integrity of his smile. (fig1)





Clinical appearance eight weeks post-injury, shown in both facial and occlusal views. a. occlusal view, b. extra-oral view

A CBCT was performed to complete the pre-implant exam. It has revealed that

there is insufficient bone thickness at the planned implant site. (fig2)



Computed tomography scans reveal Figure 2 the three-dimensional ridge defect

Based on clinical and radiographic information, the treatment plan need to include bone augmentation procedures such as guided bone regeneration (GBR) prior to implant placement, to enhance the bone volume and achieve the necessary thickness.

Surgical protocol

After a local anesthesia with mepivacaine 2% containing a vasoconstrictor 1:100,000 (medicaine 2%, Médis, Tunisia), a supracrestal incision was made, along with two releasing incisions on either side of the edentulous site, and then the flap was removed. (fig3, 4)





Figure 3 Supracrestal incision with two releasing incisions





Then, corticoperforations were performed. This technique involves creating small perforations in the cortical bone, which offers several advantages. It enhances vascularization by promoting bleeding, which is crucial for the successful integration of bone grafts. Additionally, corticoperforations stimulate the release of growth factors that accelerate new bone formation. This approach also helps in stabilizing the graft material, ensuring better retention and reducing the risk of bone resorption in the treated area. (fig5)



Figure 5 Corticoperforations of vestibular cortical bone

Periosteal releasing incisions are then made. They help to mobilize the soft tissue flap, allowing for better coverage and tension-free closure over the grafted area. (fig. 6)





Periosteal releasing incision to increase the mobility of a surgical flap

The vestibular aspect is augmented using a particulate xenograft to reduce the risk of resorption of the vestibular bone cortex. (fig7)





Vol 14 - Nº 1 & 2 - Décembre 2024







A tension-free closure was performed to secure the membrane and reduce the risk of dehiscence. (fig10)



Tension-free closure to reduce the risk of dehiscence. Figure 10 a. apical matress, b. occlusal view showing sutures



Figure 11 Postoperative retroalveolar X-ray

Figure 7 Xenograft particles

DISCUSSION

Treating an injury in the anterior maxillary region is typically challenging and complex. This area presents significant difficulties due to its critical role in both aesthetics and function. Unfortunately, trauma to this region is quite common, making it essential to address these injuries with careful planning and precision to achieve the best possible outcomes. (8 –12) Post-traumatic conditions affecting the bone or teeth can vary widely, each requiring a tailored treatment approach to ensure optimal recovery and function, especially in the young patient (13). These conditions can range from simple fractures or tooth avulsions to more complex issues such as alveolar bone loss, root fractures, or severe displacement of teeth.

In cases where the bone is involved, the extent of the damage may necessitate bone grafting, guided bone regeneration GBR, or even reconstructive surgery to restore the lost bone structure and support the remaining teeth or future implants.

The fundamental principle of guided bone regeneration (GBR) involves placing mechanical barriers to protect blood clots and isolate the bone defect from the surrounding connective tissue. This creates a protected environment that allows boneforming cells to access and regenerate the designated space for new bone growth. (39)

On the other hand, dental trauma might require treatments such as root canal therapy, reimplantation, splinting, or orthodontic intervention to reposition and stabilize affected teeth.

Six studies reported an overall implant survival rate of 97% in the anterior maxilla after traumatic tooth loss, with a mean follow-up period of 3.5 years across the included research. (14–19)

A retrospective study of single dental implants used to treat traumatic dental injuries in the anterior maxilla found a similar survival rate of about 96%. (20)

Vergara and Caffesse followed 16 patients for approximately one year after implant treatment in the anterior maxilla and found an implant survival rate of 87%. They noted that most teeth were extracted due to crown or root fractures, but it was unclear if these fractures were caused by the traumatic dental injury. (21). Studies on implants placed in grafted bone of the anterior maxilla have shown promising results, often comparing favorably with those of implants placed in nongrafted bone. (20, 22-24) There are many options for augmenting an alveolar ridge defect. These include the use of xenografts, allografts, or synthetic grafting materials, which can be utilized alone or in combination with autogenous particulate bone.

Vol 14 - Nº 1 & 2 - Décembre 2024

Autogenous bone, sourced from either extraoral or intraoral sites, remains the gold standard for posttraumatic cases. (20,25) The graft needs to have sufficient strength and rigidity for secure fixation at the recipient site, along with three-dimensional stability to resist muscular forces. (26) As a result, an autogenous block graft is frequently recommended for use in the post-traumatic anterior maxilla. (20) Recent studies indicate that a block allograft combined with a resorbable membrane may serve as a viable alternative to an autogenous block graft for treating compromised alveolar ridges. (23,24, 27-30) The primary motivation for using block allografts in post-traumatic cases, particularly in young patients who have already experienced trauma, is to minimize the risk of donor-site morbidity. (31,32) It also eliminates the need for a second surgical site, results in less patient discomfort, and reduces overall surgery time. (33)

In our case, we separated the GBR and implant placement into two distinct procedures. Our concern was the impact of vascularization on the integration of both the bone graft with native bone and the implant with native bone [34-38].

Consequently, GBR was performed 5 months before implant placement.

In contrast, recent studies have demonstrated that performing these procedures simultaneously can achieve high precision and accuracy, ultimately saving time for both the patient and clinician [40, 41].

It is evident that integrating a regenerative technique with dental implant placement is a key factor in enhancing the bone regeneration process (42,43).

It has been strongly recommended that incorporating synthetic bone graft material during dental implant placement, particularly in conjunction with guided bone regeneration, plays a vital role in maintaining ridge width. (40)

This approach not only ensures that the implant has sufficient bone support but also helps prevent the natural resorption that often occurs after tooth loss.

CONCLUSION

The goal of successful guided bone regeneration (GBR) is to rebuild the lost alveolar bone to create a stable foundation for implant placement. This reconstruction is crucial for ensuring that the implants can be positioned according to prosthetic needs. Ultimately, GBR aims to achieve a final restoration that is both aesthetically pleasing and functionally harmonious, integrating seamlessly with the natural surrounding tissues. By restoring the bone structure, GBR facilitates the creation of a well-aligned, natural-looking implant-supported restoration that meets both cosmetic and functional requirements.

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>>> ARTICLES SCIENTIFIQUES



Complications à 2 Ans de Suivi d'une Intrusion Totale d'une Dent Permanente Immature

Complications at Two-Year Follow-Up of Total Intrusion in an Immature Permanent Tooth

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Résumé

Introduction : L'intrusion dentaire, bien que relativement rare, représente entre 0,3 % et 2 % de l'ensemble des traumatismes dentaires. Elle est considérée comme le traumatisme dentaire le plus sévère occasionnant des complications importantes. Ce type de traumatisme touche principalement les enfants en âge préscolaire, période où les dents permanentes immatures et leur support parodontal sont particulièrement vulnérables et nécessitent une prise en charge bien adaptée.

Observation : Une patiente âgée de 9 ans nous a été adressée suite à un accident de la voie publique ayant entraîné une intrusion totale de l'incisive centrale permanente immature. L'examen clinique a révélé l'absence de la dent sur l'arcade, accompagnée d'une fracture alvéolaire. L'examen radiologique a confirmé l'intrusion totale de la dent et a révélé la présence d'une fracture des deux tiers coronaires. La prise en charge a consisté en une intervention combinant un traitement chirurgical et endodontique. Un suivi rigoureux, réalisé sur une période de 2 ans, a permis de surveiller l'évolution clinique et de mettre en évidence les complications survenues au cours de cette période.

Discussion : L'intrusion dentaire pose des défis cliniques majeurs, souvent associée à un pronostic défavorable. La complexité de ce traumatisme associé à la fragilité des dents permanentes immatures exige une approche méticuleuse comprenant un examen clinique approfondi, une planification thérapeutique adaptée et un suivi rigoureux pour anticiper et gérer les complications.

Key words : traumatisme dentaire, intrusion dentaire, résorption dentaire, fracture dentaire.

Abstract

Introduction : Dental intrusion, though relatively uncommon, constitutes approximately 0.3% to 2% of all dental injuries. It is widely regarded as the most severe form of dental injury, frequently resulting in significant complications. This trauma predominantly affects preschool-aged children, a critical period when immature permanent teeth and their supporting periodontal structures are particularly fragile, necessitating a meticulously designed and individualized management approach.

Observation: A 9-year-old patient was referred following a road traffic accident resulting in the total intrusion of an immature permanent maxillary central incisor. Clinical examination revealed the tooth's absence from the arch, along with an associated alveolar fracture. Radiographic evaluation confirmed the total intrusion and revealed a coronal fracture involving two-thirds of the crown. The treatment plan consisted of a combined surgical and endodontic intervention. A rigorous two-year follow-up allowed for close monitoring of the clinical progression and the identification of complications that emerged during this period.

Discussion: Dental intrusion poses significant clinical challenges and is frequently associated with an unfavorable prognosis. The severity of this trauma, combined with the structural fragility of immature permanent teeth, necessitates a meticulous approach. This approach includes a comprehensive clinical examination, personalized, evidence-based treatment planning, and long-term follow-up to effectively anticipate, prevent, and manage potential complications

Mots clés: traumatology, tooth injuries, tooth intrusion, tooth resorption, root resorption,

Actualités Tunisiennes 44

d'Odontologie

INTRODUCTION

Les traumatismes dentaires représentent un défi majeur en dentisterie, en particulier chez les jeunes patients, où les conséquences fonctionnelles et esthétiques peuvent être profondes et durables 1,2. Parmi ces traumatismes, l'intrusion dentaire se distingue par sa gravité et sa complexité. Elle est définie comme le déplacement axial de la dent dans l'os alvéolaire à la suite d'un choc violent. Ce type de lésion est particulièrement difficile à gérer en raison du risque élevé de complications, telles que la nécrose pulpaire, la résorption radiculaire et l'ankylose, qui peuvent compromettre la survie à long terme de la dent1,2,3,4.

Les enfants et les adolescents sont particulièrement vulnérables à ce type de lésion, notamment en raison de leur style de vie actif. Compte tenu des particularités anatomiques de leurs dents permanentes immatures (DPI), la gestion de l'intrusion se révèle particulièrement délicate 1,2,3,4. Une variété d'options thérapeutiques peut être considérée, mais l'objectif primordial reste la

préservation optimale de la dent, de son capital osseux, et le maintien du potentiel de développement radiculaire autant que possible 1,2,3,4.

Cet article se propose d'explorer les défis cliniques posés par l'intrusion dentaire à travers la présentation d'un cas clinique, en discutant les stratégies de traitement et les complications observées au bout de 2 ans de suivi.

OBSERVATION

La patiente, âgée de 9 ans, en bon état général, nous a été adressée par le service de maxillo-faciale pour une prise en charge d'un traumatisme dentaire survenu la veille de la consultation, à la suite d'un accident de la voie publique. A l'interrogatoire, la patiente est déjà sous ATB. A l'examen exobuccal, on retrouve : une échancrure de la joue droite, unhématome mentonnier, un œdème des lèvres supérieure et inférieure et de la commissure labiale gauche qui est suturée (figure 1).



L'examen endobuccal révèle l'absence de la 21 sur arcade, une voussure gingivale en regard de la 21 de couleur violacée dure à la palpation et une palpation du fond du vestibule douloureuse et irrégulière faisant suspecter une fracture de l'os alvéolaire (figure 2).



Figure 2 Examen endobuccal

L'examen radiologique (rétro-alvéolaire) montre une intrusion totale de la dent selon un axe oblique dans le sens mésio-distal, une fracture intéressant les 2/3 de la hauteur coronaire, une disparition totale du ligament parodontal et un apex ouvert (figure 3).



Figure 3 Examen radiologique (rétro-alvéolaire)

Notre conduite à tenir en urgence a consisté en un repositionnement chirurgical de la dent à l'aide d'un davier. Au cours de cette intervention, la fracture de la table alvéolaire vestibulaire s'est avérée nette, et les deux segments ont été repositionnés par pression digitale (figure 4).

Un contrôle radiologique a été réalisé à ce stade et la mise en place d'une contention semi-rigide de canine à canine pendant 4 semaines a été réalisée (figure 5). Des recommandations ont été dictées aux parents de la patiente, à savoir ; une alimentation molle pendant 2 semaines, un brossage régulier (brosse à dent souple), l'utilisation d'un bain de bouche à base de Chlorhexidine gluconate 0,1 % sans alcool pendant 1 à 2 semaines et des précautions à prendre afin d'éviter un traumatisme secondaire.

Figure 1 Examen exobuccal





Repositionnement chirurgicale d'urgence : (a) incision vestibulaire (b) mise en évidence de la dent (c) fracture déplacée de la table alvéolaire vestibulaire (d) repositionnement de la dent à l'aide d'un davier (e) dent replacée sur arcade



Figure 5 (a) contrôle radiologique après repositionnement chirurgicale de la 21 (b) contention de canine à canine

Le traitement endodontique de la dent a été entamé durant la période de contention, celle-ci était déjà nécrosée à l'ouverture de la cavité d'accès, une médication à base d'hydroxyde de calcium (PARACHIMIC) a été placée dans le canal pendant 2 semaines, suivi d'une apexification à l'MTA (ROOTDENT TECHNODENT) (figure 6).



Figure 6 Apexification à l'MTA

Après 4 semaines, la contention a été déposée, à ce stade on a constaté une irrégularité des collets des dents dû à une récession en regard de la 21 et la dent en position légèrement plus haute (figure7). Ceci pourrait être dû à un repositionnement manquant dans le sens vertical.

Aucune intervention supplémentaire ne pouvait être effectuée à ce moment. Enfin, une restauration de la perte tissulaire coronaire par une reconstitution corono-radiculaire fibrée a été effectuée (figure 8).



Figure 7 Aspect clinique après dépose de la contention

d'Odontologie Vol 14 - N° 1 & 2 - Décembre 2024





Reconstitution coronoradiculaire fibrée de la 21 (a) vue frontale (b) vue occlusale (c) radio post-opératoire

Après 1 an du traumatisme, la patiente se présente avec une fracture de la résine composite à la suite d'un 2ème traumatisme (chute de son lit), le tenon est encore en place sans mobilité.

Une reprise de la restauration coronaire a été réalisée en la plaçant en sous-occlusion par rapport à la dent adjacente (figure 9).





Contrôle à 1 an du traumatisme (a) fracture de la résine composite (b) reprise de la restauration coronaire (c) rétro alvéolaire de contrôle

A 2 ans du traumatisme, un contrôle clinique a révélé un manque d'étanchéité de la résine composite, une teinte grisâtre du tiers cervical de la dent, des poches parodontales du côté vestibulo distal et au centre du côté palatin de 9 mm qui font sourdre du pus à la pression digitale, et un affaissement de la table vestibulaire entre la 21 et la 22. Radiologiquement, on découvre une résorption radiculaire qui s'étend du 1/3 cervical au 1/3 médian de la hauteur radiculaire communiquant avec le canal et une perte osseuse marginale au niveau des septas dentaires. (Figure 10).







Contrôle à 2 ans (a) sondage parodontal profond du côté distal (b) rétroalvéolaire montrant une plage radioclaire au niveau cervical et médian de la racine dentaire avec une atteinte osseuse marginale

La dent a été jugée non conservable, et la patiente bénéficiera d'une prothèse partielle amovible pour remplacer la 21 jusqu'à ce que la maturation parodontale soit atteinte. À cet âge-là, des interventions parodontales chirurgicales seront nécessaires pour corriger le défaut osseux et restaurer l'harmonie des collets gingivaux.

DISCUSSION

L'intrusion dentaire est largement reconnue comme le traumatisme dentaire le plus sévère, en raison de la complexité de sa prise en charge et des conséquences potentiellement graves qu'elle entraîne. Elle pose de nombreux défis cliniques, tant en termes de traitement que de prévention des complications à long terme 1,2,3,4.

Actuellement, toutes les études sur le traitement des dents permanentes intruses présentent des limitations. Les recommandations de traitement ne sont donc pas fondées sur des preuves solides1.

A commencer par la prescription d'antibiotiques, il existe des preuves limitées quant à leur utilisation dans la prise en charge des traumatismes dentaires. En effet, jusqu'à ce jour, il n'existe aucune confirmation que la couverture antibiotique améliore le pronostic des dents traumatisées. Selon l'International Association of Dental Traumatology (IADT), l'indication se pose uniquement en cas de traumatismes dentaires accompagnés de lésions des tissus mous, la nécessité d'une intervention chirurgicale ou lorsque l'état général du patient justifie une couverture antibiotique2. Dans notre cas, la patiente avait déjà été placée sous antibiotiques par les services d'urgence en raison des lésions des tissus mous occasionnées par le traumatisme. En cas d'intrusion dentaire, la priorité en urgence est de repositionner la dent dans sa position d'origine. Ceci aura pour but de décompresser le tissu lésé et en rétablir la relation normale entre la dent et l'os sousjacent5. Ce geste peut être spontané, orthodontique ou chirurgicale selon le degré d'intrusion, cependant, selon l'IADT, pour les dents permanentes immatures il faudra privilégier le repositionnement spontané indépendamment du degré d'intrusion. Si aucune rééruption n'a lieu dans les 4 semaines suivantes, il convient de commencer le repositionnement orthodontique 2.

Dans notre cas, l'intrusion est totale (> 7mm) avec une muqueuse fermée, un changement de l'axe de la dent (inclinaison dans le sens M°D) et une fracture alvéolaire associée ; choses qui rendent le repositionnement spontané impossible.

Entre le repositionnement orthodontique et chirurgicale, il n'existe pas de différence significative en termes de résultats indésirables 1, en revanche, ils peuvent constituer un nouveau traumatisme, ce qui pourrait, de ce fait, accroître le risque de complications 4.

Dans notre situation clinique , le repositionnement orthodontique n'a pas été envisagé car la pose de brackette sur la dent intruse n'était pas possible, avec divers inconvénients associés à cette méthode ; à savoir ; les forces de traction utilisées pour déplacer les incisives intruses dépassent celles du traitement orthodontique conventionnel ce qui augmenterait les complications parodontales, en plus de l'absence de ligament parodontal fonctionnel chez les dents totalement intruses ; une condition indispensable au mouvement orthodontique. Autre point essentiel, le repositionnement orthodontique est une procédure longue rendant la coopération du patient un facteur critique5.

En raison de ces considérations, le repositionnement chirurgical immédiat a été choisi comme traitement de choix.

Aussi, la dent a été stabilisée à l'aide d'une contention pendant 4 semaines, car en plus de la fracture alvéolaire, les cellules et les structures intercellulaires ont été gravement endommagées par l'écrasement dû au déplacement axial de la dent, ainsi, le processus de guérison est prolongé de plusieurs semaines, ce qui se traduit par une période de contention plus longue 1,6.

Le traitement endodontique

Lors de l'intrusion, la pulpe perd immédiatement son approvisionnement vasculaire, et le ligament parodontal subit des dommages sévères. Le pronostic de cette blessure est défavorable, avec un risque considérablement élevé de nécrose pulpaire et d'arrêt de la maturation radiculaire. De plus, en cas de traumatismes combinés (fracture coronaire associée), les dents encourent un risque accru de nécrose pulpaire et d'infection. Ainsi, un traitement endodontique immédiat ou précoce est souvent recommandé 1,7.

d'Odontologie Vol 14 - N° 1 & 2 - Décembre 2024

Dans notre cas, en plus de l'intrusion totale, la dent a subi une fracture coronaire intéressant les 2/3 incisifs et une fracture déplacée de l'os alvéolaire. Ces lésions rendent encore plus complexe la préservation de la vitalité pulpaire, pourtant essentielle pour les dents permanentes immatures.

Face à ces circonstances, nous avons procédé à un traitement endodontique avec un passage de Ca(OH)2. Cette médication inter-séance est d'une importance capitale dans la gestion de ces cas vu que l'hydroxyde de calcium inhibe la réponse inflammatoire en supprimant l'activité ostéoclastique et en favorisant le processus de réparation tissulaire 2,5,7.

Le choix entre la revascularisation et l'apexification repose sur des critères spécifiques qui doivent être évalués avec soin. Chaque procédure présente des indications particulières, et une analyse minutieuse des facteurs cliniques, radiographiques et biologiques est essentielle pour déterminer la méthode la plus appropriée. Cela inclut l'évaluation du degré de développement radiculaire, du volume pulpaire radiculaire, la longueur de la racine, l'épaisseur des parois dentinaires radiculaires et le diamètre du foramen apical. Dans notre cas, l'apexification a été choisie comme procédure de choix vu que la longueur radiculaire est presque complète (classe IV de Cvek) avec une bonne épaisseur des parois radiculaires et un apex moins de 1,1 mm de diamètre. En outre, le succès de la revascularisation repose sur un approvisionnement sanguin adéquat, or, la gravité du traumatisme et les lésions du ligament parodontal compliquent considérablement ce processus en altérant le réseau vasculaire local, entravant ainsi l'apport sanguin nécessaire à la régénération de la pulpe2,8,9.

L'apexification constitue une procédure qui consiste à induire une fermeture apicale par la formation d'une barrière de dentine calcifiée. Dans notre cas nous avons utilisé le MTA, comme on peut utiliser la

d'Odontologie Vol 14 - N° 1 & 2 - Décembre 2024

Biodentine qui est plus facile à manipuler, nécessite beaucoup moins de temps pour sa prise, absorbe plus de forces, présente un module d'élasticité plus proche à celui de la dentine donc moins de stress transmis à la dentine 10.

Pronostic

Le pronostic des dents permanentes immatures intruses dépend de plusieurs facteurs :

1) Le stade de développement radiculaire : Les chances de revascularisation augmentent dans les racines avec des apex largement ouverts (> 1,1 mm) 2,3,8,9.

2) Le degré de l'intrusion : plus l'intrusion est importante plus le risque de résorption radiculaire de remplacement et inflammatoire augmente1,2,3.

3) Le délai de prise en charge : plus le traitement est retardé, plus le pronostic de la dent se détériore. En effet, laisser les dents intruses en contact étroit avec l'os accroît considérablement le risque de résorption radiculaire de remplacement, et externe inflammatoire 1,7,11.

4) L'âge du patient : étroitement lié à la perte osseuse marginale avec une plus grande perte osseuse identifiée chez les personnes plus âgées, peut-être parce que leur os est plus dense et qu'ils ont moins de capacités de guérison par rapport aux jeunes individus. D'autre part, les études ont montré que la résorption radiculaire postintrusion est plus fréquente et rapide chez les jeunes patients 1,3,11.

5) Les traumatismes combinés : des études ont démontré que les dents avec des fractures coronaires avec ou sans exposition pulpaire, accompagnées d'une intrusion, présentent une fréquence plus élevée de nécrose pulpaire et d'infection 2.

Parmi les complications on retrouve, les oblitérations canalaires, la nécrose pulpaire, la perte d'attache gingivale, la perte osseuse marginale et les résorptions radiculaires 1,2,3,5,11.

Dans notre situation clinique, la dent traumatisée a été sujette à une nécrose pulpaire, une perte d'attache gingivale, une perte osseuse marginale et des résorptions radiculaires.

La perte d'attache gingivale et la perte osseuse marginale pourraient être liées à l'importance du traumatisme, le degré de l'intrusion et le stade du développement radiculaire. En effet, plus l'intrusion est profonde, plus la dent est enfoncée dans l'os, endommageant le ligament parodontal et compromettant l'attache gingivale. De plus, chez les patients jeunes ayant des dents immatures, leurs structures de soutien sont plus fragiles, augmentant ainsi le risque de résorption et de perte osseuse1,3,4,12.

La résorption radiculaire

En 2022, une nouvelle classification clinique des résorptions radiculaires a été proposée, principalement basée sur les processus anatomiques, physiologiques et pathologiques impliqués dans la résorption, tout en intégrant parfois l'approche étiologique.

Selon cette classification, la résorption survenue dans notre cas clinique est une résorption invasive externe ; connue dans la littérature scientifique par le terme « résorption cervicale ».

Cependant, cette forme de résorption ne se localise pas systématiquement dans la région cervicale de la dent, en particulier en cas de récession gingivale. Étant d'origine externe, elle prend toujours naissance dans une zone sous-gingivale, avant de pouvoir se propager dans toutes les directions au sein de la dent. Le terme « invasive » est privilégié car il décrit la nature du tissu résorptif et la manière dont il se propage à travers la dent 14.

« Heithersay » décrit quatre stades ; la classe IV correspond à la situation clinique rapportée dans notre article, caractérisée par une invasion s'étendant au-delà du tiers cervical de la racine, avec une lésion plus étendue visible radiographiquement.



Figure 11 Représentation schématique de la résorption cervicale classe IV selon « Heithersay » 1999 14.15

Une classification alternative, fondée sur la tomographie assistée par ordinateur en trois dimensions, a été proposée par « Patel et al » en 2018. Celle-ci peut être utile pour orienter les décisions thérapeutiques si de telles images sont disponibles. Cependant, la classification de « Heithersay » est généralement plus facile à utiliser

d'Odontologie Vol 14 - N° 1 & 2 - Décembre 2024

et ne nécessite qu'une radiographie périapicale, qui est généralement l'image réalisée de première intention 14,15,16,17,18.

 Tableau I
 Classification tridimensionnelle des résorptions

 radiculaires cervicales selon « Patel et al » 2018

Hauteur	Propagation circonférentielle	Proximité avec le canal radiculaire
1 : Au niveau de la jonction amélo-cémentaire ou coronaire à la crête osseuse (supracrestal)	A : ≤ 90°	d: Lésion dans la dentine
2 : S'étend dans le tiers coronaire de la racine et apicalement à la crête osseuse (subcrestal)	B: $> 90^{\circ} \ \dot{\alpha} \le 180^{\circ}$	p: Implication pulpaire probable
3 : S'étend dans le tiers moyen de la racine	C : > 180° à ≤ 270°	
4 : S'étend jusqu'à la région apicale de la racine	D: > 270°	

Selon ces 2 classifications, les Classe IV de « Heithersay », et la classe 4 et D de « Patel et al » sont de mauvais pronostic et la dent est généralement non conservable 15,18.

Cependant, à ce jour, il n'existe pas de lignes directrices universelles clairement établies pour le traitement de ces résorptions.

CONCLUSION

L'intrusion dentaire constitue un traumatisme sévère et complexe, particulièrement lorsqu'elle affecte une dent permanente immature. Bien que la ré-éruption spontanée soit l'approche la plus sûre, elle n'est pas toujours applicable. Par conséquent, il est nécessaire de repositionner la dent en veillant à éviter des dommages parodontaux supplémentaires.

Ce type de traumatisme dentaire est le plus souvent associé à un pronostic défavorable, avec des complications dévastatrices telles que les résorptions radiculaires. Bien que les classifications existantes fournissent des repères utiles, aucun consensus précis sur leur traitement n'a encore été établi. Les approches varient selon les cas, incluant le traitement endodontique et les interventions chirurgicales, mais un protocole précis reste à définir.

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>>> ARTICLES SCIENTIFIQUES



Dental trauma and bone defect in aesthetic zones: a case report of an autogenous appositional grafts

Traumatisme dentaire et défaut osseux dans les zone esthétiques : un rapport du cas d'une greffe d'opposition autogène

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Abstract

Before implant placement, a 3D exploration to the bone volume is crucial. In some cases, we face bone defects usually caused by trauma that should be treated through alveolar ridge augmentation in order to create enough bone for endosseous implant. Two major materials have been described in this procedure: xenografts and autogenous bone graft which has been always the gold standard for bone defect corrections.

In this case report, we will discuss the use of autogenous block graft from the symphysis as a method to increase bone width in order to restore the upper right incisor using an implant which was lost due to a dental trauma.

<u>**Key words**</u> : dental trauma, bone defect, symphyseal appositional graft, endosseous implant, guided regenerated bone.

Résumé

Avant la pose d'un implant, une exploration en 3D du volume osseux est cruciale. Dans certains cas, nous sommes confrontés à des défauts osseux généralement causés par un traumatisme qui doivent être traités par une augmentation de la crête alvéolaire afin de créer suffisamment d'os pour la pose d'un implant endo-osseux. Deux matériaux principaux ont été décrits pour cette procédure : les xénogreffes et les greffes osseuses autogènes, qui ont toujours été l'étalon-or pour les corrections de défauts osseux.

Dans ce rapport de cas, nous discuterons de l'utilisation d'une greffe de bloc autogène provenant de la symphyse comme méthode pour augmenter la largeur de l'os afin de restaurer l'incisive supérieure droite à l'aide d'un implant qui avait été perdu à la suite d'un traumatisme dentaire

Mots clés: traumatisme dentaire, défaut osseux, greffe d'apposition symphysaire, implant endo-osseux, régénération osseuse guidée.

INTRODUCTION

Dental trauma the most common cause for loosing teeth in the anterior region . Usually, the lost teeth site presents an alveolar bone defect (12) . Today, implantology is an important part of the practitioner's therapeutic arsenal. Integrated into the treatment plan of oral rehabilitation, it can avoid the use of removable prostheses or fixed restorations that sometimes require the preparation of healthy teeth. Implant-supported restorations, obeying to functional as well as aesthetic requirements, will sometimes urge the use of bone grafting techniques in order to overcome these difficulties (9).

These procedures, aiming to increase bone volume, have been developed in recent years (1).

From the progress made in allograft and xenograft to

more elaborated solutions such as guided tissue regeneration (GTR). However, it seems that in comparison to all these operating modes previously mentioned, from a biological, immunological and even medico-legal point of view, autogenous bone has proven its superiority (7). This is why we are particularly interested in this type of rehabilitation. Autogenous bone grafts have now been used for more than thirty years in pre-implant surgeries . It is still considered, at the present time, as the gold standard for bone reconstruction.

In this case report, we will discuss the use of autogenous block graft as a method to increase bone width in order to restore the upper right incisor using an endosseous implant which was lost due to a dental trauma.

CASE PRESENTATION

H.M a 19-year-old male patient has consulted the Outpatient department of the Monastir Dental Clinic, Faculty of Dental medicine (TUNISIA) for esthetic reasons. The clinical exam revealed the absence of the upper right central incisor due to an ancient trauma (figure 1 a,b).



Figure 1 a: Frontal view, b: occlusal view

The clinical exam revealed that the patient is undergoing an orthodontic treatment. At the lost teeth site, a concavity on the buccal side of the crest which is so typical in the case of a trauma.

This concavity might give us an assumption of crest width that could be insufficient for implant placement. To confirm the diagnosis, radiographic explorations has been realized (figure 2): an orthopantomography (OPG) and a cone beam computed tomography (CBCT) to explore any remaining root tips or cavities in all the denture. The OPG confirmed the absence of a remaining root tip at the 11 site and the persistence of the 46 roots that was treated ulteriorly (figure 2 a).

To explore the width of the alveolar ridge, CBCT scan confirmed the presence of a buccal bone depression (width = 3mm) (figure 2 b).



Figure 2 a: OPG, D. COC. c: symphyseal CBCT scan a: OPG, b: CBCT scan of the 11 site,

After clinical and radiological exams confrontation: a zircon crown supported by an endosseous implant after a block graft harvesting from the symphysis was retained.

Vol 14 - Nº 1 & 2 - Décembre 2024

Additional CBCT scan has been made to explore the symphyseal area, evaluating bone dimensions and anatomical obstacles (figure 2 c).

Seven days before surgery the patient was undergoing scaling and root planning and trained to correct hygiene procedure. On the day of the surgery, the patient rinsed with 0.2% chlorhexidine for one minute.

Block grafting surgical procedure:

The Receiving site:

After local anesthesia, a straigh vertical incision that continues with a sulcular incision was performed with two realising incisions to guarantee flap mobility. A proper flap reflection using Howarth periosteal elevator is the key to have an adequate visibility and accessibility to the alveolar ridge (figure 3 a, b)



Figure 3

a: Incisions, b: Flap reflection showing an horizontal bone defect

The graft dimensions evaluation on the receiving site was measured using a Marguis coded probe. In this case it was 12mm/8mm. Those measures will be marked on the donor sites during harvesting (figure 4)



Figure 4 Graft dimensions evaluation

The flap was a mucoperiosteal and was raised sufficiently over the mucogingival junction in an apical direction for at least 10 mm to cover the graft. With conventional dental forceps, we hold the flap in a coronal direction to evaluate the tension during coverage of the augmentation site using periosteal incisions.

With a new scalpel (blade No. 15) and at the distal part of the flap perpendicular to the periosteum, the periosteum was cut without stopping at a depth of 1-3 mm. Always moving the blade in a direction from distal to mesial. The blade should cut the tissue in a level apical to the mucogingival junction to avoid flap perforation.

After this step, pulling the flap and checking for a tension-free flap advancement is very important. In case of insufficient closure, small parallel cuts on the internal face of the flap to detach any muscle insertions will give more mobility.

Finally, the buccal flap has been adequate in a way that the margin covered on the lingual or palatal site at least of 3-5 mm. (Figure 5)



Figure 5 Flap adaptation after periosteal incisions

The final step before moving to the donor site surgery is to perform small perforations in the cortical bone to get to the spongious bone which will assure the internal vascularization of the graft (figure 6). Those perforations permit the access to the medullary endosteal spaces. It is an important source of osteoprogenitor cells that will boost bone cicatrisation simultaneously with the periosteum.



Figure 6 a : Cortical bone perforations , b: receiving site

A saline-soaked compress is then placed at the recipient site while harvesting the graft from the donor site (figure 6 b).

The Donor site:

After local anesthesia, an incision at the marginal limit of keratinized gingiva (security zone of 5 mm to avoid recessions) and two lateral incisions gave an optimal access to the symphyseal bone, the incision was done on two steps. First, a superficial incision for the mucogingival plan (figure 7 a) then a second incision for the muscular plan (figure 7 b). A full thickness flap was reflected with a sufficient visual access to the surgical site. (figure 7 c). Osteotomy was performed using a piezoelectric device (O T 7 insert) creating a unicortical cut (figure 7 d). The cuts were made at least 5 mm inferior to root tips and 5 mm superior to the inferior border of the mandible and 5mm to the mental foramen respecting the rule of MISH. The cuts limits should exceed the graft dimensions specially at the angles in order to guarantee its separation from the bony tissues around it. The graft was harvested with an osteotome and was recontoured to adapt it to the receiving site (figure 7 e). The donor site was filled with an haemostatic agent (surgicel ©) (figure 7 f). The periosteum and muscle attachment were carefully sutured first. The mucosa closed as a second layer using resorbable sutures to avoid bone exposure during cicatrisation (Figure 7 g , h).



Figure 7

a : Mucosal incision , b: Muscular incision, c: Flap reflection, d: Piezoelectric corticotomy , e: Graft harvesting , f: Surgicel © filling , g : Muscular sutures, h: Mucosal sutures

The Graft was placed back into the receiving site (figure 8). It was stabilized with 2 titanium screws (2 × 10mm). Xenograft was placed around the margin of harvested graft for a better healing shape then all the graft was covered by a second layer of xenograft to fill the space between it and the alveolar ridge. It was then covered by a resorbable collagen membrane which should passe the graft limits by 2mm to insure epithelial cells exclusion and graft stability.



Figure 8 Graft adaptation and fixation

After stabilizing the collagen membrane, the site was closed with 3–0 sutures. An apical mattress suture was performed to translate the tension line apically and also for more stabilization to the membrane. Then for wound closure, classic O sutures was used.

Post-operatively, the patient was given antibiotics (amoxicillin for 7 days), analgesics (paracetamol for 5 days) and anti-inflammatory medication (dexamethasone for 2 days). The patient was recalled every alternate day to check for wound dehiscence and hematoma.

After 10 months (figure 9) the CBCT scan showed a gain in bone width (5 mm at least) that allows us to place the implant. The implant size was selected as per CBCT measurements and was finalized as 3.6 × 10 mm.



Figure 9 CBCT scan after 10 months (width 8 mm)

Implant surgery procedure

A crestal incision was given along with 2 releasing incisions around the 11 region (figure 10 a).

Full thickness mucoperiosteal flap was reflected to expose the titanium screws which were then removed

(figure 10 b). Following this, biotech dental Implant $(3.6 \times 10 \text{ mm})$ was placed (figure 10 c). The site closed using 3-0 suture (figure 10 d).



Figure 10 a : Incision and flap reflection, b: Screws removal, c:Implant placement; d: Sutures

DISCUSSION

Dento-alveolar trauma often leads to a need for reconstruction of the alveolar crest before an implant can be placed. Although autogenous bone grafts is considered the 'gold standard', this may be associated with patient morbidity and graft resorption. Consequently, the use of bone substitutes has increased. Today, a substantial number of biomaterials are available on the market, but only a few are well documented. The user should be aware that these biomaterials have different properties: resorbable or non-resorbable, time of resorption and resorption mechanism. The key to a successful aesthetic and functional implant treatment is to achieve a harmonious relationship between the implant-supported restoration and the natural teeth.

Ideally, the implant should be in line with the future prosthetic tooth and in line with the bone crest. In cases of deficient bone volume, the use of angled abutments can correct an offset emergence profile. However, according to Bahat et al (2007), and due to many factors (aesthetic, mechanical, etc.), surgical reshaping always seems to be preferable to the modification of supra-implant abutments (1). According to Baudoin et al , Abd El Salam and Davarpanah et al, the width of the alveolar ridge should allow the implant to be covered on all sides by a minimum of 1.5mm of bone (2, 3, 4). There are many types of grafts which can be used to correct the crest dimensions. In this case we have used appositional autograft

Autografts: An autogenous bone graft is an autograft based on taking bone tissue and grafting it into the same individual. Widely used, this graft represents one of the most interesting techniques because of its osteogenic potential. The presence of osteoinductive cells and growth factors will stimulate the proliferation of osteoblasts and bone apposition. As a result, due to those many properties (osteogenesis, osteoinduction and osteoconduction) that autogenous bone grafting is the technique of choice among the various materials that can be used for fillers and grafts (6, 5). As an autogenous, bone it has many advantages: The first advantage is that the graft eliminates, by definition, any risk of rejection of immunological origin and of transmission of infectious diseases (bacteria, virus, prion) (7). Moreover, knowing that bone regeneration is governed by the three basic mechanisms of osteogenesis, osteoconduction and osteoinduction, it is interesting to remember that autogenous bone initiates these three processes. Autogenous bone is osteogenic (because it contains living bone cells), osteoinductive (because of the presence of matrix proteins) and osteoconductive (the bone framework guides remodelling), which makes it the most effective graft material in most clinical situations (Zerah, 2004) (8, 9, 10).

At the same time, it has some disadvantages such as the necessity of a second operative site:

the donor site. This means that the possible postoperative consequences inherent in this surgery must be taken into consideration (11). It is this disadvantage that has led some authors, to use allogeneic bone, or synthetic materials, if the autogenous bone is not used (12). Another major disadvantage of autogenous bone grafting is it's more or less significant long-term resorption. This resorption will be all the greater as the constraints are greater (13,14).

In addition, the availability of this autogenous bone can also be a disadvantage, as in the case of an important reconstructions where heavy interventions are to be considered (cranial or iliac harvest, for example). Appositional grafts: (used in this clinical case). According to Maujean et al, appositional bone grafts correspond to the addition of material in the form of screwed bone blocks or autogenous (and/or exogenous) bone particles, whether or not covered by a membrane, to a site with a quantitative or qualitative bone deficit (15, 16). It can be used for:

Horizontal alveolar reconstructions. This is the typical indication for block grafts but also for thin ridge expansions. Horizontal bone loss most often requires autogenous bone harvesting en bloc during symphyseal or retromolar harvesting (17,18). The first intra-oral donor site described in pre-implant reconstructive surgery is the mandibular anterior donor site or "symphyseal site». It is an easily accessible donor site that allows harvesting under local anaesthesia. In fact, symphyseal bone in its massive form (cortical blocks), is used for the treatment of limited or medium-sized crest height deficiencies (18). Crushed and used alone, or in association with bone substitute materials possibly supplemented by membranes obtained by blood centrifugation (PRF). Quantitatively, it is possible to obtain a graft of up to 5 cm in length (in one or two pieces), 5 to 6 mm in thickness and 12 to 15 mm in height, depending on the subject (19). In 1999, Misch compared the two harvesting sites, retro molar and chin, and noted that the latter is easier to access and has a larger volume; it yields a thick corticocancellous block with an average size of 1.74cm³ (20). For harvesting the symphyseal graft, osteotomy cuts were given conventionally according to the rule of 5mm by Misch (21)

Vol 14 - Nº 1 & 2 - Décembre 2024

Inherent contraindications to symphyseal harvesting: (22) Insufficient height at the basal bone level, a treatment plan involving placement of implants at the mandibular anterior ridge, A bony defect greater than 4 teeth in extent, or with very significant vertical bone loss, in which case the indication for an extraoral donor site will be preferred.

The graft healing takes place in several phases. The first, which is dependent on the recipient bed, consists of an inflammatory reaction with the penetration of vascular buds into the grafted material, providing the mediators involved in neovascularization and cell migration. Those buds are from two origins: the first is endosteal, the second is periosteal (23). Thanks to this revascularization, the physiological processes of osteoclastic resorption and bone neoformation will, as during physiological bone remodelling, progressively and more or less completely lead to the replacement of the graft by neo formed bone (24).

For a minimum bone resorption during healing, any pressure after bone volume increasing should be

eliminated via two methods: flap design and suture technique.

Incision design and flap reflection techniques may increase flap mobility, allowing the flap to rest passively over the membrane and increased volume of graft material. Most strategies combine flap extension, vertical incisions, and periosteal releasing incisions to increase mobility and passivity of full thickness (mucoperiosteal) flaps. Park et al (25) found that the addition of one vertical incision extends the length of the flap by 1.1 mm, the second vertical incision extends the flap 1.9 mm from baseline, and a periosteal releasing incision extends the flap by 5.5 mm from baseline. Raising the flap has an immediate consequence: it becomes mobile. This mobility will create additional tension.

The key to eliminate all tension and mobility, according to Alain SIMONPIERI et all (26) is the suture that must immobilise the vestibular flap. This is the principle of the apical mattress suture which will immobilise the flap creating a completely tensionfree zone. This absence of tension will prevent not only the early reopening of the flap, but also creates a shortening of the vestibular flap, resulting in thickening of the gingiva especially in its keratinised part.

For a maximum exploitation of bone volume, the software should be used to vary for each implant:

- its dimensions: diameter and length

- its inclination in the vestibulo-lingual/palatal and mesio-distal planes as needed.

This is the only method that allows the double obliquity of an implant to be visualized simultaneously.

Depending on the available bone volume, several solutions are often possible if one takes into account the prosthetic constraints, the dimensions of the available implants and their possible inclinations. All these solutions can be considered by implant simulation, and the one corresponding to the best compromise between all these factors will be retained.

CONCLUSION

Autogenous bone was and still the gold standard solution for bone defects especially in case of a trauma . The evolution of instrumentation (piezo devices) and 3D radiographic explorations have made harvesting more accessible for practitioners. it should be always introduced to the patients as a first therapeutic plan. In case of a contraindication, then bone substitutes (xenografts etc...) can be exploited.

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>>> ARTICLES SCIENTIFIQUES



Traitement ortho-chirurgical d'une classe III squelettique associée à une laterognathie mandibulaire : à propos d'un cas clinique

Ortho-surgical treatment of skeletal class III associated with mandibular laterognathy: a clinical case

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Résumé

Introduction : La malocclusion squelettique de classe III est caractérisée par une disharmonie entre le maxillaire et la mandibule, affectant l'apparence du visage et la fonction masticatoire. Habituellement, l'association avec des anomalies transversales et verticales complique le travail de l'orthodontiste qui sera perçu comme un défi Observation clinique : Il s'agit d'une patiente âgée de 18 ans, consulte pour un motif esthétique et fonctionnel : la présence d'un diastème inter-incisif supérieur et une difficulté lors de l'incision et la mastication ainsi que des douleurs articulaires. Les analyses céphalométriques montrent la présence d'une classe III squelettique par prognathie mandibulaire avec une latérognathie mandibulaire faciale. Ainsi un traitement orthochirurgical a était indiqué On a entamé une phase orthodontique préchirurgical de décompensation suivi d'une chirurgie d'avancée et de dérotation. Une phase orthodontique post chirurgical a permis par la suite l'amélioration de l'occlusion et l'établissement d'une parfaite classe I dentaire canine et molaire. Discussion : Les cas de malocclusion squelettique de classe III associés à des différentes anomalies nécessitent un contrôle très précis des dents et des arcades dans le sens antéro-postérieur, transversal et vertical ; c'est la raison pour laquelle la chirurgie orthognathique s'avère parfois indispensable. Habituellement, lorsque le problème squelettique concerne l'esthétique du visage, l'estime de soi du patient, la perception et la conscience de son profil représentent la principale plainte. Ainsi, l'objectif principal de la chirurgie orthognathique est d'améliorer l'esthétique faciale pour obtenir un résultat clinique acceptable et de restaurer une fonction normale avec un aspect facial harmonieux. Il est principalement indiqué chez les patients adultes présentant une asymétrie faciale et sans potentiel de croissance. Conclusion : L'approche orthochirurgicale pour traiter les malocclusions squelettiques de classe III sévères et compliquées peut être un traitement efficace des anomalies osseuses. Son succès repose sur un bon examen clinique pour obtenir un diagnostic précis et un plan de traitement individualisé pour répondre aux besoins du patient et aux résultats souhaités en termes d'aspect esthétique final et de fonction occlusale.

Mots-clés : Classe III squelettique, Latérognathie mandibulaire, Chirurgie orthognathique, Traitement orthodontique

Abstract

Introduction: Class III skeletal malocclusion is characterized by disharmony between the maxilla and mandible, affecting facial appearance and masticatory function. Clinical observation: This is an 18-year-old patient, consulted for aesthetic and functional reasons. Cephalometric analyzes showed the presence of skeletal class III due to mandibular prognathia with mandibular laterognathia. Thus, an orthosurgical treatment was indicated. Discussion: Cases of class III skeletal malocclusion associated with different anomalies require very precise control of the teeth and arches in 3 directions; this is why orthognathic surgery is sometimes essential. Thus, the main objective of surgery is to improve facial aesthetics to obtain an acceptable clinical result and to restore normal function with a harmonious facial appearance.Conclusion: The orthosurgical approach to treat severe and complicated Class III skeletal malocclusions can be an effective treatment for bone abnormalities. Its success is based on a good clinical examination to obtain a precise diagnosis.

Key words: Skeletal class III, Mandibular laterognathia, Orthognathic surgery, Orthodontic treatment.

INTRODUCTION

Les classes III sont des anomalies caractérisées par une position trop antérieure de la mandibule par rapport au maxillaire qui peut être en position normale ou rétrusive. Les classes III squelettiques et dentaires sont le plus souvent associées, mais on peut rencontrer parfois une classe III squelettique avec des relations occlusales de classe I et vice versa (3,18).

La malocclusion squelettique de classe III est caractérisée par une disharmonie entre le maxillaire et la mandibule, affectant l'apparence du visage Actualités Tunisiennes 57

d'Odontologie Vol 14 - N° 1 & 2 - Décembre 2024

et la fonction masticatoire.

Habituellement, l'association avec des anomalies transversales et verticales complique le travail de l'orthodontiste qui sera perçu comme un défi. L'approche orthochirurgicale peut être considérée comme une alternative efficace pour le traitement des malocclusions squelettiques de classe III et qui nécessite une relation interdisciplinaire entre l'orthodontiste et un chirurgien maxillo-facial.(13)

Dans le traitement orthochirurgical de la dysmorphose de classe III squelettique, on distingue 3 types de chirurgies :

-Ostéotomie Lefort I d'avancée maxillaire

-Ostéotomie d'Obwegeser de recul mandibulaire

-Chirurgie bi-maxillaire

Une croissance mandibulaire sagittale excessive isolée ou associé à un déficit sagittal maxillaire, entraînent généralement le développement de déformations dento-faciales asymétriques de classe III (1).

En effet, l'asymétrie faciale est l'une des déformations dento-faciales les plus difficiles à corriger en orthodontie. Cette asymétrie est souvent causée par un dysfonctionnement de l'articulation temporo-mandibulaire (ATM) et est donc couramment observée dans la mandibule, qui constitue le support squelettique des tissus mous de l'étage inférieur du visage.(13)

La correction optimale de cette asymétrie nécessite une approche interdisciplinaire impliquant la coopération de l'orthodontiste et du chirurgien maxillo-facial dès le début de la planification du traitement.

L'objectif principal de notre article est de présenter le déroulement d'une approche ortho-chirurgicale combinée d'une patiente adulte présentant une malocclusion squelettique de classe III et une latérognathie mandibulaire.

ETIOPATHOGÉNIE DE L'ANOMALIE SAGITTALE

Les étiologies de la malocclusion de classe III sont vastes et complexes. Elles sont associées à des facteurs environnementaux et génétiques (9).

Les facteurs génétiques

Les anomalies de classe III sont majoritairement d'origine héréditaire, leur transmission se fait selon un mode autosomique dominant.

Cette transmission familiale peut porter sur :

- Les bases osseuses.
- La langue : basse, volumineuse et protrusive.

L'exemple le plus connu de facteur héréditaire est celui de la famille des Habsbourg. Les caractéristiques distinctives de cette famille comprenaient une mandibule prognathique et, par conséquent une malocclusion de classe III. Sur les 40 membres de la famille pour lesquels des dossiers sont disponibles, 33 présentaient une mandibule prognathique et donc une classe III squelettique (10,11).

Les facteurs environnementaux

Un large éventail de facteurs environnementaux a été suggéré pour contribuer au développement de la malocclusion de classe III. Il s'agit notamment de :

- L'éruption ectopique de l'incisive centrale maxillaire

- L'hypertrophie des amygdales (difficulté à respirer par le nez)

- Défauts anatomiques congénitaux

- Les maladies de l'hypophyse (comme l'acromégalie)

- L'habitude de propulser la mandibule en raison de la taille de la langue (macroglossie) ou de problèmes respiratoires, qui peuvent conduire à la classe III.

- Contacts prématurés : Selon Planas, ces contacts prématurés peuvent entrainer une propulsion mandibulaire et une limitation de l'enveloppe fonctionnelle de la mandibule.

- La croissance : La quantité de croissance mandibulaire normalement supérieure à celle du maxillaire est un facteur défavorable dans l'évolution des classes III. De plus, la poursuite de la croissance mandibulaire plus de 2 ans après celle du maxillaire favorise l'aggravation tardive de ces dysmorphoses et provoque fréquemment leur récidive (14,15).

OBSERVATION

Il s'agit d'une patiente âgée de 18 ans , consulte pour un motif esthétique et fonctionnel : la présence d'un diastème inter-incisif supérieur et une difficulté lors de l'incision et la mastication ainsi que des douleurs articulaires.

L'examen exobuccal révèle (Figure 1):

- Vue de face : asymétrie faciale, non parallélisme des lignes horizontales, déviation du menton vers le côté droit

- Vue de profil : profil concave, diminution de l'étage inférieur, Angle naso-labial ouvert, rétrochéilie supérieure, prochéilie inférieure et une distance cervico-mentonnière de 5 doigts

- Sourire disgracieux perturbé par un diastème inter incisif supérieur et une asymétrie faciale

- Sourire disgracieux perturbé par un diastème inter incisif supérieur et une asymétrie faciale









L'examen endobuccal révèle (Figure 2): - Inversé d'articulé antérieure et

- Classe III canine de deux cotés et classe

- Déviation du milieu inter incisif inférieur

unilatérale du côté droit - Une béance antérieure

III molaire côté droit

vers le côté droit



Photos exobuccales de début de traitement







Figure 2 Photographies endobuccales avant le traitement

Examen des fonctions

- Déglutition dyfonctionnelle
- Respiration mixte
- Mastication unilatérale stricte coté gauche
- Altération de la fonction phonatrice, chuintement
- Absence des Para-fonctions
- Manœuvre de DENEVREZE négative

- Non coïncidence des milieux en PIM, en RC et en ouverture maximale

Le bilan radiologique comporte (Figure 3):

- Un panoramique dentaire qui confirme la présence des germes des dents de sagesse.

- Une téléradiographie de profil sur laquelle le tracé céphalométrique permet de poser le diagnostic squelettique de la malocclusion (trois analyses céphalométriques ont été effectuées (Tab I, Tab II et figure 4) : l'analyse de Tweed , de Steiner et de Coben).

- Une téléradiographie de face (Figure 5)









Figure 3 Bilan Radiologique de début de traitement

Tableau I Analyse de Tweed

SNA	84°	13
SNB	88°	100
ANB	-4°	ar
Ao Bo	-11mm	1
FMA	23°	ma
FMLA	38°	적
IMP.4	93°	Eal
Li	120°	po
UF L	134°	-
Z	84°	-

4 RI 0,8 Enc 5 C Spee 1 y Enc Croissance 0 Enc 8 +1,2 Total



SND	87°		+	Bur 6
I/NA	40°/10mm	Enc	u '	See.
i/NB	30°/5mm	RI	a fre	2,7
Po/NB	0mm	C Spee	Jen 2 ft	yay 1
GoGn/SN	. 37°	DDW	21.	C. A.
SL	75mm	DDM	1,5	Par
SE	19mm	Exo	non	E. You
EL	94mm	NET	S all	and a





Figure 4 Analyse de Coben

Actualités Tunisiennes 60 d'Odontologie

Vol 14 - Nº 1 & 2 - Décembre 2024

L'analyse de Coben :

- Montre l'augmentation de la taille de la mandibule ainsi qu'une position avancée de celle -ci

- Augmentation de la hauteur du ramus

- Augmentation de la hauteur de l'étage inférieure de la face





Téléradiographie de face



Les objectifs du traitement orthodontique sont :

- Correction du décalage squelettique
- Correction de la dysharmonie dento-maxillaire
- Amélioration de la forme des arcades
- Rétablir un overjet et un overbite fonctionnels

- Améliorer autant que possible le profil esthétique et le sourire de la patiente

- Faciliter l'accès à l'hygiène

La décision thérapeutique et le plan de traitement comporte : Traitement orthochirurgical en technique de Roth (022*028) sans extraction avec une ostéotomie d'Obwegeser de recul et de dérotation mandibulaire suivie par une génioplastie de recentrage

* Préparation de la denture

- Freinectomie labiale supérieure

- Nivellement de l'arcade maxillaire par des arcs Niti 012, 014, 016 et 018

- Nivellement de l'arcade inférieure par des arcs Niti 012, 014,016 et 018

- Fermeture des espaces au niveau de l'arcade supérieur et mésialisation des fonds au niveau de l'arcade inférieure

* Phase chirurgicale

- Réalisation des arcs chirurgicaux sur arcs acier 019"*025".

- Réalisation d'une gouttière chirurgicale.

- Chirurgie d'Obwegeser Dalpont de recul et de dérotation mandibulaire pour corriger l'asymétrie.

- Chirurgie de génioplastie de recentrage
- * Finition:
- Coordination des arcades par des arcs acier 019"*025".
- Traction inter-maxillaire si nécessaire.
- * Stabilisation

* Contention collée maxillaire et mandibulaire de canine à canine





Figure 6

Nivellement dentaire et fermeture des espaces supérieurs et inférieurs



Figure 7

Les Photos endobuccales avant la chirurgie













Figure 9 Bilan radiologique avant la chirurgie







Figure 11 Ostéotomie d'Obwegeser de recul et de dérotation mandibulaire vers le côté gauche

d'Odontologie Vol 14 - Nº 1 & 2 - Décembre 2024



Figure 12 Les photos endobuccales après la chirurgie



Figure 13 Les photos exobuccales après la chirurgie



Figure 14 Fermeture des espaces inférieures par une chainette

d'Odontologie Vol 14 - Nº 1 & 2 - Décembre 2024

- Mécanique de classe III du coté gauche
- Élastiques d'intercuspidations du coté droit

Une déviation du menton restante indication d'une génioplastie de recentrage





Figure 15 Les photos endobuccales du fin de traitement









Figure 16 Les photos exobuccales du fin de traitement







DISCUSSION

Les cas de malocclusion squelettique de classe III associés à des différentes anomalies nécessitent un contrôle très précis des dents et des arcades dans le sens antéro-postérieur, transversal et vertical ; c'est la raison pour laquelle la chirurgie orthognathique

s'avère parfois indispensable. (16)

Habituellement, lorsque le problème squelettique concerne l'esthétique du visage, l'estime de soi du patient, la perception et la conscience de son profil représentent la principale plainte. Ainsi, l'objectif principal de la chirurgie orthognathique est d'améliorer l'esthétique faciale pour obtenir un résultat clinique acceptable et de restaurer une fonction normale avec un aspect facial harmonieux. Il est principalement indiqué chez les patients adultes présentant une asymétrie faciale et sans potentiel de croissance (2).

Cet article décrit le traitement d'une patiente adulte présentant une relation squelettique et dentaire de classe III associée à une latérognathie mandibulaire. Un traitement orthodontique préchirurgical sans extraction a été exécuté pour décompenser la malocclusion et niveller les dents.

La détermination de la cause de l'asymétrie est nécessaire pour la formulation du plan de traitement approprié. Les asymétries dentaires sont souvent traitées orthodontiquement au moyen de d'extraction asymetrique et de mécanique asymétrique à l'aide des élastique (14,15). Mais dans notre cas , le décalage transversale associé à la classe III ont indiqué une chirurgie orthognathique associé au traitement orthodontique.

En raison de sa polyvalence et de sa simplicité, La chirurgie d'Obwegeser a gagné en popularité pour une vaste marge d'utilisation (12). D'ailleurs, la réalisation de cette ostéotomie peut être l'une des procédures les plus pertinentes et les plus efficaces de la chirurgie orthognathique (5,7).

De ce fait, nous commençons toujours par le positionnement des tissus durs, là où ils pourront assurer un bon soutien des tissus mous. Dans un second temps, nous portons notre attention sur la morphologie des tissus durs et des tissus mous, afin de décider comment en changer la forme (6).

Dans ce cadre, une préparation orthodontique adéquate doit être effectuée avant toute intervention chirurgicale. Cela inclut l'orthodontie préopératoire pour la décompensation dentaire ainsi qu'une évaluation faciale globale pour l'esthétique du visage [56,78]. Une séquence opératoire cohérente doit être suivie pour accélérer la procédure et éliminer les pertes de temps inutiles (4)

En effet, Kerr et al. ont suggéré que la chirurgie soit pratiquée chez les patients présentant un angle ANB et IMPA inférieurs à - 4° et 83° respectivement (8).

Rabie et al. ont évalué des patients de classe III qui avaient subi un traitement orthodontique de camouflage ou une chirurgie orthognathique et ont suggéré que l'angle de Holdaway peut être un guide fiable pour déterminer la modalité de traitement de ces patients. Ils ont également suggéré que les patients dont l'angle de Holdaway est supérieur à 12° peuvent être traités avec succès par l'orthodontie seule, tandis que les patients dont l'angle de Holdaway est inférieur à 12° doivent être traités par l'orthodontie (14).

Dans notre cas, le défis était de gérer à la fois les anomalies dans les 3 sens : la classe III, la béance antérieure et la latérognathie mandibulaire.

Comme préalable au traitement, on a commencé par une freinectomie labiale supérieure pour pouvoir fermer le diastéme inter-incisif supérieur.

Puis on a entamé la préparation à la chirurgie par un nivellement des arcades supérieure et inférieure.

Après cette étape, on a réalisé une fermeture des espaces au niveau de l'arcade supérieure par technique de glissement. Pour l'arcade inférieure on a réalisé une mesialisation des fonds.

On a terminé la préparation chirurgicale par la mise en place des arcs chirurgicaux (arcs acier 019"*025") et par la confection d'une gouttiére chirurgicale.

Enfin, la patiente a subi une chirurgie d'Obwegeser Dalpont de recul et de dérotation mandibulaire pour corriger l'asymétrie faciale.

Pour recentrer le menton, une chirurgie de recentrage a été indiquée.

Cependant, le défi majeur d'un cas pareil était la stabilité à long terme. Pour garantir cet objectif, l'obtention d'une occlusion fonctionnelle et stable et l'utilisation d'une contention adéquate sont nécessaires. Par conséquent, il est obligatoire pour tous les orthodontistes de diagnostiquer correctement le cas et de planifier initialement le traitement et la contention.

CONCLUSION

L'approche orthochirurgicale pour traiter les malocclusions squelettiques de classe III sévères et compliquées peut être un traitement efficace des anomalies osseuses. Son succès repose sur un bon examen clinique pour obtenir un diagnostic précis et un plan de traitement individualisé pour répondre aux besoins du patient et aux résultats souhaités en termes d'aspect esthétique final et de fonction occlusale.

Le résultat esthétique stable optimal et le résultat fonctionnel amélioré dans notre cas ont été obtenus

par une rotation transversal, un recul de la mandibule et une génioplastie de redressement en conjonction avec un traitement orthodontique préchirurgical et post-chirurgical méticuleusement planifié.

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>>> ARTICLES SCIENTIFIQUES



Emergency Management of Coronal Fractures in Immature permanent Teeth: cases report

Traitement d'urgence des fractures coronaires des dents permanentes immatures

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Abstract

Immediate and effective management of traumatized immature permanent teeth with vital pulp is crucial for ensuring proper root development and apex closure while preventing complications. This article details a series of cases involving pediatric patients with various coronal fractures due to dental trauma. Each case was treated with appropriate methods, including conservative Vital Pulp Therapy (VPT) using different sealing or pulp-capping materials to promote apexogenesis, or endodontic treatments according to the latest guidelines. These emergency treatments were followed by functional and aesthetic restorations, resulting in successful and effective management of these challenging dental injuries. **Key words**: Crown fracture; vital pulp therapy; immature permanent teeth; dental trauma

Résumé

La prise en charge immédiate et efficace des dents permanentes immatures traumatisées avec une pulpe vitale est cruciale pour assurer le développement correct de la racine et la fermeture de l'apex tout en prévenant les complications. Cet article présente une série de cas impliquant des patients pédiatriques présentant diverses fractures coronaires dues à des traumatismes dentaires. Chaque cas a été traité avec des méthodes appropriées, y compris la thérapie conservatrice de la pulpe vitale (VPT) en utilisant différents matériaux de scellement ou de coiffage de la pulpe pour promouvoir l'apexogenèse, ou des traitements endodontiques conformément aux dernières recommandations. Ces traitements d'urgence ont été suivis de restaurations fonctionnelles et esthétiques, ce qui a permis de gérer avec succès et efficacité ces lésions dentaires difficiles. **Mots clés**: Fracture coronaire, Traitement de la pulpe vitale, dents permanentes immatures, Traumatisme dentaire.

INTRODUCTION

Traumatic dental injuries (TDIs) are particularly prevalent among children and adolescents.

These injuries can severely affect both the function and appearance of teeth, often leading to physical and psychological challenges for those impacted. Crown fractures are the most common type of TDI, comprising between 26.2% and 44.1% of cases. These fractures can be categorized as either complicated or uncomplicated, based on whether there is exposure of the pulp [1]

Conserving vitality and ensuring aesthetic restorations are major challenges when managing traumatized immature teeth with coronal fractures. Moreover, shortcomings in the initial management of traumatic dental injuries (TDIs) can lead to a prolonged treatment process, often resulting in increased long-term treatment costs [2]. Based on the latest guidelines and recommendations from IADT [2] and AAE [3], various Vital Pulp Therapy (VPT) techniques are employed to maintain pulp vitality and achieve successful outcomes. These include direct pulp capping for recent, small pulp exposures, partial pulpotomy (Cvek's pulpotomy) for removing part of the coronal pulp to achieve hemostasis, and complete pulpotomy for removing the entire coronal pulp down to the pulp stumps before applying a pulp-capping material.[4]

The size of the pulp exposure is key in selecting the appropriate vital pulp therapy. However, when a fracture severely compromises the tooth structure, a post for core retention might be required. In these situations, endodontic treatment may be indicated even if the pulp is still vital and the exposure is relatively minor [5]

Case 1: A simple crown fracture treated with Indirect pulp capping

A 9-year-old boy in good general condition was a victim of a trauma one day after a road accident. Clinical and radiological examinations revealed degree 1 mobility on tooth 11 associated with an amelodentinal fracture close to the pulp without exposure (figure 1; a). The retro alveolar x-ray on 11 shows that the tooth is still immature (Nolla stage 9) and confirms the diagnosis of a subluxation and a simple coronal fracture (figure 1; b). Emergency treatment consisted of indirect pulp capping with "Dycal" followed by bonding of the fragment after hydration in saline solution. (figure 2 et 3)





Uncomplicated crown fracture of the 11 tooth(a) with a retro alveolar showing immature central incisors(b)





Indirect pulp capping with"Dycal" following Figure 2 by bonding of the fragment





The fragment was bonding on the 11 fractured tooth (a) with X ray post operative (b)

Case 2: Emergency Treatment of a Complicated Crown Fracture with Partial Pulpotomy

A 9-year-old girl presented to the pediatric dentistry department 2 days after a dental trauma. The examination revealed a crown fracture on tooth 11 with minimal pulpal exposure (2 mm) and a juxta-gingival fracture on tooth 21 with more extensive pulpal exposure (over 3 mm).(figure 4) Radiographs indicated that both central incisors were at Nolla stage 8.(figure 5a)

d'Odontologie Vol 14 - Nº 1 & 2 - Décembre 2024

The treatment plan involved performing a partial pulpotomy (Cvek's pulpotomy) on tooth 11, followed by pulp capping with MTA (figure 5b).

For tooth 21, a pulpectomy was chosen due to the extensive juxta-gingival fracture, which compromised the retention of a future restoration (figure 5c).



Figure 4

Crown fracture of the upper central incisors with pulp exposure; the fracture on 21 is more severe and juxta gingival





The different retro alveolar (a) confirms the diagnosis of crown fracture with pulp exposure on the immature central incisors (b) partial pulpotomy with MTA on the 11 (c) Pulpectomy on the 21

Case 3: A complicated crown fracture treated in emergency with pulpectomy

An 8-year-old male patient visited the department of pediatric Dentistry in emergency following a dental trauma that occurred 24 hours ago as a result of a fall at school. Intraoral examination revealed a simple coronal fracture on the 21 with pulp exposure. (figure 6) Emergency treatment was based on the latest IADT recommendations. For the 11; the treatment was to protect the dentinal

d'Odontologie Vol 14 - N° 1 & 2 - Décembre 2024

wound with a capping material such as CVI(figure 7a). For the 21 given that the fracture exceeds the coronal half, the global management consists of setting up a coronoradicular reconstitution. The emergency treatment is therefore to open the tooth and carry out the endodontic debridement following by an intracanal medication based on calcium hydroxide. Subsequently; the placement of an apical plug of MTA at the level of the 21 is done according to the guidelines of American association of endodontists (figure 7b). Next, the root canal filling was followed by a coronal radicular reconstitution (figure 8 a). The final aesthetic result is achieved on traumatized incisors thanks to composite resin restorations (figure 8b).



Figure 6

Simple crown fracture on the 11 with complicated fracture that exceeds the coronal half on the 21. The panoramic radiograph shows the different fractures on the immature incisors





(a) sealing with a CVI the simple fracture of the 21(b) Pulpectomy of the 21 following by placing an apical plug of MTA.



Figure 8

(a) placing a coronal radicular reconstitution.(b) Restoring aesthetics with composite resin on the central incisors

DISCUSSION

The preservation of pulpal vitality is crucial for the long-term success of injured teeth, particularly in immature teeth, as it significantly impacts their prognosis [6]. Effective emergency treatment of traumatic dental injuries (TDIs) is essential, as any shortcomings can lead to prolonged treatment cycles and increased costs [7]. Vital pulp therapy (VPT) techniques play a key role in this management by aiming to maintain the vitality and function of the dental pulp after injury from trauma, caries, or restorative procedures. These techniques traditionally include indirect or direct pulp capping, and partial or complete pulpotomy [6].

Thus, the use of appropriate VPT interventions is integral to optimizing outcomes for traumatized immature teeth. [7]

In the initial case, the patient presented with a simple coronal fracture without pulp exposure.

The emergency treatment adhered to the recommendations of the International Association of Dental Traumatology (IADT) [2]. The treatment involved placing a calcium hydroxide lining; which effectively prevents adverse symptoms and achieves favorable outcomes. Clinical guidelines show it supports normal root development and apical closure, while avoiding complications like pulpal necrosis. periapical involvement, root resorption, or ankylosis [1]

Subsequently; the fractured fragment was reattached to the tooth after being properly hydrated by soaking it in water or saline for 20 minutes [2] The fragment bonding was completed in the initial visit, as it is recommended to place a definitive bonded restoration promptly following vital pulp therapy (VPT) for traumatized teeth. This approach helps to minimize the risk of coronal leakage and prevents potential pulp infections. [8]

For complicated fractures with pulp exposure, the treatment approach is more complex and can involve either pulp capping or pulpotomy. The choice of treatment depends on factors such as the extent of pulp exposure, the time elapsed between the injury and examination, and the stage of root development.[9] Direct pulp capping is recommended for teeth with recent trauma (within 24 hours) and minimal pulp exposure (up to 1 mm). This procedure is suitable for both immature and mature teeth, particularly when the exposure is limited and then; a simple restoration is required [10]. There are two types of pulpotomy procedures. The first, partial pulpotomy "Cvek pulpotomy", is indicated for traumatic pulp exposures. This procedure involves the removal of inflamed pulp tissue from an exposure site of 4 millimeters or less, typically to a depth of 1 to 3 millimeters or more, to reach and preserve the deeper healthy pulp tissue.[11] In contrast, total pulpotomy entails the complete removal of the cameral pulp. This approach is appropriate only if the root pulp is Actualités Tunisiennes 68

d'Odontologie

Vol 14 - Nº 1 & 2 - Décembre 2024

unaffected, as evidenced by the absence of pulpal bleeding from the root following cameral pulp removal and the achievement of hemostasis within 5 minutes [10][12]

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d'Odontologie

>>> ARTICLES SCIENTIFIQUES



Alveolar Ridge Preservation: Bridging the Gap Between Extraction and Implantation (Case Report)

Préservation alvéolaire: entre l'extraction et l'implantation (à propos d'un cas clinique)

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Abstract

Alveolar ridge preservation (ARP) is a technique designed to reduce bone resorption after tooth extraction and to support prosthetically-driven implant placement. Understanding the physiological changes that occur post-extraction, along with the effects of ARP, is essential for effectively implementing clinical procedures.

ARP reliably minimizes undesirable horizontal and vertical ridge reduction when there is a delay in dental implant treatment.

Various methods, such as guided bone regeneration, socket fillers, socket sealers, and growth factors, have been effectively utilized in this context.

The main goal of this article is to illustrate, step by step, an appropriate surgical technique to preserve the dental socket and optimize the placement of the implant and the subsequent aesthetic prosthetic restoration.

<u>Key words</u> : Alveolar ridge preservation, Bone resorption, Tooth extraction, Alveolar grafting materials, Alveolar sealing membranes, Growth factors, bone loss

Résumé

La préservation alvéolaire est une technique déstinée à réduire la résorption osseuse après une extraction dentaire, Elle permet de manière fiable de minimiser les pertes osseuses, tant horizontales que verticales, en cas de retard dans le traitement implantaire.

Comprendre les changements physiologiques qui surviennent après l'extraction, ainsi que les effets de la préservation alvolaire est essentiel pour mettre en œuvre efficacement les procédures cliniques.

Différentes méthodes, telles que la régénération osseuse guidée, les biomatériaux de comblement alvéolaire, les membranes de scellement alvéolaire et les facteurs de croissance, ont été efficacement utilisées dans ce contexte.

L'objectif principal de cet article est d'illustrer, étape par étape, deux techniques chirurgicales adaptées pour préserver l'alvéole dentaire et optimiser la mise en place de l'implant ainsi que la restauration prothétique esthétique qui en découle.

INTRODUCTION

Tooth extraction is frequently necessary to remove teeth that cannot be adequately preserved in terms of health, function, and/or aesthetics, or for strategic purposes. Beyond the immediate impact of tooth loss on quality of life, extraction triggers a series of biological processes that disrupt the homeostasis and structural integrity of the surrounding periodontal tissues. This leads to progressive disuse atrophy of the alveolar ridge.1

Managing a post-extraction socket is challenging.

Uncontrolled vertical and horizontal bone resorption can disrupt the ideal three-dimensional placement of an implant.

Alveolar ridge preservation (ARP) is defined as "a procedure to maintain the ridge volume within the envelope present at the time of extraction"2

This process involves the application of bone graft materials, membranes, and biological products, either individually or in combination. ARP typically delays implant placement by a minimum of three to six months post-extraction.3
Ideally, treatment planning begins prior to tooth extraction and includes three therapeutic options: spontaneous healing of the extraction socket, immediate implant placement, and techniques aimed at preserving the alveolar ridge at the extraction site.4

Clinically, the choice of ARP technique is influenced by several factors: (i) the timing of implant placement; (ii) the quality and quantity of soft tissue surrounding the extraction site; (iii) the remaining height of the buccal bone plate; and (iv) anticipated implant survival and success rates .4

One indication for ARP is when patients are unavailable for immediate or early implant placement, as well as to minimize the need for sinus floor elevation.5 It is important to note that immediate implant placement alone may not prevent remodeling of the alveolar ridge after extraction. Strict selection criteria should be applied for immediate implant cases to avoid unfavorable outcomes.3

Research indicates that ARP procedures can reduce the necessity for additional ridge augmentation during implant placement compared to unassisted socket healing 3,5.

However, limitations such as infection, root fractures, or decay can hinder the effectiveness of this technique.3

In dentistry, platelet-rich fibrin (PRF) has been employed for various applications, including treatment of extraction sockets, gingival recessions, palatal wound closure, regeneration of periodontal defects, and management of hyperplastic gingival tissues.6

The reported benefits of PRF include accelerated wound healing, enhanced angiogenesis, costeffectiveness, and complete immune biocompatibility.6

CASE REPORT 1

A 25-year-old female patient sought care for the rehabilitation of upper left second premolar tooth, which had a root caries. (Figure A)

The proposed treatment was extraction and rehabilitation with implant.

The radiological examination shows a thickness of less than 1 mm of the buccal cortical bone, which leads us to proceed with alveolar preservation. (Figures B)

- A vertical incision (Vista Technique) and fullthickness tunneling were performed prior to extraction to avoid the risk of fracturing the buccal plate at the time of elevation. (Figure B1)

- Atraumatic extraction was performed using a periotome kit, and the socket is carefully curetted. (Figure B2,3,4)

Vol 14 - Nº 1 & 2 - Décembre 2024

- The space created between the periosteum and the vestibular cortical bone by tunneling was filled with Bio-Oss, condensed, and then sutured hermetically (Figure B 5,6)

- PRF was collected, and the socket was filled with Bio-Oss covered by PRF, followed by suturing. (Figure B7,8,9)



Actualités Tunisiennes 71

d'Odontologie Vol 14 - Nº 1 & 2 - Décembre 2024





Figure B8 of Patelet-Rich

Bone Grafting of the Alveolus, Application

Fibrin (PRF)

Figure B9 Sutures

CASE REPORT 2

A 28-year-old patient presents for the management of a damaged premolar (Figure C). Clinical and radiological examinations indicate that the tooth needs to be extracted

The proposed treatment was extraction and rehabilitation with implant. Due to financial constraints, the patient has opted to postpone implant rehabilitation for 6 to 8 months. Consequently, alveolar ridge preservation has been recommended to minimize changes and prevent post-extraction alveolar resorption cortical bone, which leads us to proceed with alveolar preservation. (Figures D)

- Atraumatic extraction was performed using a periotome kit, and the socket is carefully curetted. (Figure D1)

- An epithelial-connective tissue graft was harvested from the palate for the preparation of a connective tissue-epithelial hybrid graft (Figure D2.3)

- The connective tissue-epithelial hybrid graft was carefully adapted and sutured to the buccal splitthickness flap (tunnel approach) (Figure D4,5)

- the socket was filled with Bio-Oss covered by PRF, followed by suturing to the lingual split-thickness flap (tunnel approach) (Figure D6,7)









DISCUSSION

The potential benefits of alveolar ridge preservation (ARP) include maintaining the existing soft and hard tissue envelope, ensuring a stable ridge volume to optimize functional and aesthetic outcomes, and simplifying future treatment procedures by promoting adequate soft and hard tissue volume at the time of implant placement. 4,5

Research indicates that spontaneous healing after tooth extraction can lead to an estimated 50% reduction in the bucco-lingual width of bone, along with a decrease in bone height within 12 months post-extraction. Notably, two-thirds of this reduction occurs within the first three months.3,5 Conversely, immediate implant placement in a fresh extraction socket, without additional guided bone regeneration procedures, does not prevent bone resorption and may not offer advantages over spontaneous healing.4 However, using grafting materials in conjunction with immediate implant placement can reduce horizontal bone resorption.4 Histologically, the inner part of the socket wall consists of lamellar bone, known as bundle bone, which has a reported thickness of 0.2–0.4 mm. Similar to root cementum and periodontal ligament, its presence is dependent on teeth.4

Studies have shown that the buccal bone plate in most anterior maxilla locations is typically less than 1 mm thick, with nearly 50% of sites having a maximum thickness of 0.5 mm. This suggests that the bundle bone and buccal bone plate often share similar thicknesses in the anterior maxillary region. Therefore, it can be inferred that after tooth extraction in aesthetic areas, resorption of the buccal bone plate predominantly occurs in the more coronal region.4 While ARP has been shown to decrease residual ridge resorption, some degree of bone loss is still expected.3,5

The need for additional bone augmentation at implant placement varies between 0% to 15% for ARP and 0% to 100% for spontaneous healing4. ARP tends to be more beneficial for ridges with compromised extraction sockets compared to those with intact socket walls.3

Furthermore, the proximity of the maxillary sinus poses challenges for implant placement in the posterior maxilla, particularly due to sinus pneumatization that can extend just a few millimeters above the crest of the alveolar ridge. Immediate implants placed in this area may face complications from undetected communication with the maxillary sinus and poor-quality bone that could lead to implant displacement into the sinus.7

Various materials have been utilized for these procedures; however, no single material or technique has proven superior to others.3,4

The choice of material for alveolar ridge preservation is critical for achieving optimal clinical outcomes. PRF, xenografts, collagen membranes, hydrogel systems, synthetic grafts, and injectable materials each offer unique benefits that can enhance bone healing and maintain ridge integrity after tooth extraction8.

Calcium sulfate and beta-tricalcium phosphate exhibit faster resorption rates, while xenografts demonstrate lower resorption rates and may better preserve bone size over time compared to allografts.3 There are three primary options for alveolar ridge preservation: using soft tissue grafts, hard-tissue graft materials, or a combination of both soft- and hard-tissue biomaterials.4 Preserving soft tissue has been shown to enhance quality and/or regenerate quantity in deficient soft tissues before or after tooth extraction. While minimal new bone formation can be expected within a healing period of 6-8 weeks, complete soft-tissue closure is achievable.4 Preservation techniques for both hard and soft tissues are indicated for combined deficiencies and involve longer healing periods (4-6 months) using a minimally invasive approach without flap elevation.4 In cases where there is significant loss (>50%) of the buccal bone plate, it is recommended to use biomaterials for hard tissue preservation with an extended healing time prior to implant placement.4

Vol 14 - Nº 1 & 2 - Décembre 2024

Flap elevation and primary closure of soft tissue appear to have minimal impact on dimensional changes3; however, membrane use requires soft tissue coverage5.

Research indicates that alveolar ridge preservation (ARP) is effective in maintaining ridge volume, especially at the hard tissue level. However, it does not provide significant clinical benefits in terms of implant success compared to traditional techniques, and it requires a longer healing period of over six months.

Platelet-rich fibrin (PRF) forms a three-dimensional fibrin matrix that supports tissue regeneration and acts as a barrier membrane in guided bone regeneration (GBR) and guided tissue regeneration (GTR) procedures while retaining various growth factors essential for wound healing.6

Connective tissue grafts can serve as a barrier in ARP procedures, helping to prevent the infiltration of epithelial cells into the extraction socket. This aligns with guided tissue regeneration (GTR) principles, which aim to facilitate bone healing by allowing only specific cell types to populate the area, thus promoting bone regeneration while minimizing soft tissue complications9. While ARP techniques involving connective tissue grafts may require longer healing periods (typically 4-6 months), they ultimately lead to improved outcomes in terms of ridge stability and implant success rates when compared to untreated extraction sites. 10

Actualités Tunisiennes 73

d'Odontologie

CONCLUSION

In conclusion, alveolar ridge preservation (ARP) is a critical intervention that effectively mitigates the dimensional changes typically associated with tooth extraction. The systematic review of various studies demonstrates that the use of xenografts and absorbable sealing materials significantly reduces both horizontal and vertical bone resorption compared to spontaneous healing, particularly in the aesthetic zone. ARP not only aids in maintaining ridge volume but also enhances the conditions for future implant placement. While different materials and techniques are available, the choice should be tailored to individual patient needs and specific clinical scenarios. Continued research into optimal graft materials and methodologies will further refine ARP practices, ensuring improved outcomes for patients requiring dental rehabilitation following tooth loss.

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d'Odontologie

>>> ARTICLES SCIENTIFIQUES



Traumatic frontal mucocele caused by unusual circumstances

Mucocèle frontale traumatique causée par des circonstances inhabituelles

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Abstract

Frontal mucoceles are rare, benign, mucus-filled cysts that typically develop following chronic sinusitis, trauma, or sinus surgery. This article presents an extraordinary case of a traumatic frontal mucocele caused by the tooth of another individual following a motorcycle collision. A 32-year-old male developed persistent headaches and facial swelling months after the accident, during which he sustained a frontal sinus fracture. Imaging revealed a frontal mucocele containing a foreign body—the incisor of the other motorcyclist, lodged in the patient's sinus. Surgical intervention, through a coronal approach, included mucocele marsupialization, foreign body removal, and fracture repair with a titanium plate. This case highlights the importance of thorough imaging and early intervention in facial trauma to prevent delayed complications

<u>Key words</u>: Frontal mucocele, frontal sinus fracture, traumatic mucocele, retained tooth, Caldwell-Luc procedure, coronal approach, sinus surgery, post-traumatic complications

Résumé

Les mucocèles frontales sont des kystes bénins, remplis de mucus, qui se développent généralement à la suite d'une sinusite chronique, d'un traumatisme ou d'une chirurgie des sinus. Cet article présente un cas exceptionnel de mucocele frontale traumatique causée par la dent d'une autre personne lors d'une collision à moto. Un homme de 32 ans a développé des céphalées persistantes et un gonflement facial plusieurs mois après l'accident, au cours duquel il avait subi une fracture du sinus frontal. L'imagerie a révélé une mucocele frontale contenant un corps étranger : l'incisive de l'autre motocycliste, coincée dans le sinus du patient. Une intervention chirurgicale, réalisée par une approche coronale, a permis la marsupialisation de la mucocele, le retrait du corps étranger et la réparation de la fracture à l'aide d'une plaque en titane. Ce cas met en évidence l'importance d'une imagerie approfondie et d'une intervention précoce en cas de traumatisme facial pour prévenir les complications tardives.

Mots clés : Mucocèle frontale, fracture du sinus frontal, mucocèle traumatique, dent incluse, procédure de Caldwell-Luc, approche coronale, chirurgie des sinus, complications post-traumatiques.

INTRODUCTION

Frontal mucoceles are benign, mucus-filled cysts that form due to the obstruction of sinus drainage, typically resulting from chronic sinusitis, trauma, or prior sinus surgery (1). While the majority of cases are associated with common causes, rare instances arise from unusual factors, such as retained foreign bodies following trauma. This article presents an exceptionally rare case where a frontal mucocele was caused by a foreign object—a human tooth introduced into the sinus following a motorcycle collision. The presence of a foreign body, especially from another individual, adds complexity to both diagnosis and surgical management. Mucoceles are generally treated with endoscopic sinus surgery(2), the current gold standard due to its minimally invasive nature and high success rates (2). However, cases involving traumatic foreign bodies may necessitate alternative surgical approaches, such as the Caldwell-Luc procedure. Although this approach is less commonly used today, it remains valuable in managing complex cases with extensive trauma or foreign bodies (2).

d'Odontologie Vol 14 - Nº 1 & 2 - Décembre 2024

This article details the diagnostic and therapeutic challenges in a rare case of a frontal mucocele caused by a foreign tooth, with particular emphasis on the role of different surgical techniques, including the relevance of the Caldwell-Luc procedure in modern rhinology.

CASE REPORT

A 32-year-old male patient presented in the emergency department with persistent frontal headache, nasal discharge and facial swelling evolving for four months. He had no history of chronic sinusitis or allergic rhinitis. He reported a motorcycle accident six months ago. He had a frontal collision with another motorcyclist. Neither of them was wearing a helmet.

The patient had a frontal injury that was sutured at the emergency department under local anesthesia. The wound has not been surgically explored and no further complementary exams were requested at the time.

At the clinical examination, we found an inflammatory skin towards the scar with a frontal painful swelling. The rhinological exam showed edematous nasal mucosa with pus discharge.

A complicated frontal sinusitis was suspected. Therefore, a computed tomography (CT) scan of the paranasal sinuses was performed and revealed a displaced fracture of the anterior table of the frontal sinus which was occupied by an expansile homogenous mass centered by a rounded opacity (figure 1). The diagnosis of a frontal mucocele associated with a foreign body was then suggested.



Figure 1

Sagittal CT scan showing a frontal fracture associated with mucocele centered by an opacity

The patient was referred to the maxillofacial department. He was operated on under general anesthesia by a coronal approach allowing a direct access to the frontal sinus after creating a frontal cutaneous flap (figure 2).



Intra-operative picture showing the Figure 2 coronal approach with direct access to frontal sinus

The mucocele was then marsupialized. Surprisingly, an incisor was found in the frontal sinus and was thought to be ectopic. The tooth was successfully removed (figure 3). The fracture was also fixed using a titanium plate (figure 4).



Figure 3 Picture showing the removed tooth



Figure 4 Fracture repaired with titanium plate

Postoperative period was free from complications. Nasal irrigation and antibiotics were prescribed to prevent infection.

For a better understanding of the origin of the tooth, the patient was re-examined. At our big surprise, all his teeth were in place. The diagnosis of an ectopic tooth in the frontal sinus was then eliminated. After a meticulous interview of the patient, he reported that the second motorcyclist lost a tooth during the

Vol 14 - Nº 1 & 2 - Décembre 2024

accident. The diagnosis of a frontal mucocele caused by a tooth from another patient was retained.

No recurrence occurred during the five year-follow-up period.

DISCUSSION

This case report highlights a unique and extremely rare presentation of a frontal sinus mucocele associated with a retained foreign body (an incisor tooth) resulting from a motorcycle collision.

The case underlines the complexities involved in post-traumatic sinus injuries and the potential for complications when initial trauma management is incomplete or inadequate.

Frontal sinus fractures are relatively common in cases of blunt facial trauma(3), particularly in highvelocity injuries such as motorcycle accidents, where the frontal bone absorbs a significant portion of the impact(3). The primary concerns with such fractures are intracranial injury, infection, and aesthetic deformities. However, fractures of the frontal sinus are often ovemenerlooked when there is no immediate evidence of intracranial damage or severe displacement, as was the case with this patient, who initially only received sutures for the laceration without further investigation or imaging.

Unrecognized or inadequately treated frontal sinus fractures can lead to complications such as:

-Chronic frontal sinusitis related to an obstruction of the sinus drainage pathway, which can occur due to fracture displact and leads to chronic infection and inflammation.(4)

- Mucocele formation which is a cyst-like lesion that forms when the normal drainage of mucus from the sinus is obstructed. Over time, the sinus fills with mucus, causing expansion and bone erosion. In this case, the fracture of the anterior table and subsequent obstruction led to the formation of the mucocele (4)

-Retention of foreign bodies: Although rare, foreign bodies can be introduced into the sinuses following trauma, especially in high-velocity impacts. The presence of a foreign body, such as a tooth exacerbates the risk of infection, chronic inflammation, and mucocele formation. The presence of a human tooth as a foreign body in the frontal sinus is an extraordinary and highly unusual finding. To the best of our knowledge, this is the first case report documented in the literature. Most foreign bodies found in the sinuses are either iatrogenic (from prior surgeries) or due to penetrating trauma involving objects like glass,

metal, or wood. In our case report, the foreign body (an incisor) belonged to the other

person involved in the motorcycle collision.

The force of the collision likely drove the tooth from the other rider into the patient's frontal sinus through the fractured anterior table. Given that neither rider was wearing a helmet, both sustained significant facialtrauma, and the lack of immediate imaging meant that the retained foreign body was missed during the initial assessment. Foreign bodies in the frontal sinus can remain asymptomatic for some time, as seen in this case, where the patient's symptoms (frontal headache, nasal discharge, and facial swelling) developed gradually over four months. The body's reaction to the foreign material, combined with sinus obstruction from the fracture, likely contributed to the development of the mucocele.

Mucoceles are benign, slowly expanding cystic lesions that form due to the obstruction of sinus drainage(1). Over time, the sinus fills with mucus, leading to progressive bone expansion and erosion. If left untreated, mucoceles can cause significant complications, including:

-Bone destruction: An expansion of the mucocele can erode the surrounding bone, including the skull base, leading to intracranial extension and potential neurological complications.(5)

- Orbital involvement: Frontal mucoceles can extend inferiorly into the orbit, causing proptosis, diplopia, and even vision loss due to compression of the optic nerve. (5)

- Infection: The accumulation of mucus provides a fertile environment for bacterial growth, leading to superimposed infection and the development of a pyocele, which can result in osteomyelitis or intracranial abscess formation. In this case, early suspicion of complicated frontal sinusitis based on clinical symptoms and CT findings allowed for timely surgical intervention, preventing further complications. (4)

One of the key lessons from this case is the critical importance of imaging in the assessment of patients with facial trauma, particularly those involving the frontal sinus. In this instance, the lack of initial imaging at the time of injury delayed the diagnosis of the frontal sinus fracture and the retained foreign body, allowing for the development of a mucocele over several months. CT scan is the gold standard for diagnosing sinus fractures and their complications. It provides detailed information on the bony structures and the presence of soft tissue masses, such as mucoceles or foreign bodies. The CT scan in this case revealed the displaced fracture of the anterior table and the expansile mass in the frontal sinus, which led to the suspicion of a mucocele with a foreign body. Early imaging and identification of the fracture could have potentially prevented the delayed complications seen in this patient.

The management of frontal sinus fractures and mucoceles involves both functional and cosmetic considerations. The goal is to restore sinus drainage, remove any infected material or foreign bodies, and repair the fracture to prevent further complications (6). In this case, a coronal approach was used, which allowed for direct access to the frontal sinus. The coronal incision is typically made along the hairline, providing excellent exposure of the frontal bone and sinus while minimizing visible scarring. The mucocele was marsupialized (opened and drained), and the foreign body (incisor) was removed. The fracture of the anterior table was then repaired with a titanium plate, restoring the integrity of the frontal sinus. This approach is particularly useful in cases involving large fractures or significant sinus pathology, as it provides a wide field of view for both visualization and manipulation of the sinus structures.

Additionally, the use of titanium plates for fracture fixation provides long-term stability and has a low complication rate.

The patient had an uneventful postoperative recovery, with no signs of infection or recurrence of the mucocele. Nasal irrigation and antibiotics were prescribed to reduce the risk of infection, particularly given the previous presence of a foreign body in the sinus. Long-term follow-up is essential in such cases to monitor for any potential complications, such as recurrence of the mucocele or sinus infection. This case serves as a reminder that even seemingly minor facial trauma can lead to significant delayed complications if not properly evaluated at the time of injury. Early imaging, prompt surgical intervention, and thorough follow-up are key to preventing such outcomes.

<u>Key Takeaways :</u>

-Uncommon Complications of Trauma: This case exemplifies how rare and unusual complications, such as the retention of a tooth from another individual in the frontal sinus, can occur following high-impact trauma. Such cases underscore the importance of maintaining a high index of suspicion for unusual foreign bodies in the post-trauma setting.

- Role of Imaging: Timely imaging is crucial in trauma cases to identify fractures and associated complications. CT scans provide detailed insights into both bone and soft tissue pathology, which can guide management and prevent delayed complications.

-Surgical Approach: The coronal approach is effective for accessing frontal sinus pathology, allowing for comprehensive management of both mucoceles and complex fractures while preserving cosmetic outcomes.

-Importance of Multidisciplinary Care: Collaboration between emergency medicine, maxillofacial surgery, and radiology was essential in the successful diagnosis and management of this case.

CONCLUSION

This case highlights the rare presentation of a frontal mucocele with an associated foreign body (a human incisor) following a motorcycle collision. It emphasizes the need for thorough clinical evaluation and imaging in patients with facial trauma, even when initial injuries appear minor. Early recognition and intervention are critical to preventing long-term complications in posttraumatic sinus conditions.

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>>> ARTICLES SCIENTIFIQUES



Conservative Treatment of Complicated Crown Fracture and Horizontal Cervical Root Fracture in Permanent Incisors: A Case Report

Traitement conservateur des fractures compliquées de la couronne et des fractures horizontales de la racine cervicale dans les incisives permanentes : un rapport de cas

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Abstract

Purpose : This systematic review aimed to identify the possible impact that fluoride can have on both occurrence and clinical manifestation of molar-incisor hypomineralization. Methods : The search was conducted through 4 databases : Pubmed via Medline, Cochrane library, Scopus, and SciencesDirect. So as to make the search more accurate, a complementary search was done through google scholar and a hand-searching was performed after checking the references lists of the included articles after step two. After full-text reading, eleven articles were included in the systematic review. Results : Considering the occurrence of MIH, some authors supposed that fluoride has no impact on it while others suggested that fluoride is a protective factor of this condition. None of the included studies proposed fluoride as an aetiological factor. From another side, regarding the clinical apperance of MIH, some authors supposed that fluoride has no impact on the severity of it, others supposed that it worsons it and others admited that fluoride enhances the severity of MIH. Conclusion : Various hypotheses concerning the impact of fluoride on both occurrence and clinical presentation of MIH, were suggested by the included studies. No definitive answer has been retained urging to performing further research regarding this issue.

<u>Key words</u>: MIH, molar-incisor hypomineralization, dental enamel hypoplasia, fluoride, fluorided water, dental fluorosis, association, frequency, severity.

Résumé

Les traumatismes dentaires sont souvent associés à des effets sociaux et psychologiques négatifs. Les incisives maxillaires sont les dents les plus fréquemment touchées dans les cas de traumatismes dentaires, avec des fractures coronaires compliquées et non compliquées étant les types les plus courants. La prise en charge de ces cas peut être réalisée de diverses manières, en fonction de plusieurs points clés recueillis lors de l'examen initial. La présence d'une lésion concomitante, le délai écoulé entre le traumatisme et l'intervention, ainsi que l'état de la pulpe sont des éléments importants à prendre en compte. Ce rapport de cas vise à illustrer une option de traitement conservateur après une fracture coronaire compliquée survenue sur la dent 21. La dent présentait une édification radiculaire au stade 9 selon la classification de Nolla. Cette technique spécifique propose une solution conservatrice pour gérer les fractures coronaires compliquées tout en préservant la vitalité, la fonctionnalité et l'esthétique de la dent. **Mots clés**: traumatisme dentaire; fracture dentaire; enfants; dents permanentes...

INTRODUCTION

Traumatic dental injuries (TDIs) primarily affect children and young adults and can significantly impact both social and psychological wellbeing [1]. Dental fractures are categorized by the involvement of tissues and pulp, including enamel infractions, uncomplicated crown fractures (enamel and enamel-dentin fractures), and complicated crown fractures (involving pulp exposure). Other types of fractures include crown-root and root fractures [2]. The majority of TDIs involve the anterior teeth, especially the maxillary incisors [3,4], while the Actualités Tunisiennes 79 d'Odontologie

mandibular central incisors and upper lateral incisors are less frequently affected [5,6]. Crown fractures, particularly those with pulp exposure, are the most common in permanent teeth, with causes ranging from falls and traffic accidents to violence and sports injuries [3,7].

Treatment for complicated crown fractures, as per the International Association of Dental Traumatology (IADT, 2020), focuses on conservative pulp management, including partial pulpotomy for both mature and immature roots. A critical step before treatment is to assess the pulp's condition to determine the appropriate course of action [1]In cases of dental trauma, pulp vitality tests, like cold tests and electric pulp tests, are essential but may show false negative results due to the temporary loss of nervous response after an injury [8]. Despite this, performing these tests both immediately and during follow-up appointments is recommended to observe any changes in pulp status over time [1,9].

Techniques like laser Doppler flowmetry (LDF), which assess blood flow in the pulp, offer additional diagnostic accuracy [1].

Radiographs play a key role in diagnosing trauma. A periapical radiograph is generally necessary, and further imaging may be required if symptoms suggest deeper issues. For soft tissue injuries, X-rays of the lip or cheek are advised to check for debris or tooth fragments. In cases of suspected fractures or luxations, cone beam computed tomography (CBCT) provides precise details regarding the extent and direction of the injury [10]. Additional imaging should only be pursued when it could influence treatment plans.

When a tooth fragment is available, reattachment is ideal. In its absence, protective measures like covering the exposed dentin with glass-ionomer or a bonding agent and composite resin are recommended. For fully developed teeth requiring a post to retain a crown, root canal therapy is generally preferred [1].

Successful outcomes are characterized by symptomfree teeth, positive pulp sensibility responses, and appropriate restoration quality. In immature teeth, ongoing root development is a positive indicator of healing. Factors such as injury severity, the timing and quality of the initial intervention, and adherence to a structured follow-up schedule—at 14 days, 6–8 weeks, 3 months, 6 months, and 1 year—are crucial for a favorable prognosis. The case report discussed here illustrates conservative treatment for a complicated tooth fracture using pulpotomy and resin composite restauration.

Consent from the guardian was obtained prior to the preparation of the manuscript.

Vol 14 - Nº 1 & 2 - Décembre 2024

PRESENTATION OF THE CASE

Consent was obtained from the the patient's guardian for publication of this case report and any accompanying images.

A 13-year-old male patient, accompanied by a guardian, experienced direct trauma due to a car accident. The injuries included a root fracture at the cervical third of tooth 22, a complicated crown fracture of tooth 21, and an uncomplicated crown fracture of tooth 11 (Figure 1). The consultation took place the day after the trauma.



Figure 1

The patient presented to the department with a panoramic X-ray that revealed a root fracture of tooth 22. The teeth were vital upon thermal testing, with the crown of tooth 22 exhibiting mobility. No additional mobility or symptoms of other trauma were identified during clinical and radiographic examinations (Figure 2).



After disinfecting the area with Betadine, local anesthesia was administered using 2% lidocaine with 1:80,000 epinephrine. A rubber dam was applied to tooth 21, and access to the pulp chamber was created using a sterile Endo-Z bur. A cervical pulpotomy was performed by removing the pulp tissue from the entire pulp chamber, using a highspeed bur under saline irrigation.

d'Odontologie Vol 14 - N° 1 & 2 - Décembre 2024

Hemostasis of the radicular pulp was achieved within five minutes compression using a sterile cotton pellet soaked in sodium hypochlorite. Once bleeding had ceased, MTA was placed directly into the pulp chamber, covered by a flowable composite resin and glass ionomer cement (GIC) (Figures 3 and 4).





Figure 3



Figure 4

Following the removal of the rubber dam, the coronal fragment of tooth 22 was repositioned and a passive flexible splint was applied using a 0.4 mm twisted stainless steel wire from canine 13 to canine 23 (Figures 5 and 6). The patient was advised to avoid contact sports, maintain meticulous oral hygiene, and use an antibacterial mouthwash. It was also recommended that the carious lesion on the right maxillary first permanent molar (tooth 16) be treated.



Figure 5



Figure 6

A follow-up schedule was set for one week, two weeks, six weeks, three months, and a final check at four months for splint removal. At the first followup, a resin composite reconstruction was performed on tooth 21 (Figures 7 and 8). The splint was removed after four months following a radiographic assessment (Figures 9 and 10).



Figure 7



Figure 8



Figure 9



Figure 10

After one year, the teeth were asymptomatic, with no radiographic signs of necrosis. There were no signs of root resorption, and the lamina dura was intact. Tooth 22 showed signs of repair between the fractured segments, with normal or slightly physiological mobility of the coronal fragment (Figure 11).



Figure 11

DISCUSSION

Vital pulp therapy is the treatment of choice in situations complicated crown fractures, vital pulp therapy (VPT).

These treatments include direct pulp capping (DPC), partial and cervical pulpotomy (PP) and (CP).

Based on the analysis of the clinical conditions and additional tests, it was decided to perform a cervical pulpotomy, maintaining the vitality of radicular pulp in the treated tooth. PP was chosen as the treatment method since the exposure was important and following the admission of the patient within 24 hours after injury, no caries, and vital and asymptomatic pulp.

In general, the success rate of VPT is high, but several factors can influence the outcome, such as pulp vitality, the time between exposure and treatment, patient age, and the nature of other associated injuries. Additionally, the cause and size of the exposure are also important [11].

The vitality testing using thermal stimulus depends on neural reactions in the pulp. Therefore the results might not be reliable during the first period following the trauma. The pulp is in fact in a state of sideration[12]. The testing of pulp blood flow using tests like pulse oximetry is more reliable and a better choice in the case of trauma [12]. While it's important to treat traumatized teeth as soon as possible since the time between the trauma and the treatment is a key point in prognosis, the stage of developement of the tooth has no implication on the treatment results [11,13]. The increasing time between injury and intervention contributes to lower treatment success. On the other hand if there is an association with another type of injury like a luxation the prognosis will also be negatively influenced [14]. The pulp exposed due to trauma, compared to carious exposure, has a greater chance of healing [11,15].

Vol 14 - Nº 1 & 2 - Décembre 2024

Isolation with rubber dam to control sepsis risk is another factor that influences the results of the treatment. Other factors include sufficient blood control, appropriate choice of the capping material and a tight final coronal seal. Unlike many presume, how small or big is the exposure is of no relevant importance in the possibility of treatment success [11].

Although vasoconstrictors can interfere with hemostasis, making it harder to evaluate the pulp's initial state, they do not influence treatment outcomes in vital pulp therapy [16]. In contrast, prolonged bleeding could indicate irreversible inflammation, but the duration to stop bleeding, which can range from 2 to 25 minutes, has no impact on prognosis [16].

True hemostatic agents like ferric sulfate are avoided as they can obscure signs of inflammation in the radicular pulp [17].

Sodium hypochlorite, endorsed by the American Association of Endodontists for its bactericidal properties, is considered safe for pulp tissue and effective for hemostasis [18]. This agent is applied with soaked cotton pellets to achieve hemostasis without harming the pulp [18].

An ideal material for pulpotomy should not only be biocompatible and non-toxic but also encourage hard tissue formation while having disinfecting properties [19]. Calcium hydroxide (CH) is known for its bactericidal qualities and high pH, which help neutralize acids and lipopolysaccharides [21]. It forms a dentin bridge, but it has limitations like instability over time and potential for creating pores that invite microorganisms [23-24]. Aqueous CH suspensions are preferred due to their reduced toxicity, but light-cured versions are discouraged because of their cytotoxicity [20, 22]. Calcium silicate materials (CSMs), like mineral trioxide aggregate (MTA), offer superior mechanical strength and less toxicity than CH [25].

However, MTA has downsides, such as complex application, long setting time, and discoloration issues [26].

Follow-up visits after trauma are essential for detecting complications like pulp infection, necrosis, pulp canal obliteration (PCO), and root resorptions.

The control includes an interview, radiographs, and pulp sensitivity tests, allowing early treatment when necessary. In complicated crown fractures, checkups should be done at 14 days, 6-8 weeks, 3-6 months, and one year, and success is evaluated by positive clinical and radiographic outcomes.

Treatment of root fractures follows two main steps: repositioning the displaced coronal fragment and stabilizing it securely. In the present case, treatment followed the 2020 IADT guidelines, which recommended using a flexible splint for 4 months when the fracture is near the cervical area.

It's important to stress that maintaining excellent oral hygiene is crucial to avoid periodontal complications, which can lead to endodontic infections. Periodontal pockets provide a pathway for bacteria to access the fracture line.

Additionally, ongoing radiographic monitoring is key to identifying resorption, as it could compromise the success of treatment, making it less viable for future prosthetic procedures that rely on preserving healthy bone through conservative approaches. [27]

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Dental Implant surgery in the Aftermath of Tooth Trauma: clinical case reports

La Chirurgie Implantaire suite à un Traumatisme Dentaire : Étude de Cas Cliniques

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Abstract

Introduction: Dental trauma, particularly in the anterior maxillary region, poses significant challenges in restorative dentistry. Observation: This article presents two clinical cases involving young adult patients who experienced traumatic tooth loss, highlighting the complexities of implant rehabilitation post-trauma. The first case involved a 24-year-old patient with a missing maxillary central incisor following a road accident. Implant placement was complicated by bone deficiency, necessitating guided bone regeneration (GBR) and the use of xenografts. The second case, a 21-year-old patient with a fractured incisor, required atraumatic extraction and implant placement with GBR due to a thin vestibular cortical. Discussion: Through these case studies, we examine the intricacies of managing dental trauma, including infection control, bone regeneration techniques, and the timing of implant placement. This work underscores the importance of individualized treatment planning, advanced imaging techniques, and staged implant procedures to optimize both aesthetic and functional outcomes. It also addresses the complications associated with multiple tooth trauma, such as bone resorption and infection, and the necessary pre-treatment strategies to ensure long-term implant success. Conclusion: In conclusion, managing dental trauma, particularly when multiple teeth are affected, requires meticulous planning and a comprehensive approach to infection management, bone preservation, and tissue augmentation to achieve successful implant rehabilitation.

Key words : dental trauma, implantology, CBCT, extraction.

Résumé

Introduction : Le traumatisme dentaire, en particulier dans la région antérieure du maxillaire, présente des défis majeurs en dentisterie restauratrice. Observation : Cet article présente deux cas cliniques impliquant de jeunes adultes ayant subi une perte traumatique de dents, illustrant les complexités de la réhabilitation implantaire post-traumatique. Le premier cas concerne un patient de 24 ans ayant perdu une incisive centrale maxillaire à la suite d'un accident de la route. La pose de l'implant a été compliquée par une déficience osseuse, nécessitant une régénération osseuse guidée (ROG) et l'utilisation de xénogreffes. Le second cas implique un patient de 21 ans ayant une fracture d'incisive, nécessitant une extraction atraumatique et la pose d'un implant avec ROG en raison d'une corticale vestibulaire fine. Discussion : À travers ces études de cas, nous explorons les complexités de la gestion du traumatisme dentaire, y compris le contrôle des infections, les techniques de régénération osseuse et le choix du moment pour la pose de l'implant. Ce travail met en avant l'importance d'un plan de traitement individualisé, des techniques d'imagerie avancées et des procédures en plusieurs étapes pour optimiser les résultats esthétiques et fonctionnels. Il aborde également les complications associées aux traumatismes multiples, telles que la résorption osseuse et l'infection, ainsi que les stratégies pré-traitement nécessaires pour assurer le succès à long terme des implants. Conclusion : En conclusion, la gestion des traumatismes dentaires, notamment lorsque plusieurs dents sont touchées, requiert une planification rigoureuse et une approche complète pour contrôler les infections, préserver l'os et augmenter les tissus afin de réussir la réhabilitation implantaire.

Mots clés: trauma dentaire, implantologie, CBCT, extraction

INTRODUCTION

Managing treatment after traumatic tooth loss presents significant challenges and is largely shaped by expert consensus and the unique circumstances of each patient. This complexity is particularly pronounced when addressing trauma in the anterior maxillary region, where aesthetic and functional considerations are paramount. The delicate balance between achieving optimal esthetics, preserving bone structure, and ensuring long-term stability requires a highly individualized approach tailored to the specific needs of the patient.(1,4)

OBSERVATION

Case N°1

Patient NBM aged 24 years old in a good general health visited our out-patient department for the replacement of his right central maxillary incisor lost due to a road accident with the complete expulsion of his tooth at an early age (figure 1).



Figure 1 Intra-oral occlusal view

The patient refused the orthodontic treatment as a first step of the treatment plan and asked to only replace the missing tooth with an implant rehabilitation thus an orthopantomogram (OPG) (figure2a) and a cone beam computed tomography were asked (figure 2b).



for the preoperative radiological exam, the CBCT showed a well healed bone yet a thin alveolar ridge with a very large incisive canal and a periapical lesion of the adjacent tooth (the 21) (figure 2b).

For the surgical phase we started by anesthesia followed by supra crestal, intra sulcus and two releasing incisions and we lifted a full thickness flap (figure 3)



Figure 3

Frontal view of the surgical site after full thinkness flap reflection

The granulated tissue was shown (figure 3), we had to clean the bone we eliminated the periapical lesion and obturated the tooth retrograde with Biodentine and regular follow-up (figure 4)



Figure 4 Elimination of the granulated tissue

After cleaning and disinfecting the area we proceeded with the drilling protocole of the implant placement (biotech 3.6/12) for the parallelism control we refered to the incisive canal and we had to sacrifice the components of the canal (figure 5,6)



Occlusal view of the drilling axis Figure 5 and the parallelism with the incisive canal

Figure 2 (a) OPG of the patient (b) sagitall section of the CBCT



Figure 6 Placement of the implant with large bone deficiency

After implant placement toward the palatal areas, primary stability was obtained regardless the exposure of the vestibular coils due to the significant bone deficiency (figure 6), the use of guided bone regeneration (GBR) was indicated. We combined xenograft material and applied it around the implant, covering the area with a collagen membrane (figure 7).





Occlusal view of the membrane covering the xenograft

To ensure proper flap mobility, we performed partial incisions to release the flap, followed by apical mattress sutures to reposition the tension apically. The procedure was completed with 'O' sutures to secure the site (figure 8;9).





Figure 8 Frontal view of the mobility of the tension free flap



Figure 9 Frontal view of the sutures with the apical matress

For an aesthetic purpose and since the young age of the patient we tried to fixe a prosthetic tooth with contention file fixed on the palatal face of the two adjacent teeth away from the surgical site (figure 10) The patient is still under treatment.



Figure 10 Frontal view of the temporary prosthetic tooth

Case N°2

Patient YR, aged 21 years old in a good general health visited our out-patient department for the fracture of his right central maxillary incisor.



Figure 11 Intra-oral vestibular view



Figure 12 OPG of the patient

d'Odontologie Vol 14 - N° 1 & 2 - Décembre 2024

The clinical and radiological exam showed the resorption of the tooth's root and needs to be extracted figure (11, 12)

We started by extraction the tooth in an atraumatic way, and after a period of healing, we asked a CBCT from the patient and it showed a very thin vestibular cortical.(figure 13)



Figure 13 Sagittal sections of the CBCT of the patient

We decided to put an implant biotech (3.6/10) with GBR we started by anesthesia followed by supra crestal and intra sulcus incision and two vertical incisions (figure 14).



Figure 14 Frontal view of the surgical site

We proceeded with the drilling protocole and we relocated the drilling sequence in a palatal position in order to guarantee the primary stability of the implant figure (15,16,17)













After placing the implant, we had a large bone deficiency so to perform the GBR, the xenograft bone was mixed and added it to the implant and we cover the site with a collagen membrane (figure 18)



Figure 18 Frontal view of the membrane covering the xenograft

Prior to that the flap was released a partial incisions an apical mattress stitches were performed in order to relocate the tension apically followed by "O" stitches to secure the site (figure 19).



Vol 14 - Nº 1 & 2 - Décembre 2024

Meanwhile, for an aesthetic purpose the patient had a resin bonded bridge (figure 20).



Figure 20 Frontal view of the resin bonded bridge after surgery

DISCUSSION

Dental trauma refers to injuries affecting various components of the oral region, including the lips, teeth, periodontal tissues, tongue, and alveolar processes. The approach to managing such trauma is highly dependent on several factors, including the patient's age, whether the affected teeth are primary or permanent, the timing of the clinical consultation and the severity of the injuries sustained. Tailoring the management strategy to these variables ensures that treatment is both effective and appropriate for the specific circumstances of each case.(1,2)

Comprehensive guidelines exist for managing traumatized teeth, with the primary goal of preserving natural dentition for as long as possible. Despite these best practices, certain traumatized teeth may unfortunately present with a poor prognosis. This adverse outcome may become evident immediately or develop over time. Complications such as inflammatory resorption, replacement resorption, or endodontic failure can arise in some cases, impacting the long-term viability of the affected teeth. Consequently, it is crucial to evaluate and consider appropriate replacement options early in the treatment process when a poor prognosis is anticipated. This proactive approach ensures that patients have viable alternatives and maintain optimal oral health.(3,4,5) When a single tooth is lost or extracted due to trauma, several options for replacement are considered, each with its own implications:

- Leaving the Space: Typically not recommended due to aesthetic and functional issues.

- Dental Implant-Supported Crown: Offers longterm replacement, though age considerations may apply.

- Removable Prosthesis: Suitable as an immediate or temporary replacement but may contribute to bone resorption if not designed carefully. - Conventional Fixed Bridge: Best for patients with adjacent crowns but may impact healthy teeth if the patient is young.

- Adhesive Fixed Bridge: Conservative, with favorable success, and ideal as a medium-term option for younger patients.

- Autotransplantation: Effective for children, allowing the transplanted tooth to adapt and align with surrounding teeth.

- Orthodontic Space Closure: Beneficial in cases of crowding, with orthodontic guidance necessary for optimal outcomes.(2, 6,7)

Choosing an appropriate method for single-tooth replacement requires careful assessment of factors such as the patient's age, oral health, and specific clinical needs. When the alveolus and surrounding soft tissues are intact, clinicians must decide on the optimal timing for implant placement. There are three primary approaches(8,9):

1. Immediate Placement: Here, an implant is positioned in a fresh extraction socket, which has shown positive outcomes. However, studies suggest there is limited evidence showing a clear advantage over delayed placement. For success, immediate placement requires specific criteria: no active infection or periapical pathology, robust periodontal tissues, a healthy patient with good wound healing, and adequate bone density and volume, particularly with an intact buccal plate of at least 2mm thickness to support the implant effectively.

2. Early Placement (6-8 weeks): Also known as "delayed-immediate" implants, this method involves implant placement after an initial period of soft tissue healing. This waiting period facilitates flap closure, enables the healing of any minor infections, and minimizes buccal plate resorption. This technique helps form a more stable foundation for the implant, which can enhance long-term success rates.

3. Late Placement (2-3 months): Also called "delayed" implants, this approach allows for more extended healing of bone and soft tissue. It's beneficial when surrounding bone is thin, near essential structures, or if the socket is much larger than the implant. Late placement is also advised if there is insufficient bone beyond the tooth apex or if apical infection is present. These scenarios may necessitate socket grafting to enhance residual bone, support healing, and counteract bone resorption. In cases involving labial bone loss or vertical defects due to trauma, more advanced grafting techniques may be required to ensure optimal implant stability.(15,16)

Each of these options, whether immediate, early, or delayed, requires careful planning to ensure longterm functional and aesthetic success in implant restoration. The choice of approach depends on the clinical situation, aiming to establish a stable foundation that minimizes resorption and promotes effective integration of the implant with surrounding bone..(17,18)

When dental trauma affects multiple teeth, the consequences can significantly compromise the success of subsequent implant treatment. Trauma often leads to a cascade of issues, such as damage to the surrounding bone, periodontal tissues, and soft tissues, all of which create a complex healing environment. In cases where infection is present, the bacterial load can exacerbate the problem, leading to inflammation, delayed healing, and ultimately bone loss.

Take, for instance, the first clinical case where extensive trauma and infection were present.

The bacterial load introduced through trauma significantly increased the risk of complications. Local infection in the injured area can spread to the bone, compromising its integrity. This inflammation leads to bone resorption, a process where the body begins to break down bone tissue as part of the inflammatory response.(19, 20)

For successful implant placement, especially in trauma cases, a healthy, infection-free environment is crucial. Implants rely on the integration with healthy bone to remain stable and functional over time. If trauma has resulted in a compromised bone structure, immediate implant placement may not be advisable. Instead, the clinician must carefully manage the infection, reduce the bacterial load, and promote bone regeneration, either through grafting techniques or with guided tissue regeneration. (20,21)

In the scenario where infection has caused bone loss, immediate implant placement could risk failure, as the implant would lack sufficient bone support for osseointegration. Moreover, the ongoing presence of bacteria can prevent proper healing and lead to periimplantitis, a serious complication that could jeopardize the long-term success of the treatment. (20,21)

In conclusion, managing dental trauma in cases involving multiple teeth requires meticulous care to ensure infection is controlled, the bacterial load is reduced, and sufficient healthy bone is available for implant placement. Careful timing, adequate pretreatment, and potentially staged implant placement may be necessary to achieve optimal outcomes in such challenging cases. (19,20,21)

CONCLUSION

Despite efforts to save teeth affected by dental trauma, some may ultimately be lost or deemed to have a poor prognosis. It is crucial to conduct a thorough assessment to determine the most suitable treatment approach. For adult patients, an implant-supported restoration is frequently the optimal choice. However, in growing children, preserving a tooth in the absence of infection can be advantageous, as it supports normal development and maintains existing bone and soft tissues until growth is complete.(2;6)

Achieving the best outcomes requires careful clinical evaluation, strategic planning, and advanced imaging techniques. Proper timing of tooth extraction, combined with the use of hard and soft tissue augmentation techniques, and precise implant positioning are essential for ensuring both aesthetic and functional success of the implant rehabilitation.(2,6)

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d'Odontologie Vol 14 - N° 1 & 2 - Décembre 2024



Orthodontic management of post-traumatic malocclusion after facial trauma: a case report

Gestion orthodontique de la malocclusion post-traumatique après un traumatisme facial : un rapport de cas

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Abstract

Post-traumatic malocclusion is a serious post-traumatic sequela and considered to be the most frequent complication after closed treatment for condylar fracture. The management of this kind of malocclusion is thought to be extremely delicate and difficult due to its complexity.

Numerous treatment approaches, from conservative measures to surgical procedures, have already been put forth. Nevertheless, the purpose of this article is to outline the conservative orthodontic strategy that uses bite stops and elastics to treat a long-term post-traumatic malocclusion that is characterized by a noticeable cross bite and midline shift. An occlusion that was both functional and stable was thus achieved. This suggests that non-surgical methods can effectively address post-traumatic malocclusion. **Key words**: Orthodontics, Mandibular Condyle, Multiple Trauma

Résumé

La malocclusion post-traumatique représente une séquelle grave et complexe, souvent consécutive à une fracture condylienne mandibulaire, et constitue l'une des complications les plus fréquentes après une réduction fermé de cette fracture. La gestion de cette malocclusion nécessite un diagnostic précis et une prise en charge rigoureuse, en raison de la diversité des facteurs impliqués et de la complexité de la pathologie. Une stratégie interdisciplinaire et évolutive est essentielle pour aborder cette problématique de manière complète. Elle doit inclure des spécialités variées telles que la chirurgie maxillo-faciale, l'orthodontie, la prosthodontie, l'implantologie, la physiothérapie, et parfois même la psychiatrie, afin de traiter efficacement la malocclusion sur tous ses aspects. Dans ce cadre, cet article illustre, à travers un cas clinique, la stratégie orthodontique face à ce type de malocclusion qui s'avère particulièrement efficace pour restaurer une occlusion stable et fonctionnelle, tout en préservant l'équilibre fragilisé des condyles mandibulaires. **Mots clés**: Orthodontie, Condyle Mandibulaire, Traumatisme

INTRODUCTION

Maxillofacial fractures involving condylar fractures could lead to significant sequelae in the dental articulation. Maxillo-facial surgeons are the first line of treatment for the temporomandibular joint trauma. They have two options: open or closed procedures. Both can generate complications, but only the closed method can generate a short- or a long-term malocclusion known as 'post-traumatic malocclusion' (PTM) (1). This is, generally, accompanied by mandibular deviation and facial asymmetry if the fracture is unilateral, or a reduction in posterior facial height with the creation of an open bite, if it is bilateral. Once the malocclusion is established and stable, its management is very delicate and complicated, often multidisciplinary, and completely different from conventional treatment. It is imperative to work with respect for the manducatory system, which presents a fragile equilibrium in this type of case. Any misdiagnosis, or simply missing an important element, could have serious and often irreversible consequences. Several treatment options are, therefore, available. These include two types: invasive and non-invasive. TMJ reconstruction surgery (2), orthognathic surgery (3), occlusal adjustment, orthodontic management (4), or a combination of these, are all proven effective treatment options.

No clear consensus is currently available (5), but the choice of treatment will depend essentially on the fracture itself (number of fracture lines, fracture location, presence of displacement), the quality of consolidation, the complexity of the malocclusion and the patient's psychological profile.

The aim of this article was to study the management of post-traumatic malocclusion case in a young adult aged 23 through solely orthodontic management.

OBSERVATION

Medical history

A 23-year-old male patient, was the victim of a motorcycle-vehicle accident in 2019 that led to a multi-line fracture of the left mandibular body, a para-symphyseal fracture extending between 31 and 32, a fracture of the right condyle resulting in an anteromedian luxation of the condylar head, and a non-displaced fracture of the right coronoid process (figure 1).



Figure 1

after the accident: 1.A- fracture of the coronoid and anteromedial luxation of the condyle, 1.B-Parasymphyseal Fracture crossing the incisors. 1.C- Multiplane fracture of the left mandibular body 2- Frontal view of the condyle fracture

3D Facial CT SCAN: realised in 2019 immediately

Alveolodentally, the condylar facture on the right side caused premature contact points on the contralesionally side, resulting in a unilateral open bite. Near-total intrusion of the four upper incisors and coronal fracture of all the premolars and molars on the right side in both the upper and lower arch were also recorded.

The emergency management, performed by the maxillofacial team, involved closed reduction of the condylar fracture, open reduction of the mandibular fractures with insertion of osteosynthesis plates, and bi-maxillary fixation for 15 days. Finally, the intruded incisors were also repositioned.

Two years after, at the end of 2021, the patient was referred to our orthodontics and dentofacial orthopedics department at the Monastir dental clinic for orthodontic treatment reporting, essentially, a functional complaint.

Endo and Exobuccal examination

At first inspection, the patient presented significant facial asymmetry, featuring mandibular deviation towards the left side (figure 2). The profile was straight, with a markedly open goniac angle, an increase of the posterior height and a protrusive lower lip. Smiling aggravated the chin shift to the left. The patient had a three-finger mouth opening with a leftward deviated trajectory. No joint sound or pain was observed. Joint and muscle palpation revealed nothing abnormal. Endobuccal examination showed a post-traumatic malocclusion, manifested by the presence of a significant left cross-bite, and non-coincidence of the midlines.

Radiological examination

Root resorption on the upper incisors was observed on the panoramic radiograph and confirmed on retroalveolar x-rays.

Cephalometric analysis revealed skeletal Class I, facial hyperdivergence and normally positioned incisors (Table I).

RICKETTS frontal analysis

Table I	Cephalometric summary records
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Measurements	Average	Pretreatment	Posttreatment
SNA	82±2°	79°	79°
SNB	80±2°	77°	77°
ANB	2±2°	2°	2°
AOBO	0±2mm	-0.5mm	1mm
FMA	25±3°	34°	31°
GOGN/SN	32±5°	41°	41°
IMPA	86°	87°	86°
I/F	107±5°	109°	113°
I/i	131°	123°	128°
Z	78°	61°	63°

Actualités Tunisiennes 92 d'Odontologie Vol 14 - Nº 1 & 2 - Décembre 2024



A. Exobuccal radiographic assessment



B. Endobuccal radiographic assessement



C. Radiological assessment through panoramic X-ray, frontal and profile teleradiography



Figure 2 Pre-treatment photographic and radiological assessment

confirmed the diagnosis of left-sided laterognathy.

Objectives and therapeutic approach

The esthetic objective of treatment is to symmetrize the face. From a dentoalveolar perspective, the aim is to restore damaged teeth, harmonize the arches, correct the left crossbite, non-coincidence of midlines, overjet, overbite and maintain Class I occlusion.

As the patient categorically refused to undergo major surgery again, a conservative orthodontic treatment with extraction of the upper left incisor and maintenance of its space for future implant placement was considered in this case.

A minor surgery, known as, genioplasty can be indicated at the end of orthodontic treatment to enhance the balance of the facial features. Finally, for financial constraints, it was decided to close the space of the missing premolar to avoid a, costly, second implant placement for the patient, and so, would be ending up with a Class II therapeutic molar, which is considered as a stable, functional and longlasting occlusion (6).

Treatment progress

Firstly, the patient was referred for temporary prostheses to restore all damaged teeth to enable proper bonding. A conventional bracket system with a ROTH SLOT of a .022*.028 inch was used in this case. The alignment phase was carried out first with small-section stainless steel archwires, followed by thermal activated archwires to minimize displacement forces on teeth that, originally, had unfavorable intrinsic and extrinsic factors. The malocclusion correction phase was carried out by using rigid rectangular archwires. Occlusal stops were placed to unlock the occlusion on the left side, and criss-cross elastics were used to correct the left crossbite. Space closure was performed using power chains on a .019*025 stainless steel arch.

Specifically, closing the space of the missing premolar was very constraining. On the one hand because of the endodontic treatments associated with the second premolar and first molar, which could have slowed down teeth displacement, and on the other hand because of the use of very light forces to lessen any excessive stress on the fragile anterior group. Maintaining the space and replacing it with an implant would have been a more appropriate solution for this case. Artistic bends with slight forces were achieved on the upper incisors for better esthetic result. After one year and seven months, spaces were closed, class I malocclusion was maintained, the midlines were coincident, the crossbite was resolved and the overbite and overjet were 2mm each. An alternate unilateral mastication was, also, established again. So, as the occlusal objectives have been achieved, the next stage was a twomonth stabilization period.

Subsequently, a mandibular bonded retention and a removable prosthesis replacing the upper incisor were indicated. Two ESSIX® retainers were made for nocturnal use only. Once debonded, the patient replaced posterior temporary crowns with definitive ceramic crowns and still in progress, anterior implants placing and facial symmetrisation genioplasty (figure 3).

DISCUSSION

Condylar fractures have an incidence ranging from 16.5% to 56% of all mandibular fractures (7). They, predominantly, occur following indirect shocks. The mechanism of these fractures has been well explained by Lindahl: if the impact is on the chin, the fracture is, often, bilateral.

On the other hand, if the impact is lateral, and more precisely if it occurs in the mandibular body's region, the fractured condyle is opposite to the point of application of the traumatic force (8). Subsequently, a so-described protective adaptation mechanism takes place spontaneously, involving three protagonists: the skeletal, neuromuscular and dental systems (9). The two possible options, here, are to act immediately and perform an open reduction, which is generally, the most frequently used approach due to its many advantages. In fact, open reduction allows a close return to

normality with full correction of the adaptive malocclusion. However, the major complication of this method is facial nerve damage, with an increased incidence of facial palsy.

The second option consists of a non-invasive method, but this, often, entails an increased risk of maintaining or even worsening the post-traumatic occlusion. Fracture type, age, general condition and patient motivation are all decisive factors in determining the best therapeutic approach (10,11). The incidence of PTM following closed reduction is between 0-24% (12).

Once the condition has been established, unlike in children, it is important not to rush into making a decision on what course of action to take, but to wait until the condition has stabilized and the protective



A. Exobuccal radiographic assessment



B. Endobuccal radiographic assessement





C. Radiological assessment through panoramic X-ray, and profile teleradiography



Figure 3 Post-treatment photographic and radiological assessment

equilibrium has been established. At that point, the management process can involve either reconstructive surgery in extremely severe cases. But generally speaking, orthodontic treatment with or without orthognathic surgery is sufficient to achieve a functional occlusion and an acceptable, correct aesthetic compromise. Orthodontists can operate at several levels on the road to recovery for patients who have been victims of facial trauma:

-Emergency treatment: in the first phase of treatment, immediately after the accident and when an open reduction is required, the maxillofacial surgery team may request the intervention of the orthodontic team with the maxilla-mandibular fixation (MMF), whether by using rigid bars, bonding brackets with elastics, or even by placing miniscrews with elastics when tooth structures are too damaged to allow the attachment of the fixation appliances (13).

-Role in preventing the establishment of (PTM): The orthodontist, in conjunction with a physiotherapist,

also intervenes when certain cases require functional rehabilitation (14). This is considered to be a key step in preventing the permanent installation of posttraumatic malocclusion, and helps guiding the stomatognathic system towards a functional equilibrium that prevents the onset of PTM. However, functional rehabilitation has been shown to be more effective in children than in adults (15). It is recommended to start functional rehabilitation no more than three months after the fracture has set, to increase the success rate (16).

- Role in overcoming existing post-traumatic malocclusion: the management of a facial trauma case is completely different from conventional treatment. The patient is, often, faced with several challenges: dento-periodontal, occlusal, muscular and even psychological. The overriding goal in this kind of case is to achieve a therapeutic compromise that is essentially functional, but also esthetic, without disturbing the adaptive articular balance that has been established. When the options available to the orthodontist, such as the wide range of appliances, temporary skeletal anchorage (TADS), intermaxillary elastics and occlusal stops, are not sufficient to achieve this objective, orthognathic surgery is often required. Together, orthodontist and maxillo-facial surgeons, in a collaborative effort, they optimize the achievement of a satisfactory result. This is, unfortunately, not a surgery that is readily accepted by these patients, who remain severely psychologically affected by the accident they have undergone.

CONCLUSION

It is obvious that the management of post traumatic malocclusion is very complex and, demands very accurate diagnosis, that would play a crucial role in the comprehensive care of a patient with PTM. Overall, an interdisciplinary and evolving strategy incorporating several specializations such as maxillofacial surgery, orthodontics, prosthetics, implantology, physical therapy, and even psychiatry may be required to comprehensively tackle the issue from all fronts. The main objectives are to restore a stable and functional occlusion, to maintain the equilibrium position of the condyles, to enhance facial aesthetics and, in general, to give patients a better quality of life.

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d'Odontologie

>>> ARTICLES SCIENTIFIQUES



Réimplantation d'une dent avulsée : à propos d'un cas clinique

Reimplantation of avulsed tooth : case report

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Résumé

Introduction : L'avulsion dentaire est une urgence dentaire courante. Une prise en charge rapide et appropriée est cruciale pour le pronostic de la dent reimplantée.

Objectif : Cet article présente la gestion de l'avulsion dentaire, détaillant la procédure clinique et les résultats associés au traitement. Observation : Un patient âgé de 17 ans s'est présenté au service de médecine dentaire à l'hôpital universitaire de sahloul avec une incisive centrale droite maxillaire avulsée à la suite d'un accident domestique. La dent a été conservée dans du lait et reimplantée dans les six heures suivant l'incident. L'examen clinique et les radiographies ont confirmé le diagnostic d'avulsion dentaire sans fracture alvéolaire. Le patient a bénéficié d'un suivi, comprenant un traitement endodontique, sur une période de 3 mois.

Discussion : Ce cas souligne les défis et les complications potentielles associés à la reimplantation dentaire. Une intervention précoce et une manipulation correcte des dents avulsées sont essentielles pour obtenir des résultats favorables, mais des complications telles que l'ankylose ou la résorption peuvent néanmoins survenir. Ce cas soutient la nécessité de poursuivre les recherches pour améliorer les protocoles de traitement et les résultats chez les patients victimes de traumatismes dentaires. Les évaluations cliniques et radiographiques initiales ont indiqué une guérison satisfaisante. Cependant, lors du suivi à trois mois, le patient a développé une ankylose de la dent reimplantée.

Conclusion : La replantation des dents avulsées reste une option viable malgré les complications telles que l'ankylose et la résorption radiculaire. La détection précoce et un suivi régulier sont essentiels pour améliorer les résultats à long terme.

Mots clés: Avulsion dentaire, Traumatisme dentaire, réimplantation dentaire, ankylose, résorption dentaire

Abstract

Tooth avulsion is a common dental emergency often resulting from traumatic dental injuries. Quick and appropriate management is critical for the prognosis of the remplanted tooth

Aim : This article reports the management of dental avulsion by immediate replantation of the tooth, highlighting the clinical procedure and outcomes associated with the treatment.

Observation: A 17-year-old male patient presented to the dental clinic with an avulsed maxillary right central incisor following a domestic accident. The tooth was preserved in milk and remplanted within six hours of the incident. Clinical examination and radiographs confirmed the diagnosis of tooth avulsion without alveolar fracture.. The patient received follow-up care, including endodontic treatment, over a period of 3 months.

Discussion: This case underscores the challenges and potential complications associated with tooth reimplantation. Early intervention and proper handling of avulsed teeth are essential for favorable outcomes, but complications such as ankylosis can still occur. This case supports the need for ongoing research to improve treatment protocols and patient outcomes in dental trauma cases. Initial clinical and radiographic evaluations indicated satisfactory healing.

However, at the three-month follow-up, the patient developed ankylosis of the remplanted tooth.

Conclusion : Replantation of avulsed teeth remains a viable option despite complications such as ankylosis and root resorption. Early detection and regular follow-up are essential for improving long-term outcome

Key words: Dental trauma, avulsed tooth, tooth replantation, ankylosis, root resorption

Actualités Tunisiennes 97

d'Odontologie Vol 14 - Nº 1 & 2 - Décembre 2024

INTRODUCTION

Traumatic injuries involving dentition are seen frequently in the age group of 7-11 years.

Avulsion is one serious traumatic dental injury that corresponds to the complete displacement of the tooth out of the alveolar bone socket1. Maxillary central incisors are the most commonly involved teeth due to their prominent position in the arch1.

According to the International Association of Dental Traumatology, one in every two children gets a dental assault, with the most common age range being 8 to 122. The degree of damage might range from minor enamel chipping to serious maxillofacial trauma2.

The primary line of treatment for the management of an avulsion injury is replantation1. A retrospective study in children has confirmed that the replantation procedure has a long term survival rate (79.3%) in accordance with the treatment guidelines prescribed by the International Association of Dental Traumatology (IADT)1.

The aim of this case report is to present the replantation of the tooth, highlighting the clinical procedure and outcomes associated with the treatment.

OBSERVATION

A 17-year old male patient in good general condition presented at the dental medicine department of Sahloul hospital with avulsed maxillary right incisor tooth (tooth 11) following a domestic accident.

The avulsed teeth had been kept in milk, from the moment of trauma until emergency visit 6 hours later. The extraoral examination revealed labial wound that has been sutured previously at the emergency departement (figure 1).



Figure 1 Pre-operative clinical image

On examination, the tooth was in one piece with closed apex. On intra oral examination, the right maxillary central incisor (11) was missing and the

marginal gingiva in the associated area was lacerated. On inspection and palpation of the anterior maxillary segment, the dento-alveolar fracture was ruled out. Panoramic X-ray revealed an empty alveolar socket (figure 2).



Pre operative radiograph showing Figure 2 empty alveolar socket of the 11

After obtaining informed consent, it was decided to reposition and replant the avulsed tooth.

After taking it out from the milk, the avulsed tooth was cleaned with gauze soaked in normal saline in order to remove any debris that had adhered to it and the rest of the necrotic periodontal ligament (figure 3).



with gauze soaked in normal saline

cleaned with gauze soaked in normal saline

Local anaesthesia (2% lidocaine without vasoconstrictor) was administered with labial and palatal infiltration in the involved area. The alveolar socket was gently rinsed with normal saline. The avulsed tooth was then repositioned in the alveolar socket with slight digital pressure and the correct positioning was verified with RadioVisioGraphy (RVG) (figure 4,5).

Actualités Tunisiennes 98 d'Odontologie

Vol 14 - N° 1 & 2 - Décembre 2024





Repositioning of the avulsed tooth



Figure 5 Radiograph verification of correct positioning of the 11 in its alveolar socket

The repositioned tooth had an acceptable occlusion and thus, occlusal adjustment was not required. After radiographic verification, the replanted tooth was stabilised in its socket with splinting that comprised of an orthodontic wire secured with lightcure flowable composite resin (Figure 6) for 4 weeks.



Figure 6 Replanted tooth stabilised in place with splinting

The labial surfaces of the maxillary anterior teeth were spot etched at the middle third level of the crown with 37% phosphoric acid for 30 seconds which was rinsed and air dried. Bonding agent was then applied and light cured for 20 seconds.

Flowable composite was placed at the respective spots and then the splinting wire was secured in place after light curing each tooth for 20 seconds.

Oral analgesics and antibiotics (amoxicillin 1000 mg and clavulanic acid 125 mg twice daily) were

prescribed for seven days. The patient was also recommended to seek an anti-tetanus booster dose. He was advised to maintain a soft diet for two weeks along with the use of a soft-bristled toothbrush and 0.12% chlorhexidine mouth rinse for oral hygiene maintenance.

The patient was recalled after two days and conventional root canal therapy was initiated in the replanted tooth. An access cavity was prepared followed by extirpation of the pulp and working length determination with #15 K file. The root canal space was shaped and prepared with rotary instrumentation (E-Flex gold). After each instrument change, the root canal space was irrigated with 2.5 ml of 3% sodium hypochlorite (NaOCl) solution followed by a final rinse with 17% ethylenediamine tetra-acetic acid (EDTA) solution for a minute. After rinsing with saline, the canal was dried with absorbent paper points. Calcium hydroxide intracanal medicament was placed in the root canal space and the access cavity sealed with a temporary filling. Two weeks after replantation, the intracanal medicament was removed. The root canal space of the replanted tooth was obturated with gutta-percha and zinc-oxide eugenol as a sealer by the cold lateral compaction technique (figure 7). The access cavity was then sealed with a light-cure composite resin restoration.



Figure 7 Radiograph showing completed root therapy

The splint was removed after 4 weeks. It was also noted that the mobility of the replanted tooth had reduced to grade I.

At the 3-month follow-up, signs of ankylosis were observed. During the clinical examination, a metallic sound was noted upon axial percussion, indicating the onset of ankylosis. On radiographic examination, there was localized disappearance of the periodontal ligament and areas of external root resorption on the apical third of the root (Figure 8).

d'Odontologie

DISCUSSION

Avulsion injuries in permanent teeth are among the most severe dental trauma, often requiring immediate and appropriate management to ensure the best possible prognosis. In this case report, we presented a replantation of the right maxillary incisor tooth (#11) following avulsion. Although the tooth was successfully replanted, complications such as early ankylosis and root resorption were observed after three months, which are frequent following such injuries.

The decision to replant an avulsed tooth depends on several factors, including the patient's general health, maturity of the root, the time elapsed since the injury, and the use of appropriate storage media1,3.

Replantation is generally recommended for permanent teeth in younger patients, where maintaining the natural tooth, even temporarily, can aid in alveolar maxillary bone development and provide temporary restoration of esthetics and function which potentially delay the need for prosthetic replacement. For this reason, replanting a permanent tooth is often the right decision, even if the extraoral dry time exceeds 60 minutes (which have a poor long-term prognosis, as the periodontal ligament (PDL) becomes necrotic and is unlikely to regenerate)4. It preserves future treatment options, and the tooth can be extracted later if necessary, following thorough interdisciplinary assessment . In this case, replantation was indicated due to the young age of the patient and the clinical condition of the tooth, despite the extraoral time exceeding 60 minutes.

The increase of the duration of the dry time can lead to the increase of the risk of ankylosis which is significantly higher with mature teeth that have closed apex than with immature teeth3,5,6. In our case, we discovered replacement root resorption after 3 months which is the most prominent complication (the incidence varies between 59% and 80%), followed by the inflammatory external root resorption(23.2%,), then the surface root resorption(13.3%), and finally, the internal root resorption(1.2%) which is the least common3,6.

While the use of an appropriate temporary storage medium can help preserve the (PDL) cells, it should not delay tooth replantation efforts, as timely intervention is crucial to the tooth's viability until professional care is available7,8. In the current case, the patient had carried the avulsed tooth in milk which, according to the guidelines of international association of dental traumatology (IADT), is currently the most recommended medium for storing an avulsed tooth in a pre-hospital setting, since its pH (6.7) and osmolality values (about 280 mOsm/ kg) are compatible with those of the PDL cells 3,5,7. According to the guidelines of the (IADT), saline, saliva and milk are considered physiological media that preserve the PDL before replantation5.

Previous guidelines have suggested that teeth stored dry for >60min should be cleaned from the necrotic tissue remnants attached to them before replantation. However, recent studies do not recommend removing tissue remanent since those teeth would have been ankylosed.

Those findings are in accordance with the recent guidelines of the IADT5.

The effect of applying topical antibiotics to the root surface prior to replantation, particularly in relation to pulp revascularization, remains a subject of debate in dental literature3. Some studies suggest that antibiotics, such as tetracycline, may reduce the risk of infection and inflammatory resorption by limiting bacterial invasion, which can support the healing process9. However, the impact on pulp revascularization is less clear, as these agents could potentially interfere with the cellular processes necessary for revascularization. Additionally, the effectiveness of different types of antibiotics and the optimal method of application have not been definitively established. While some clinicians advocate for their use to enhance outcomes, others caution against the potential risks, leaving this topic open to further research and clinical investigation.

Avulsed teeth always require stabilization to maintain the replanted tooth in its correct position, provide patient comfort end improve function. According to the IADT replanted permanent teeth should be stabilized for a period of 2 weeks depending on the length and degree of maturation of the root4.

As per the IADT guidelines, root canal therapy must be initiated within two weeks post-replantation. The replanted tooth needs endodontic therapy because the necrotic pulp and its toxins may gain access to the periodontal ligament through various portals of exit, thus contributing to the process of resorption . In the past, it was advised to perform root canal therapy extra-orally before replantation. However, the current guidelines recommend root canal therapy be performed intra-orally. This minimizes the extra-oral time and associated risk factors 1,3.

Vol 14 - Nº 1 & 2 - Décembre 2024

In our case, endodontic treatment was initiated two days after replantation followed by placement of calcium hydroxide intracanal medicament for ten days. Although the current guidelines recommend placing calcium hydroxide for a longer duration of four weeks, it has been shown to have similar efficacy when placed for a shorter duration in the absence of pathology1.

Ankylosis may inhibit the growth and development of teeth in the replantation region. While there is no universally established timeline for ankylosis, follow-ups at 2 weeks, 4 weeks, 3 months, 6 months, 1 year, and then annually for a minimum of five years (with clinical and radiographic examinations at every follow-up) are essential to detect any associated complications. In our case, signs of ankylosis were observed at the 3-month follow-up, confirming the importance of regular monitoring to enable timely intervention, such as decoronation, if necessary.3

CONCLUSION

Replantation is the preferred treatment after avulsion, as it addresses both the patient's functional and aesthetic needs while preserving the surrounding bone for potential future prosthetic rehabilitation if replantation fails. Even with prolonged extraoral time, a favorable outcome can be achieved if recommended guidelines and protocols are carefully followed.

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>>> ARTICLES SCIENTIFIQUES



Extraction of an upper central incisor with complex radicular cervical fracture in an adolescent female patient.

Extraction d'une Incisive Centrale Supérieure avec une Fracture Radiculaire Cervicale Complexe chez une Patiente Adolescente

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Abstract

Introduction: Severe anterior dental trauma during adolescence is common and can have significant aesthetic, functional, and psychological consequences. This case report focuses on the specific challenges posed by cervical horizontal root fractures, emphasizing the importance of accurate diagnosis, appropriate management, and diligent follow-up in adolescent dental trauma care. Observation: A 16-year-old girl, in good general health, presented with mobility of tooth 11 following a traumatic injury sustained two years earlier.

The trauma involved the maxillary teeth 12, 11, 21, and 22, leading to extrusive luxation and multiple fractures. Tooth 12 was extracted, and immediate stabilization of the remaining teeth was achieved with a flexible splint. Tooth 11 had a horizontal root fracture at the cervical level, with aligned fragments. Root canal filling was performed on teeth 21 and 22, and tooth 11 was treated with Ca (OH)2 to manage inflammation. Two years later, the patient returned with significant mobility (grade 3) of tooth 11. Clinical examination and radiological findings revealed mesio-distal and vestibulo-lingual misalignment of the fragments of tooth 11, with granulation tissue at the cervical level. Due to the fracture's complexity, extraction of tooth 11 was determined necessary. Conclusion: This case highlights the complexities of managing cervical root fractures in adolescents. While conservative treatments are often considered, advanced imaging, including CBCT, is crucial in guiding clinical decision-making. Prevention, early diagnosis, and meticulous follow-up are key to minimizing long-term complications.

Résumé

Introduction: Les traumatismes dentaires antérieurs chez les adolescents sont fréquents et peuvent avoir des conséquences esthétiques, fonctionnelles et psychologiques importantes.

L'objectif de ce cas clinique est de mettre en évidence les défis uniques posés par les fractures cervicales horizontales des racines et de souligner l'importance d'un diagnostic précis, d'une prise en charge appropriée et d'un suivi rigoureux, en particulier dans la dentition adolescente. Observation : Une jeune fille de 16 ans, en bonne santé générale, se présente avec une mobilité de la dent 11, consécutive à un traumatisme dentaire survenu deux ans plus tôt. Ce traumatisme a impliqué les dents maxillaires 12, 11, 21 et 22, avec une luxation extrusive et des fractures multiples. Suite à cet incident, la 12 a été extraite et une stabilisation des dents restantes a été réalisée immédiatement à l'aide d'une contention flexible. La 11 présentait une fracture radiculaire horizontale au niveau cervical avec des fragments bien alignés. Une obturation canalaire a été effectué sur les dents 21 et 22, tandis que la 11 a été traitée avec du Ca (OH)2 pour gérer l'inflammation. Deux ans plus tard, la patiente revient en consultation, se plaignant d'une mobilité importante de la couronne de la 11 (grade 3). L'examen clinique et les radiographies ont révélé un déplacement mésio-distal et vestibulo-lingual des fragments de la dent 11, ainsi que la présence de tissu de granulation au niveau cervical. En raison de la complexité de la fracture, l'extraction de la 11 a été décidée. Conclusion: Ce cas clinique illustre les difficultés de prise en charge des fractures cervicales des racines dans la dentition adolescente. Bien que des approches conservatrices soient souvent envisagées, l'utilisation d'une imagerie avancée, notamment le CBCT, est essentielle pour guider la décision clinique. La prévention, un diagnostic précoce et un suivi clinique rigoureux sont fondamentaux pour minimiser les complications à long terme.

Actualités Tunisiennes 102 d'Odontologie

INTRODUCTION

Dental trauma is a common reason for emergency consultations, particularly among adolescents, who are more prone to injuries due to their active lifestyles. Studies suggest that up to 20% of adolescents experience dental trauma, with anterior teeth being the most commonly affected (1). Among these injuries, horizontal root fractures, especially in the cervical third, pose significant challenges. Root fractures are classified based on their location-apical, middle, or cervical third-with prognosis worsening as the fracture moves coronally (2, 3). The International Association of Dental Traumatology (IADT) guidelines emphasize that treatment depends on fracture location, pulp vitality, and associated luxation injuries (2, 3). While apical and middle-third fractures often heal well with splinting, cervical root fractures have a poorer prognosis, often requiring more complex treatment approaches (3, 4). Cvek and al. found that the survival of teeth after intra-alveolar root fractures was highly dependent on fracture location and age, with younger patients showing better outcomes. In particular, a study showed that fractures in patients aged 7-17 years had more favorable outcomes if the injury was isolated to the root and not associated with luxation injuries (1). Managing such injuries in adolescents is particularly challenging due to ongoing craniofacial growth, which influences treatment choices and long-term stability. While conservative approaches, such as endodontic therapy with fiber post reinforcement, can be effective, some cervical fractures are non-restorable, necessitating extraction (4). Westphalen et al. provide a long-term evaluation of pulp maintenance after horizontal root fractures, which is highly relevant in cases where conservative management is attempted. Their study suggests that pulp vitality can be maintained in certain cases, although longterm monitoring is essential. Furthermore, implant placement is typically delayed until skeletal maturity, adding another layer of complexity (4).

Clinical and radiological examinations are essential in the diagnosis and treatment plan for patients with root fractures. Mizuhashi et al. highlighted the crucial role of advanced imaging techniques such as conebeam computed tomography (CBCT) in diagnosing root fractures, particularly horizontal fractures. They demonstrated that CBCT was more accurate than traditional radiographs in detecting fractures located at or near the gingival level, which is critical for managing cervical root fractures. Beyond clinical concerns, dental trauma profoundly affects adolescents' psychosocial well-being, impacting self-esteem and quality of life (5). This article focuses on the management of a cervical root fracture in an adolescent female patient, emphasizing the role of accurate clinical and radiological assessment in guiding treatment decisions.

Vol 14 - Nº 1 & 2 - Décembre 2024

OBSERVATION

A 16-year-old girl, in good general health, presented with mobility of tooth 11. The patient reported a two-year history of trauma that had caused extensive damage to her maxillary anterior teeth, including extrusive luxation of teeth 12, 11, 21, and 22, along with gingival lacerations and alveolar bone fractures. Initial treatment involved the reduction of the alveolar fractures and stabilization of the dislocated teeth using flexible splinting made up of polyethylene fibers reinforced with light-curing flowable composite resin (Ribbond®) to restore alignment and maintain the periodontal ligament's integrity. Tooth 11 presented horizontal radicular fracture at the cervical level and tooth 12 exhibited multiple coronal and radicular fractures. Pulpectomy was performed on tooth 11 to prevent irreversible pulpitis.

Endodontic treatment was initiated with Ca $(OH)_2$ as an intracanal medicament to control inflammation, followed by root canal filling of teeth 21 and 22 using vertical compaction of warm gutta-percha (System B/Obturall). Tooth 12 was extracted. Due to the COVID-19 pandemic in 2019, the patient was lost to follow-up and returned two years later with significant mobility (grade 3) of the crown of tooth 11. Informed consent was obtained from her mother. Clinical examination revealed a moderate pain on palpation and axial percussion of the tooth.

Retroalveolar examination showed at least two horizontal fracture lines with an in-between fragment, a radiolucent area between the cervical fracture line and a displacement of the coronal fragment, with obliteration of the main canal at the radicular part. No periapical complications were seen, such as a radiolucent area corresponding to the thickening of the periodontal ligament, a periapical lesion or a radicular resorption. These findings were confirmed by CBCT slices, with the sagital view. The depth of the fracture was recorded with axial and coronal CBCT slices (figure 1 A, B, C, D).



Figure 1

A,B: digital retroalveolar radiograph and sagital CBCT showing at least two fracture lines at the cervical (yellow arrow) and horizontal levels (orange arrow), with an in-between fragment (blue arrow), a radiolucent area between the fragments and displacement of the coronal fragment. The depth of the fracture line is seen with the occlusal and the coronal CBCT views (Figure1 C, D). Note the absence of periradicular radiolucencies (Slicing of CBCT imaging done by Pr. Latifa Berrezouga).

Indeed, the sagital CBCT slices confirmed the favorable outcome of root canal treatments performed on teeth 21 and 22 (figure 2 A, B).





A: CBCT sagital slices showing root canal fillings on tooth 21 and 22 with no complications (root canal fillings and CBCT slices performed by Pr. Latifa Berrezouga).

Under local anesthesia, microscopic examination of the tooth through the previous access cavity confirmed the displacement of the coronal fragment, the mobility of the in-between fractured fragment that was obliterating the root canal lumen. Indeed, the interposition of a granulation tissue was at the origin of the excessive bleeding.





Operative microscope, A: bleeding from the granulation tissue. B: mobile fractured fragment (microscopic exploration and Photos by Pr. Latifa Berrezouga).

Vol 14 - Nº 1 & 2 - Décembre 2024

Due to the depth and complexity of the fractures, extraction of tooth 11 was deemed necessary. The management included orthodontic treatment to realign the dentition and a plan for implant placement to address the aesthetic and functional deficits caused by the traumatic dental injury.

DISCUSSION

Dental trauma in children and adolescents is a significant concern due to its potential to disrupt craniofacial development and affect both function and aesthetics. Management requires a tailored approach that accounts for the developmental needs and biological responses of young patients (6). In particular, radicular fractures, which involve the root of the tooth, present a considerable challenge and often require a multidisciplinary approach (7).

These fractures may be associated with crown fractures and luxations, and their location-whether cervical, middle, or apical-plays a significant role in determining prognosis and treatment outcomes (3, 7). Cervical horizontal root fractures are especially problematic due to their proximity to the gingival margin, which compromises healing potential and increases the risk of infection (3, 6). Salineiro et al. studied the effectiveness of different protocols using CBCT for detecting horizontal root fractures, showing that 3D imaging significantly improves diagnostic accuracy compared to traditional 2D radiographs, particularly in cases of fractures near the gingival (8). In our case, the cervical root fracture of the upper central incisor posed a significant challenge, and despite initial attempts at conservative management, extraction became the only viable option. This finding aligns with other studies, indicating that cervical fractures often lead to unsatisfactory outcomes when treated conservatively (1). Accurate clinical diagnosis is crucial in assessing trauma severity.

Symptoms such as pain on percussion, abnormal mobility, and loss of pulp vitality often indicate significant injury (1). However, clinical findings alone are not sufficient to fully assess the extent of the damage, particularly when fractures are hidden beneath the gum line or in areas not easily visible. However, the use of the operative microscope in the present case allowed to assess the complexity of the fracture, appreciate the interposition of a fractured mobile fragment, along with the displacement of the coronal fragment that prevent from accessing the main root canal.

Cone-beam computed tomography (CBCT) has become the gold standard for diagnosing root

fractures, particularly in the cervical region, where traditional radiographs may fail to capture the full extent of the injury (8). May et al. (2013) emphasized on the importance of radiological assessment in managing horizontal root fractures, particularly using CBCT, as it allows for more precise localization and evaluation of the fracture's impact on surrounding tissues. CBCT offers high-resolution, three-dimensional imaging that allows for precise localization of the fracture and detailed assessment of displaced fragments (6). It also provides insight into the relationship between the fracture and surrounding anatomical structures, such as the periodontal ligament and alveolar bone, which are crucial for treatment decisions (3, 7). In this case, the use of CBCT was determinant in evaluating the complexity of the cervical root fracture (depth and irregularity of the fracture line) and in guiding the decision between conservative treatment and extraction.

When treating cervical root fractures, the goal is to preserve the tooth, if possible. When the fracture line is not too extensive and there is adequate support from surrounding tissues, conservative treatments like splinting, endodontic therapy, and fiber post placement can be successful (7). However, in this case, the misalignment of fractured fragments, as clearly demonstrated on the CBCT, made conservative treatment unfeasible. The extent of the fracture and the displacement of the tooth fragments indicated the extraction as the adequate treatment option. For complex fractures, particularly in the cervical region, conservative treatment often yields poor outcomes. Fractures involving significant displacement or extending below the gingival line may not heal adequately with conservative methods, increasing the risk of infection, pulp necrosis, or root resorption. In such cases, extraction offers a definitive solution (1).

The outcome of root fracture treatments depends heavily on early diagnosis, fracture location, and timely intervention. Early detection and management lead to better healing outcomes and reduce complications like pulp necrosis and root resorption (2, 3). Özler and Cehreli discussed a case of cervical horizontal root fracture managed conservatively with long-term stabilization. While some fractures can heal successfully with appropriate intervention, the prognosis in complex fractures is less predictable. In our case, the late detection and the complexities involved in the treatment led to a poor prognosis, emphasizing the

Vol 14 - Nº 1 & 2 - Décembre 2024

importance of early and thorough follow-up after dental trauma (7). Post-traumatic complications, such as pulp necrosis, infection, and root resorption, are common in severe cases. The IADT guidelines recommend close monitoring of these complications and stress the importance of regular follow-up to manage any issues promptly (2, 3). If complications arise, they may require additional interventions, such as root canal therapy or extraction, as demonstrated in this case.

While effective management of dental trauma is essential, prevention remains the most effective strategy. Adolescents engaged in contact sports and outdoor activities are at increased risk for dental injuries (3). Elkhadem et al. conducted a systematic review of adverse events following surgical extrusion for crown-root fractures, highlighting the risks involved in complex procedures for such injuries. Preventive measures such as wearing mouthguards and sport-specific protective gear can significantly reduce the incidence of dental trauma. Educating patients and their families about the risks of dental injury and the importance of preventive care can help reduce the need for complex treatments in the future (9).

CONCLUSION

In this case, clinical and radiological investigations, using the operative microscope and CBCT, clearly demonstrate the complexity and the severity of the radicular fracture, thus contraindicating conservative treatments. Proper clinical and radiological assessment is key to ensuring the best outcomes for adolescent patients.

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>>> ARTICLES SCIENTIFIQUES



Traumatized Upper Central Incisor Crown used as a Temporary Bridge in a School Boy

Utilisation de la Couronne de l'Incisive Centrale Supérieure Traumatisée en tant que Bridge Temporaire chez un écolier

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Abstract

Background: Dental trauma in children, particularly involving the maxillary central incisors, can lead to severe complications if not managed properly. Replacement root resorption is a common sequela following tooth avulsion.

Case presentation: A young patient aged 12 years old who suffered a previous severe dentoalveolar trauma to the two maxillary central incisors consulted for severe mobility grade 3 on tooth 11. Initial treatment included reimplantation of 21 and 11 followed by endodontic treatment and stabilization using a bonded retainer. However, the patient was not seen again following the covid-19 pandemic and he returned three years later following a second trauma to tooth 11. The clinical and radiological examination revealed severe root resorption of tooth 11 and a grade III mobility. The affected tooth was extracted, and the natural crown was bonded using a resin retainer reinforced with polyethylene fibers (Ribbond) as a temporary solution until the patient became eligible for implant surgery.

Conclusion: This case underscores the critical role of regular follow-up in the management of traumatized teeth and highlights the utility of fiber-reinforced splints as an effective interim solution for young patients who are not yet candidates for definitive implant therapy.

Key words : dental trauma, root resorption, fiber-reinforced splint, pediatric dentistry

Résumé

Introduction: Les traumatismes dentaires sont fréquents chez les enfants, en particulier ceux touchant les incisives centrales maxillaires et peuvent entraîner de graves complications en cas de traitement inadéquat. La résorption radiculaire de remplacement est une des complications fréquentes suite à l'avulsion d'une dent.

Présentation du cas : Un jeune patient âgé de 12 ans ayant subi un ancien traumatisme dentoalvéolaire sévère au niveau des deux incisives centrales maxillaires consulte pour une mobilité sévère grade 3 sur la 11. La prise en charge initiale comprenait une réimplantation de 21 et 11 suivie d'un traitement endodontique et une stabilisation à l'aide d'une contention collée. Cependant, le patient n'a pas été revu suite à la pandémie covid-19 et il revient trois ans plus tard suite a un second trauma sur la 11. L'examen clinique et radiologique révèle une résorption radiculaire sévère de la dent 11 et une mobilité de grade III. La dent affectée a été extraite, et la couronne naturelle a été collée à l'aide d'une fibre de polyéthylène renforcée par la résine composite comme solution temporaire jusqu'à ce que le patient puisse bénéficier d'une prothèse implanto-portée.

Conclusion : Ce cas met en évidence l'importance d'un suivi régulier dans la gestion des dents traumatisées et souligne l'utilité de l'utilisation de la couronne dentaire naturelle comme mainteneur d'espace pour les jeunes qui ne sont pas encore candidats à une thérapie implantaire définitive.

Mots clés: traumatisme dentaire, résorption radiculaire, attelle renforcée de fibres, dentisterie pédiatrique

INTRODUCTION

Dental trauma is a common issue encountered in daily dental practice. Anterior teeth are particularly affected among children and adolescents. These injuries are often caused by accidents, falls, contact sports, or violence. The incidence of trauma to permanent teeth peaks between the ages of 8 and 10, as children increasingly participate in contact

sports.(1)

Dental trauma may affect different components of the tooth and may involve soft tissues and alveolar bones' injuries. Tooth avulsion is one of the most severe traumas complications. It occurs in teeth with open or closed apices. IADT guidelines regarding permanent teeth avulsion give a detailed protocol of clinical, radiological, therapeutic and treatment outcomes features.

When a tooth is mobile, it is recommended to use flexible rather than rigid splints and apply them for shorter durations (2). Fiber-reinforced composite (FRC) have been used as an alternative to conventional space maintainers in pediatric dentistry (3). According to Kahler et al., an effective splint should enable periodontal ligament reattachment, stabilize the teeth, maintain hygiene, fulfill aesthetic requirements, and provide patient comfort (4). In absence of appropriate treatments, delayed replantation of the permanent tooth with open apices may lead to a replacement resorption or an inflammatory external resorption. Both types of resorptions may happen (2)

The aim of the present case was to report a condition of splinting of the right maxillary central incisor using polyethylene fibers in a 12-year old schoolboy victim of a second trauma during a boxing activity.

CASE REPORT

A 12-year-old schoolboy, accompanied by his mother, presented to the output Department of the Dental Clinic, Monastir, Tunisia, complaining of mobility of the upper central right incisor following a second trauma sustained during a boxing activity. The healthy patient's dental history revealed a prior severe dento-alveolar trauma occurred at the age of 9 and that lead to the avulsion of both maxillary central incisors, gingival lacerations and multiple alveolar bone fractures.

At that time, teeth were repositioned along with the fractured alveolar bone fragments and stabilized using a wire splint and composite resin. Gingival injuries were sutured.

As the extra-oral time exceeded 90 minutes, disinfection of both teeth with NaClO, 2.5% and

dressing using Ca (OH)2 were performed. Unfortunately, the patient didn't show-up for 2 years because of the pandemic of Covid-19. External inflammatory resorption occurred due to the infection of the root canals of both central incisors. Currently, the patient sustained a second trauma during his sport's activity on tooth #11. It's worth mentioning that he is not wearing his mouth guard performed by his dentist. On oral examination, maxillary anterior gap and poor oral hygiene were noted. The crown of tooth #11 was extruded and exhibited grade III mobility. Tooth #21 was not mobile, with a moderate bleeding of the gingiva. Digital retroalveolar radiography revealed nearly complete root resorption of both teeth' roots (figure 1 A, B). The initial treatment included endodontic therapy and splinting, but due of the pandemic of Covid-19, the patient didn't show-up and complications such as root resorption and increased mobility occurred.

Vol 14 - Nº 1 & 2 - Décembre 2024



Figure 1

A: Infra occlusion of tooth #21 with moderate gingival bleeding. Extrusion of the crown of tooth #11. B: Digital retroalveolar radiography showing extensive resorption of both maxillary central incisors' roots (Photos, Dr. Latifa Berrezouga).

As the patient has a sport competition abroad (Egypt) in a few days' time, the decision was made to carry out an emergency treatment on tooth #11. Informed consent was obtained from his mother.

Treatment was initiating with intraoral rinsing using 0.2% chlorhexidine, followed by ultrasonic scaling and debridement of the affected area. The crown was easily extracted, under local anesthesia with vasoconstrictor. Removal of granulation from the dental alveolus was performed with a surgical curette (figure 2 A, B, C).

The crown with resorbed areas of enamel and dentin was cleaned and disinfected. The enamel and dentin were etched with 37% phosphoric acid gel for 30 seconds, a light-curing bonding agent was applied after gentle rinsing and drying. The access cavity and the resorbed areas of the crown were then filled with a light-curing flowable composite resin at the cervical margin. (figure 3 A, B).



C: tissue granulation in the dental alveolus of the extracted crown.

Figure 2

(Photos, Dr. Latifa Berrezouga).

Figure 3

A: Clinical view of the extracted crown with enamel and dentin resorption at the cervical level; B: Filling of the access cavity and resorbed areas using flowable composite resin. (Photos, Dr. Latifa Berrezouga).

The length of the polyethylene fiber (Ribbond) was estimated using a flexible wire between the lateral upper incisors. The fiber was soaked in bonding agent (3M Universal Adhesive), applied on the palatal surface of the natural crown and then fixed by a light-curing flowable composite resin (3M, ESPE).

The lingual aspects of the adjacent teeth were spot-etched with 37% phosphoric acid gel for 30 seconds, rinsed with an air-water spray and then air-dried.

A thin layer of bonding agent was applied to the etched surfaces according to the manufacturer's instructions. The fiber splint containing the natural crown was adapted to the edentulous space and the adjacent teeth. A curing-curing flowable composite was applied along the entire length of the fiber (figure 4 A, B). In view of the occlusal gap occlusal adjustment was not necessary.





Postoperative instructions were provided, including maintaining regular oral hygiene, avoiding direct trauma from mastication or oral habits, and wearing a protective mouth guard. The patient was scheduled for a follow-up appointment one week later to assess the stability of the splint.

The patient expressed complete satisfaction with the outcome of the procedure.

DISCUSSION

Traumatic dental injuries often result in root resorption, especially when complicated with inadequate healing or after delayed follow-up.

Root resorption can occur both in the short and long term, particularly in cases involving trauma to the dental pulp, periodontal ligament, and alveolar bone. The rapid progression of resorption in this case highlights the importance of timely intervention and consistent monitoring to ensure optimal healing.

Vol 14 - Nº 1 & 2 - Décembre 2024

DISCUSSION

Managing tooth loss in young patients is particularly challenging. Restoring the lost tooth space is particularly difficult for pediatric dentists due to the limited treatment options available for children. In this case, extraction was the treatment of choice due to the increasing mobility (grade 3) and extended root resorption beyond two-thirds of the clinical root length.

Since bonding acrylic resin to composite resin is unpredictable (5), we opted for the use of the patient's own extracted natural tooth crown to maintain the space. Previous studies support the use of natural teeth as pontics (6).

The success of single-tooth restorations depends on effective bonding to adjacent teeth. To enhance retention, grooving, etching, and bonding procedures are essential. In this case, a groove was made in the mid-palatal section of the extracted tooth to maximize adhesion, improve durability, and provide mechanical support (7,8)

Biologic restoration offers several advantages, including desirable aesthetics (a natural look and feel), ease of use, and direct bonding to the tooth structure at a reduced cost. Additionally, it promotes better gingival health (due to reduced plaque retention), greater patient and parent satisfaction, and less clinical time required to achieve natural crown anatomy (7,9). This method avoids common issues encountered with other restorative techniques, such as differential wear of restorative materials, mismatched shades, and difficulties in contouring or reproducing texture (10).

Therefore, biologic restoration was deemed a suitable treatment option in this case. However, this technique is not recommended in cases of deep bite, significant interference, diastema, or extensively restored abutment teeth (10). In this case, there was no evidence of such interferences as the patient had Class I malocclusion with a front tooth gap.

An increasing demand for aesthetics has driven innovations and the development of minimally invasive adhesive restorations using fiber-reinforced composites (FRC). Ribbond was selected in this case because it is an ultrahigh molecular weight polyethylene fiber with virtually no memory, allowing it to adapt seamlessly to the contours of the teeth and dental arch. Key factors influencing the physical properties of fiber-reinforced structures include fiber loading within the restoration, the efficacy of the bond at the fiber-resin interface, fiber orientation, and fiber position in the restoration (5) Previous studies support the use of FRC as a successful alternative to conventional space maintainers over short follow-up periods (11,12) However, long-term studies are needed to evaluate its effectiveness and durability over extended periods.

CONCLUSION

The loss of maxillary incisors in childhood has always posed a challenge to the pediatric dentist to restore esthetics and function. The FRC space maintainer technique described in this case can satisfactorily restore esthetics and function and hence suggested as an alternative to conventional techniques. However, it can be considered as an provisional treatment until a definitive restoration can be performed.

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>>> ARTICLES SCIENTIFIQUES



Emergency Management of Traumatic Injuries in Primary Teeth: A Case Series and Clinical Outcomes

Gestion d'urgence des lésions traumatiques dans les dents primaires : Série de cas et résultats cliniques cliniques

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Abstract

Traumatic dental injuries in primary teeth are prevalent in children, with a global prevalence of 22.7% and falling accidents as the leading cause. Young children's more flexible alveolar bone and lower crown-to-root ratio make them prone to periodontal rather than hard dental tissue injuries, particularly affecting the maxillary incisors. This article presents three clinical cases of dental trauma in children aged 2 to 5 years, emphasizing the importance of prompt emergency management following the 2020 International Association of Dental Traumatology (IADT) guidelines. Case 1 involved a crown-root fracture requiring extraction due to the complexity of the injury and lack of patient cooperation. Case 2 involved subluxation and malalignment managed with gentle repositioning. Case 3 involved root fractures necessitating extraction of the coronal fragments. The article discusses the impact of trauma on primary teeth and its potential consequences for permanent teeth development, stressing the need for early intervention to prevent long-term sequelae.

Key words : Child-Tooth, Deciduous-Tooth Injuries / diagnosis-Emergency Treatment

Résumé

Les lésions dentaires traumatiques des dents primaires sont répandues chez les enfants, avec une prévalence mondiale de 22,7 % et les chutes étant la principale cause. L'os alvéolaire plus flexible des jeunes enfants et leur rapport couronne/racine plus faible les rendent sujets aux lésions parodontales plutôt qu'aux lésions des tissus dentaires durs, affectant particulièrement les incisives supérieures. Cet article présente trois cas cliniques de traumatisme dentaire chez des enfants âgés de 2 à 5 ans, soulignant l'importance d'une prise en charge rapide des urgences conformément aux lignes directrices 2020 de l'Association internationale de traumatologie dentaire (IADT). Le cas 1 concernait une fracture corono-radiculaire nécessitant une extraction en raison de la complexité de la blessure et du manque de coopération du patient. Le cas 2 impliquait une subluxation et un mauvais alignement gérés par un repositionnement doux. Le cas 3 concernait des fractures radiculaires nécessitant l'extraction des fragments coronaux. L'article discute de l'impact d'un traumatisme sur les dents primaires et de ses conséquences potentielles sur le développement des dents permanentes, soulignant la nécessité d'une intervention précoce pour prévenir les séquelles à long terme.

Mots clés : Enfant-Dent, caduque-Lésions dentaires / diagnostic-Traitement d'urgence

INTRODUCTION

Trauma to the primary dentition and oral cavity is a frequent issue among children and adolescents. Recent global epidemiological research has found that traumatic dental injuries to primary teeth have a prevalence of 22.7% worldwide [1]. Falling accidents are identified as the leading cause, with a slight predilection towards males [2]. The more flexible alveolar bone in young children, coupled with a lower crown-to-root ratio, often results in periodontal tissue injuries rather than damage to the hard dental tissues [3]. These injuries predominantly affect the maxillary incisors during physical activities, leading to potential functional, aesthetic, and emotional impacts [4]. The outcome for traumatized teeth is closely linked to the quality of immediate emergency care provided at the site of the injury, as well as the initial professional evaluation and treatment [5].

Vol 14 - Nº 1 & 2 - Décembre 2024

This article focuses on the emergency management of traumatic injuries to primary teeth, providing a detailed overview of recommended procedures and treatment strategies. It highlights the critical role of timely care in preserving the affected teeth and preventing further complications, offering practical guidance for clinicians in handling these cases effectively.

PATIENT OBSERVATION

First clinical case

A 2-year-old boy in good general health presented to the Preventive and Pediatric Dentistry Department at La Rabta Hospital, Tunisia, after experiencing dental trauma due to a fall. The patient arrived with his father. His medical history was unremarkable. Extraoral examination showed no additional soft tissue injuries. Intraoral examination revealed a crown-root fracture of the maxillary primary right central incisor (#51), which was sensitive to percussion, with a mobile and displaced coronal fragment. Periapical radiography confirmed a fracture extending to the occlusal third of the root. This injury was diagnosed as a complicated crownroot fracture, classified as (NA0D.05) under the WHO's new Traumatic Dental Injury classification. Due to limited cooperation, emergency treatment consisted of extraction of the affected tooth under local anesthesia. Oral hygiene instructions were provided, and a follow-up appointment along with planning for the partial dental prosthesis was scheduled.



Figure 1 A : Crown-root fracture of the maxillary primary right central incisor B : periapical radiograph showing the fracture extending to the occlusal third of the root C : the extracted tooth

Second clinical case

A healthy 4-year-old boy was referred to the Preventive and Pediatric Dentistry Department at La Rabta Hospital, Tunisia, after a domestic accident. He arrived with his mother. Intraoral examination revealed a gingival laceration, and teeth (#52, #51, #61) were displaced palatally, resulting in a crossbite (Figure 2-A). The diagnosis was lateral luxation, classified as (NA0D.13) in the WHO's new Traumatic Dental Injury classification, with class I mobility.

Occlusal interference was also observed (Figure 2-B). Tooth (#61) presented with subluxation (NA0D.11), showing tenderness to touch, slight mobility without displacement, and gingival sulcus bleeding. A periapical radiograph confirmed no fractures in the root or alveolar bone (Figure 2-C). Emergency treatment involved gently repositioning the affected tooth under local anesthesia. A splint was unnecessary, as the teeth remained stable post-repositioning, and normal occlusion was restored (Figure 2-D). No additional treatment was needed for the subluxated tooth. Oral hygiene instructions were provided, and a soft diet was recommended, along with monitoring for any changes in tooth mobility and color.



Figure 2

A : lateral luxation of the (#52, #51, #61)
B : occlusal interference
C : periapical radiograph confirmed the absence of any root or alveolar fractures
D : repositionning of the teeth

Third clinical case

A 5-year-old boy was referred to the Preventive and Pediatric Dentistry Department at La Rabta Hospital, Tunisia, following a public road accident. He was escorted by his mother.

Extraoral examination revealed injuries to the upper and lower lips (Figure 3-A). Intraoral examination showed a gingival laceration, with teeth (#52) and (#51) extruded, palatally displaced, and exhibiting class II mobility (Figure 3-B). Occlusal interference was also present. A periapical radiograph confirmed root fractures in the middle third of both teeth (Figure 3-C). For this case, the diagnosis was established as a root fracture classified as (NAOD.06) according to the WHO new Traumatic Dental Injury classification. The treatment involved extracting the coronal fragments under local anesthesia. (Figure 3-D). Oral hygiene instructions and a soft diet were recommended, along with a removable partial dental prosthesis for teeth #51 and #52. Monitoring of root resorption and the eruption of teeth #11 and #12 was advised.

DISCUSSION

In children aged 0 to 6 years, oral injuries account for up to 17% of all bodily injuries [6].

Traumatic dental injuries to primary teeth encompass various types, including injuries to the hard dental tissues, pulp, and periodontal tissues, with the latter being particularly common in this age group. In March 2022, the World Health Organization (WHO) fully adopted the Andreasen classification, introducing a new category, NA0D ("Injury of teeth or supporting structures"). This classification provides an accurate system for defining and classifying traumatic dental injuries facilitating proper diagnosis and treatment [7].

The primary causes of traumatic dental injuries in young children are unintentional falls, collisions, and recreational activities, which are especially common as children develop motor skills such as crawling, walking, and running [8]. Indoor falls are the leading cause of traumatic dental injuries among toddlers, whose motor coordination is still immature [9].

Close parental supervision and modifications to home environments are recommended to mitigate the risk of injury [10]. Due to their anterior positioning, upper incisors are particularly susceptible to trauma, as highlighted in this case series. Additionally, 45% of traumatic dental injuries are accompanied by soft tissue injuries, and multiple teeth are often involved [11]. In this series, patients presenting with soft and/or hard tissue injuries frequently had multiple traumatized teeth.

The prevalence of developmental disturbances in permanent teeth resulting from trauma to their primary predecessors ranges from 20% to 74%, due to the close anatomical relationship between the apices of primary teeth and their developing permanent successors [12]. The severity of these sequelae is influenced by the child's age at the time of injury, the nature and extent of the trauma, and the developmental stage of the permanent tooth at the moment of injury. Early intervention is critical to prevent lasting complications such as enamel hypoplasia, discoloration, root dilacerations, and other developmental anomalies [13]. The younger the child, the greater the risk and severity of these sequelae, with children under 2 years being particularly vulnerable due to incomplete bone and permanent tooth mineralization [14].

Vol 14 - Nº 1 & 2 - Décembre 2024

This case series presents three distinct types of dental trauma: crown-root fracture, lateral luxation, and root fracture, each posing significant challenges in diagnosis and management.

These represent some of the most severe types of trauma, with a higher likelihood of impacting permanent teeth. Emergency management was conducted according to the 2020 guidelines of the International Association of Dental Traumatology (IADT). In the first case, crown-root fracture required extraction due to the complexity of the injury and the patient's non-cooperation. The extraction of the loose fragment was carried out. However the apical fragment was not restorable and we couldn't leave it in situ considering the risk of infection.

Hence, the preservation of the apical fragment was not possible. A space maintainer is planned to prevent space closure and potential malocclusions Palatal luxation, however, was successfully managed with early repositioning, as recommended by the IADT guidelines, which suggest repositioning irrespective of the direction of luxation, particularly when occlusal interference is present. Root fracture management depends on several factors, including the displacement of the coronal fragment, patient cooperation, exfoliation timing, and occlusion. In the third case, the fragment was excessively mobile, necessitating extraction [15].

In many instances, traumatic dental injuries in primary teeth are the primary reason for a child's first visit to the dentist [16]. At this young age, children often exhibit resistance to comprehensive examinations, radiographs, and treatment, making it essential to minimize anxiety for both the child and their caregivers during the initial visit.

CONCLUSION

Traumatic dental injuries in primary teeth are a common occurrence in young children, often with significant implications for both primary and permanent teeth. The timely emergency management of these injuries, following established guidelines such as those from the International Association of Dental Traumatology, is crucial for reducing complications and promoting better prognoses. The cases presented in this series demonstrate the importance of rapid, appropriate intervention in managing severe dental trauma, including crown-root fractures, luxations, and root fractures. Given the high prevalence of associated soft tissue injuries and the risk of developmental disturbances in permanent teeth, early diagnosis and treatment are essential.

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Actualités Tunisiennes 114 d'Odontologie

the following TDIs

Vol 14 - Nº 1 & 2 - Décembre 2024

>>> FORMATION CONTINUE

UIZ Traumatic Dental Injuries (TDIs)



Dr. Latifa Berrezouga Professor, DDM, MSc, PhD

Pulp necrosis is more frequently seen with

Dental Traumatic Injuries (TDIs) may involve only the tooth or be associated with soft tissues' and alveolar bone injuries. This Quiz aimed at assisting dentists in evaluating their knowledge about TDIs occurring to the permanent tooth. For more information, please visit the IADT website: https://iadt-dentaltrauma.org/guidelines-and-resources/guidelines/

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>>> SUCCESS STORY D'UN CONFRÈRE AU-DELÀ DE NOS FRONTIÈRES Dr. Malek Kallel Souayah

From the Faculty of Dental Medicine of Monastir (Tunisia) to Colorado School of Dental Medicine (USA): A Huge Achievement



Dr. Malek Kallel Souayah, a young and talented dentist, began her journey in the auditorium of the Faculty of Dental Medicine in Monastir, Tunisia. Born in 1990 in Ksibet El Mediouni, a small coastal town in the Tunisian Sahel, she pursued her early education locally before graduating with honors from Lycée Pilote de Monastir in 2009. This achievement set her on the path to fulfilling her dream of studying dentistry at Tunisia's only dental school, the Faculty of Dental Medicine in Monastir.

Dr. Souayah's interest in dentistry was sparked at age ten when a traumatic injury to her front teeth opened her eyes to the profound impact of a smile on self-perception and interpersonal connections. This pivotal moment introduced her to the transformative power of dentistry—the ability to restore lives by restoring smiles.

Throughout her career, Dr. Souayah was actively involved in various community centers across Tunisia and later in the United States, where she worked alongside exceptional doctors dedicated to serving their communities. These experiences deepened her understanding of patient care, emphasizing empathy, communication, and the importance of meeting patients' needs.

A significant turning point in her life came when she relocated to the United States with her family. As an international dentist, navigating the licensing process in the U.S. proved challenging but rewarding.

Dr. Souayah worked as a dental assistant for two years and participated in numerous volunteer programs, including the ACTS program in Aurora, Colorado, supporting the Afghan refugee community. She also completed a preceptorship at Boston University Dental School and remains an active member of the International Association for Dental Research (IADR).

Dr. Souayah graduated with a DDS degree from the International Student Program at the University of Colorado School of Dental Medicine, a rigorous two-year course with 40 students from 16 countries. Reflecting on her experience, she stated, "It was one of the most incredible experiences of my life." She graduated with honors in December 2023, receiving the Pierre Fauchard Academy award and scholarship for her exemplary ethical standards and professionalism.



Today, Dr. Souayah is an associate dentist at a prominent private practice in the greater Boston area. She continues to embrace new challenges on her path to success, dedicated to making a positive impact in her field. Actualités Tunisiennes 116

d'Odontologie Vol 14 - N° 1 & 2 - Décembre 2024

>>> ESPACE DES INSTITUTIONS ET ASSOCIATIONS

Par Dr. Soumaya ABID

Certificats d'Etudes Complémentaires 2024-2025

Bases Fondamentales et pratiques en chirurgie parodontale et implantaire



L'ATORECD est fière d'annoncer la 6ème édition de son certificat d'études complémentaires en implantologie avancée, intitulé « Les bases fondamentales et pratiques en chirurgie parodontale et implantaire ».

Cette formation de haut niveau s'articule autour de 5 modules intensifs, répartis sur 2 jours chacun.

Elle sera animée par un comité d'experts composé des Professeurs Faten Ben Amor, Mohamed Salah Khalfi, Moncef Ommezzine, Ag Mohamed Tlili, ainsi que des Drs Afif Bouslema, Arij Rmida et Raki Selmi.

La formation accueillera également des conférenciers internationaux de renom, tels que le Professeur Gilberto Sammartino, le Dr Paul Gepi Mattout, le Dr Fatme Mouchref Hamasn et Mme Monique Savat.

Chaque module combine des cours théoriques, des ateliers pratiques et des démonstrations en direct («live surgery »).



Les participants auront également l'opportunité de poser des implants sur des patients, avec un encadrement personnalisé jusqu'à la mise en bouche de la prothèse, offrant ainsi une expérience pratique unique et complète.



Actualités Tunisiennes 117 d'Odontologie Vol 14 - N° 1 & 2 - Décembre 2024

>>> ESPACE DES INSTITUTIONS ET ASSOCIATIONS

Certificats d'Etudes Complémentaires 2024-2025

Bases Fondamentales et pratiques en chirurgie parodontale et implantaire



Live surgery



Tutorial personnalisé d'emplacement d'implant par les candidats



Remise des diplômes Juin 2024

Actualités Tunisiennes 118 d'Odontologie Vol 14- N° 1 & 2 - Décembre 2024

>>> ESPACE DES INSTITUTIONS ET ASSOCIATIONS

Certificats d'Etudes Complémentaires 2024-2025

NEW : Lancement du Certificat d'Etudes Complémentaires : Expertise et Responsabilité Médicale en Médecine Dentaire en collaboration avec des intervenants internationaux (Décembre 2024)

L'ATORECD organise son premier certificat d'études complémentaires intitulé « Expertise et Responsabilité Médicale en Médecine Dentaire », sous la direction du Professeur Mohamed Salah Khalfi, du Professeur Ines

Dallel et du Dr Jean-Michel Foucart.

Cette formation réunira des experts renommés, français et tunisiens, tels que le Professeur Alain Berry, Maître Laurent Delpart, le Dr Yves Soyer et le Dr et Juge Farid Ben Jaha.

Limitée à 30 participants.

Elle se déroulera sur 5 modules de deux jours chacun, combinant ateliers pratiques et conférences sur des thématiques clés : droit et responsabilité médicale, évaluation des préjudices, expertise et indemnisation..

Une occasion unique de perfectionner vos compétences dans ce domaine spécialisé.



Actualités Tunisiennes 119 d'Odontologie Vol 14 - N° 1 & 2 - Décembre 2024

>>> ESPACE DES INSTITUTIONS ET ASSOCIATIONS

XXI South Europe, North Africa and Middle East international conference SENAME en mémoire à A.Simonperi Napoli, Italie 18-19-20 janvier 2024



XXI SENAME INTERNATIONAL CONFERENCE

SENAME - South East, North Africa and Middle East Implant and Modern Dentistry Association Memorial Alain Simonpieri

Decoding today's implant dentistry: surgical and prosthetic challenges

Naples 2024 | 18-19-20 January

Congress Venue: Centro Congressi Federico II Via Partenope, 36 - Napoli (NA) Le congrés international SENAME dans sa XXI édition s'est déroulé dans le Centro Congressi Frederico II en Napoli, Italie 18-19-20 janvier 2024 présidé par Pr Gilberto Sammartino et Pr Kostantinos Valavanis sous le théme « Decoding today's implant dentistry : surgical and prosthetic challenges » avec un hommage émouvant honorant une personne exceptionnelle multidisciplinaire, le Dr Alain Simonpieri.

Le programme suit la prestigieuse tradition du SENAME en accueillant des conférenciers de haut niveau international dans un programme multidisciplinaire allant de la parodontologie à la dentisterie numérique et à la prothèse, en passant par la chirurgie et la thérapie implantaire avancée.

Pour le côté Tunisien la participation de Pr Faten Ben Amor (membre board de la SENAME) en tant que chairwoman ainsi que le doyen de la faculté de médecine dentaire de Monastir Pr Mohamed Salah Khalfi en tant que chairman durant les conférences.







Dr. Alain Simonpier

SENAME board members

Présidence de la séance par Pr. Mohamed Salah Khalfi

Actualités Tunisiennes 120 d'Odontologie Vol 14- N° 1 & 2 - Décembre 2024

>>> ESPACE DES INSTITUTIONS ET ASSOCIATIONS

XXI South Europe, North Africa and Middle East international conference SENAME en mémoire à A.Simonperi Napoli, Italie 18-19-20 janvier 2024

Pour les jeunes participants Tunisiens dans la session de young podium présidé par Filiberto Mastrangelo avec les jurys Aya Dhahri, Alessandra Miniello et Carlo Barausse, Dr Ghada Neji, résidente en anatomie générale, a gagné le 3éme place pour le prix de « Alain Simonpieri award »

Pour la session de la communication affiché, Dr Mohamed Ali Hedhli, résident en anatomie générale a gagné le premier prix de « Marwan Qasam award »



Les membres du Service des Consultations Externes / Anatomie Fiers de nos primés



Premier prix Communication Affichée Dr. Mohamed Ali Hedhli



Deuxième prix Communication Affichée Dr. Ghada Neji

Actualités Tunisiennes 121 d'Odontologie Vol 14 - N° 1 & 2 - Décembre 2024

>>> ESPACE DES INSTITUTIONS ET ASSOCIATIONS

5ème congres francophone d'orthodontie 9ème congres de l'ATREO 4-5-6 Octobre 2024



Pr. Adel Ben Amor Président du comité d'organisation

« L'esthétique au cœur de l'orthodontie » un sujet porteur pour les connaisseurs et artistes orthodontistes. Autour de ce thème les plus grands spécialistes du monde francophone ont donné leurs conférences toutes aussi différentes et intéressantes les unes que les autres dans le but de partager la science dans le cadre idyllique du Hilton Monastir.

Sous la présidence de Dr Skander Ellouz et la coprésidence de Dr Jean Michel Foucart, et l'ouverture avec la présence de Pr Abderrazek Bouzouita directeur général de la santé.

Plus de les 300 inscrits venus des 4 coins du monde. 12 pays différents, 20 partenaires et des conférences de très haut niveau 2 pré- congrès ayant fait le plein avec Dirk Wiechmann et John Voudouris.





La présidente de l'ATREO, Pr. Anissa Zinelabidine remettant le trophé à Dirk Wiechmann





Sylvie Sorel présidente du prix Goncourt de littérature pour les écrivains juniors et Pr Faten Ben Amor



Le doyen Mohamed Salah Khalfi avec le président de l'ordre des médecins dentistes Dr Salah Mejri et le vice-président Dr Mohamed Ben Romdhane

>>> ESPACE DES INSTITUTIONS ET ASSOCIATIONS

11ème Congrés Annuel de la Morroccan Orthodontic Society et l'ATREO Casablanca, 13-15 février 2025

La Moroccan Orthodontic Society, en collaboration avec l'Association Tunisienne de Recherche et d'Étude en Orthodontie, organisera son 11è Congrès Annuel. L'evenement se déroulera le 13, 14 et 15 février 2025 , à Casablanca.

Des experts internationaux partageront les dernières avancées en orthodontie, des sessions enrichissantes, rencontres inspirantes et nouveautés technologiques seront au rendez-vous.

Avec la participation de Pr Adel Ben Amor qui animera la

conference intitulée : La Distalisation Des Molaires : De l'orthodontie Multibagues Aux Aligneurs. Ainsi que Pr Samir Tobji , Dr Mohamed Romdhane et AHU Wiem Ben Amor



Joint with the

TUNISIAN ASSOCIATION OF RESEARCH AND STUDY IN ORTHODONTICS



Participation à l'honneur de la Tunisie : Pr Adel Ben Amor, Pr Samir Tobji, Dr Mohamed Ben Romdhane et Dr Wiem Ben Amor





>>> ESPACE DES INSTITUTIONS ET ASSOCIATIONS

32èmes Entretiens Odontologiques de Monastir 1-2-3 mai 2025

L'Association des Entretiens Odontologiques de Monastir a le plaisir d'annoncer la 32ème édition des Entretiens Odontologiques de Monastir, qui se tiendra du 1er au 3 mai 2025 à la Faculté de Médecine Dentaire de Monastir. Sous le thème "Oral Health For All ". Ce congrès, organisé sur deux jours, mettra à l'honneur des conférences animées par des intervenants de renom, tant nationaux qu'internationaux, promettant un riche programme scientifique.



Actualités Tunisiennes 124 d'Odontologie Vol 14 - N° 1 & 2 - Décembre 2024

>>> ESPACE DES INSTITUTIONS ET ASSOCIATIONS

20ème Anniversaire de l'Université de Monastir 4 décembre 2024

Cette année, l'Université de Monastir célèbre son 20ème anniversaire. À cette occasion, les festivités ont débuté le 4 décembre 2024 au Palais des Sciences de Monastir.

L'événement a été marqué par des présentations, des témoignages de réussites, des conférences, des compétitions et la remise de prix aux personnes ayant contribué de manière significative au développement et au succès de l'université.

Notre estimée Professeure, Dr Faten Ben Amor, a été, comme à son habitude, honorée par l'université en reconnaissance de sa précieuse contribution et de tout ce qu'elle a apporté à son rayonnement.





L'Université de Monastir en fête



Remise du certificat de reconnaissance et estime par le président de l'UM Pr Kamel Charrada



Remise du trophée au maître de cérémonie l'illustre Hamza Balloumi en présence des anciens présidents : Pr Hedi Belhaj Salah, Pr Mahjoub Aouni, Pr Adel Ben Amor, Pr Leila Hmida actuelle Vice-Présidente, Pr Faten Ben Amor Past Vice-Présidente de l'UM



Dr Faten Ben Amor et le directeur général de l'enseignent supérieur Mr Semir Becha

>>> ESPACE DES INSTITUTIONS ET ASSOCIATIONS

Accréditation ADEE et Certification ISO 21001: Une Double Reconnaissance pour la Faculté de Médecine Dentaire de Monastir

Nous avons le plaisir d'annoncer que cette année, la Faculté de Médecine Dentaire de Monastir a officiellement obtenu l'accréditation de l'Association for Dental Education in Europe (ADEE).

Cette démarche vers l'accréditation atteste de la conformité de notre programme aux standards européens, soulignant ainsi la qualité de notre formation en médecine dentaire à Monastir



Decision

Having engaged with the self-assessment report, seen firsthand the enthusiasm and drive for improvement throughout faculty and from the supportive insights provided by the student body in the interview process; the LEADER Ponel are comfortable to recommend that the Faculty of Dental Medicine of Monasti, be recognised as a LEADER school with the completion of its Foundation SAR and panel visit.

nol peer review ponel to the Faculty of Central Medicine (FMDW) of M

ADEE looks forward to praviding support and guidance as required to the college as it engages with the recommendations of the panel.

ADEE commends the leadership and faculty at the college for their openness and willingness to engage in the LEADER process as a means of demonstrating their commitment to continuous quality improvement.

Approval of this report

This report was agreed by the panel at its close out meeting held on 7th of January 2025.

Prof Sibylle Vital
Panel Academic Cha

Prof Deborah White Panel Administrative Chair

Le 31 décembre 2024 , notre faculté a également obtenu la certification du Système de Management des Organismes d'Éducation (SMOE) selon la norme internationale ISO 21001. Cette reconnaissance renforce notre engagement envers une gestion pédagogique efficace et un apprentissage centré sur les besoins des étudiants.

Nous adressons nos plus sincères remerciements à toutes les équipes qui ont contribué à ces réalisations exceptionnelles, en particulier Pr Faten Ben Amor, responsable du projet,

aux membres Pr Adel bouguezzi ,Pr Moncef Omezzine , Pr Ines Dallel ,Pr Asma kassab , Pr Amal Esghir, Pr Kaouthar Belhaj Salah , Dr Ben Yaala Mohamed ,Dr Aya dhahri.

Ansi que l'equipe decanale Pr Mohamed Salah khalfi, Pr Lamia Mansour, Pr Samir Tobji, le sécretaire général Mr Younes Ghorbali et tout le staff académique, administratif et estudiantine

OCCE -----

Actualités Tunisiennes 126 d'Odontologie Vol 14 - N° 1 & 2 - Décembre 2024

>>> ESPACE DES INSTITUTIONS ET ASSOCIATIONS

Accréditation ADEE et Certification ISO 21001: Une Double Reconnaissance pour la Faculté de Médecine Dentaire de Monastir



Août 2023, Liverpool ADEE Pr Faten Ben Amor, Pr Adel Bouguezi avec Marie Van Harten Quality assurance and research project office



Le doyen de la FMDM Pr Mohamed Salah Khalfi avec les membres du comité accréditation Pr Faten Ben Amor et Pr Adel Bouguezi recevant le président de l'ADEE Pr Paal Barkvoll Lancent du processus d'accréditation 26-01-2023



Le comité d'accréditation FMDM en compagnie des experts de l'ADEE (07-11-2024)

>>> ESPACE DES INSTITUTIONS ET ASSOCIATIONS

Classement ARU : 13ème place

Cette année, l'Université de Monastir a été classée 13 sur 115 universités dans le Arab Ranking for Universities (ARU). Ce classement prestigieux reflète l'engagement continu de l'université à exceller dans l'enseignement supérieur et à maintenir une position de leader parmi les institutions académiques arabes

<image/> <image/>
تقانينا
الأستاذ الدكتور الهادي بالحاج صالح المحترم رئيس جامعة المنستير
يسعدنا إعلامكم بأن جامعتكم الموقرة قد أدرجت في
التصنيف العربي للجامعات
لعام ٢٠٢٣ وحصلت على المرتبة 13 من إجمالي 115 جامعة عربية تم تقييمها هذا العام يرجى العلم بأن هذه المعلومة خاصة بكم برجاء أن تكون سرية وغير قابلة للنشر لغاية يوم الخميس الموافق ٢١ ديسمبر ٢٠٢٣ لغاية الساعة ١٢:٠٠ ظهراً بتوقيت مكة المكرمة
Image: marging com/

Actualités Tunisiennes 128 d'Odontologie Vol 14 - N° 1 & 2 - Décembre 2024

>>> ESPACE DES INSTITUTIONS ET ASSOCIATIONS

THE INTERNATIONAL ASSOCIATION OF DENTAL TRAUMATOLOGY-IADT





Mission: The International Association of Dental Traumatology (IADT) is a professional organization whose mission is to promote optimal prevention, diagnosis, treatment and follow-up services in the field of traumatic dental injuries through interaction with dental and medical colleagues, the lay public, and interested parties in education, sports, industry, public service and governmental agencies across the globe (source: https://iadt-dentaltrauma.org/mission/). Join the IADT.

	Guidelines and Resources+ I	ADT Membership +	IADT Fellowship+	Meetings+ About Us+
anuary 2025 Presiden	t's Message			Important Links
lear IADT Family, It is hard over year: I want to start 24 and enthusiastic support of reploceable for achieving.	to believe that 2024 passed so rapidly and 125 by first thanking YOU, the IADT member the IADT. Your dedication makes a huge dif the organization's	now we are beginnin s, for your unwoverie forence and is Read	ng 0 ▲ G ng > ▲ G ⊉ 1A ⊈ 1A ↓ All 1All News	uidelines and Resources DT Mambership DT Fellowship baut Us eetings
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Actualités Tunisiennes 129 d'Odontologie Vol 14- N° 1 & 2 - Décembre 2024

>>> ESPACE DES INSTITUTIONS ET ASSOCIATIONS

THE INTERNATIONAL ASSOCIATION OF DENTAL, ORAL, AND CRANIOFACIAL RESEARCH-IADR THE TUNISIAN SECTION

The Tunisian section of the International Association of Oral, Dental and Craniofacial Research held its 12th International Hybrid meeting on November, 28-29, 2024, at the Dental Faculty of Monastir. The prestigious IADR Local Hatton Competition and Awards was held on November 30, 2024. The winner of the competition was As.Pr. Sabra Jaafoura, who will compete at an international level in Bacelona, Spain during the 103th IADR General Session and Exhibition and the IADR Pan European Congress on June 25-28, 2025.

Congratulations Pr. Sabra Jaafoura and Best of Luck!

The President of the Tunisian Section, Pr. Latifa Berrezouga, the Honorary President, Pr. Faten Ben Amor and the Secretary, Pr. Asma Kassab invite you and welcome you to the 13th Tunisia IADR Annual Meeting that will be held on November 14 and 15, 2025 at the Dental Faculty of Monastir, Tunisia.

Join IADR at www.iadr.org





Recommandations aux auteurs

Tout article doit être original et ne pas avoir déjà fait l'objet d'une publication.

La Revue Actualités Tunisiennes d'Odontologie ou Tunisian Dental News est une revue bilingue Français/Anglais qui publie des articles scientifiques et cliniques selon les recommandations suivantes :

Charte de l'auteur

- L'auteur s'engage à soumettre un article original, n'ayant pas été publié dans d'autres revues. Les articles envoyés à la revue sont soumis anonymement au comité de lecture.

- Après acceptation du comité de lecture, les articles sont publiés dans un délai de 6 mois.

- L'article soumis sous-entend que le travail décrit est approuvé par tous les auteurs.

- Les travaux soumis doivent être conformes aux lois sur l'expérimentation biomédicale et aux recommandations éthiques en vigueur scientifique. Il doit indiquer s'il y a un conflit d'intérêt ou non pour son travail.

Guide de rédaction

Les textes doivent être sous format Word. Le texte est fourni en police Times New Roman corps 12, en double interligne. Toutes les pages seront numérotées dans l'ordre de lecture. Le plan suivant est recommandé pour les articles originaux :

- * Titre Résumé Liste des mots clés (de 3 à 5)
- * Introduction
- * Matériels et méthodes
- * Résultats
- * Discussion
- * Conclusion
- * Références (25 références au maximum).

- Pour les cas cliniques (case report). Il est recommandé de suivre le plan IOD : introduction, observation et discussion.

Les résumés ne doivent pas excéder 1/15 du texte (maximum 15 lignes). Les mots-clés seront choisis dans les listes proposées par Medline Mesh pour les mots anglais.

* Un fichier pour la page du titre (titre de l'article en français et en anglais, les noms des auteurs avec leurs affiliations avec leurs coordonnés complets).

- Article court : Comportant 3 à 6 cas, ne dépasse pas 10 pages, références et légendes des figures comprises. Les références bibliographiques sont limitées à 15. La nombre de figures ne doit pas excéder 8.

- Note technique : Avec pour plan : Introduction, Note technique, Discussion (10 pages, iconographie, légendes et 5 à 10 pages références maximum comprises)

- E-quid (Quel est votre diagnostic ?) : Ne dépasse pas 4 pages comprenant les références et les légendes des figures. Le nombre de figures doit être limité à 4 (penser à prévoir des figures fléchées pour la partie « réponse » du quid, ainsi que des légendes plus étoffées que dans la partie « question ») ; un maximum de 6 références bibliographiques. Pas de résumé ni mots clés.

- Quiz : l'auteur rédige 20 questions étalées sur 2 pages avec des figures et pas de résumé.

- Lettre à la rédaction : Concernant des textes parus récemment (notamment dans la revue) ou énonçant des opinions personnelles non susceptibles d'une publication détaillée et n'engageant que les auteurs (1 page)

Introduction: 150 à 250 caractères (espaces compris)

Corps de l'article :

- Environ 10 000 caractères espaces compris au total.

- Faire ressortir les titres de paragraphe (tous les 1000 caractères).

Illustrations

5 à 12 illustrations légendées, numérotées et référencées par ordre d'apparition dans le texte.

Fournir un fichier par image :

- largeur minimale de 8cm avec une résolution de 300dpi
- format natif (extension .jpeg ou .tiff).

Les tableaux doivent être mentionnés en chiffres romains.

Références :

La présentation des références est conforme aux règles suivantes, respectant la Convention dite de Vancouver (ordre d'apparition dans le texte) selon la forme suivante :

- Nom de l'auteur - Initiale(s) du prénom - Point - Titre de l'article - Point - Nom de la publication (en abrégé selon le code international en vigueur) - Année - Point-virgule -

Numéro du volume - Double point - Première page - Tiret -Dernière page - Point.

Exemple: Parekh H, Patel D, Mehta F, Joshi N, Bhattacharya A. Smile – A Diagnostic Tool: Photographic analysis in Adult Gujarati Population. Journal of Dental and Medical Sciences 2013;12(4):39-46.

- · Concernant une thèse :
- de second cycle : Thèse Chir Dent.,
- de troisième cycle : Thèse Doct Sci Odontol.,

- d'état : Thèse Doct Etat.

Nom de l'auteur - Initiale(s) du prénom - Point - Titre de la thèse - Point - Nom de la publication - Lieu - Double point -Université - Virgule - Année - Point.

· Concernant un livre :

Nom de l'auteur - Initiale(s) du prénom - Point - Titre de l'ouvrage - Point - Ville de l'éditeur -Double point - Nom de l'éditeur - Virgule - Année - Double point – Première page -Tiret - Dernière page - Point sans intervalle entre les chiffres







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Lien d'inscription www.a-eom.com Dernier délai de soumission des résumés 14 Février 2025