



CASE REPORT / ПРИКАЗ БОЛЕСНИКА

Decoronation – a treatment option of an ankylosed permanent tooth in children and adolescents

Boris Gašpirc¹, Tina Leban², Zoran Mandinić³, Alenka Pavlič²¹University of Ljubljana, Faculty of Medicine, Department of Oral Medicine and Periodontology, Ljubljana, Slovenia;²University of Ljubljana, Faculty of Medicine, Department of Pediatric and Preventive Dentistry, Ljubljana Slovenia;³University of Belgrade, School of Dental Medicine, Clinic for Pediatric and Preventive Dentistry, Belgrade, Serbia**SUMMARY**

Introduction In children and growing adolescents, ankylotic resorption (i.e., progressive replacement resorption) of a permanent tooth is a serious complication. An ankylosed tooth root is continuously resorbed and replaced with bone; normal growth of alveolar bone is disturbed and infraposition of the dental crown progresses. This article aims to present decoronation as a very good treatment option for permanent incisors diagnosed with progressive replacement resorption in children and adolescents.

Case outline A 9.5-year-old boy was referred with non-vital both upper central permanent incisors due to dental trauma. In the left one, which had been re-implanted 90 minutes after avulsion, progression of clinical and radiographic pathological signs of ankylotic resorption was observed over the months. To prevent the local arrest of alveolar ridge growth and tilting of adjacent teeth, we decoronated the ankylosed tooth. For aesthetic and functional rehabilitation adhesive bonding of his dental crown was performed.

Conclusion In growing individuals with progressive replacement resorption, a dentist should be aware of decoronation as an effective treatment option with a predictable outcome.

Keywords: decoronation; progressive replacement resorption; ankylosis; bone preservation; infraposition

INTRODUCTION

Severe dental traumas often result in a variety of complications; one of them is ankylotic resorption (also known as progressive replacement root resorption or dentoalveolar ankylosis). With ankylotic resorption, the tooth root is gradually resorbed, and replaced by bone. This process can progress over many years. The rate of resorption varies between individuals and depends on age, basal metabolic rate, extra-alveolar time of the tooth, root surface treatment before replantation, amount of root dentin at the time of the trauma, the severity of the trauma, and the extent of periodontal ligament necrosis [1].

Commonly, ankylotic resorption may develop in teeth reimplanted after complete separation of its alveolus (i.e., tooth avulsion). Most frequently, avulsion occurs in children aged between seven and 10 [2]. Avulsion of a permanent tooth is an emergency condition that requires immediate action [3]. From the moment the tooth is avulsed from the alveolar socket, time is the most important factor. In addition to the length of extra-alveolar time, the healing process of the reimplanted tooth is influenced by various factors, including the age of the patient, handling of the avulsed tooth before replantation [4]. As the time between avulsion to reimplantation lengthens, the likeli-

hood of a favorable outcome decreases rapidly. In non-physiological conditions, cementoblasts die on the root surface [5]. After tooth reimplantation, a severely damaged periodontal ligament prevents its regeneration. In such damaged periodontium, gradual development of ankylotic resorption is always expected [2]. The long-term prognosis of so affected tooth is poor.

This report aims to present a clinical case of a child who underwent decoronation treatment needed due to progressive replacement resorption of his permanent incisor.

CASE OUTLINE

A 9.5-year-old boy was referred to the University Medical Centre of Ljubljana, Division of Stomatology due to complications related to dental trauma. Both upper central permanent incisors suffered an injury when he fell off his bicycle a month and a half ago. The left incisor was knocked out, and a tooth crown of the right incisor was fractured and with the exposed pulp. The avulsed tooth was reimplanted after 90 minutes.

A clinical examination a month and a half after the injury revealed a negative response on cold and electrical testing of both traumatized incisors. The right one showed also some

Received • Примљено:

August 23, 2021

Revised • Ревизија:

February 10, 2022

Accepted • Прихваћено:

February 11, 2022

Online first: February 14, 2022**Correspondence to:**

Alenka PAVLIČ
Faculty of Medicine
Department of Pediatric and
Preventive Dentistry
Hrvatski trg 6
1000 Ljubljana
Slovenia
alenka.pavlic@mf.uni-lj.si

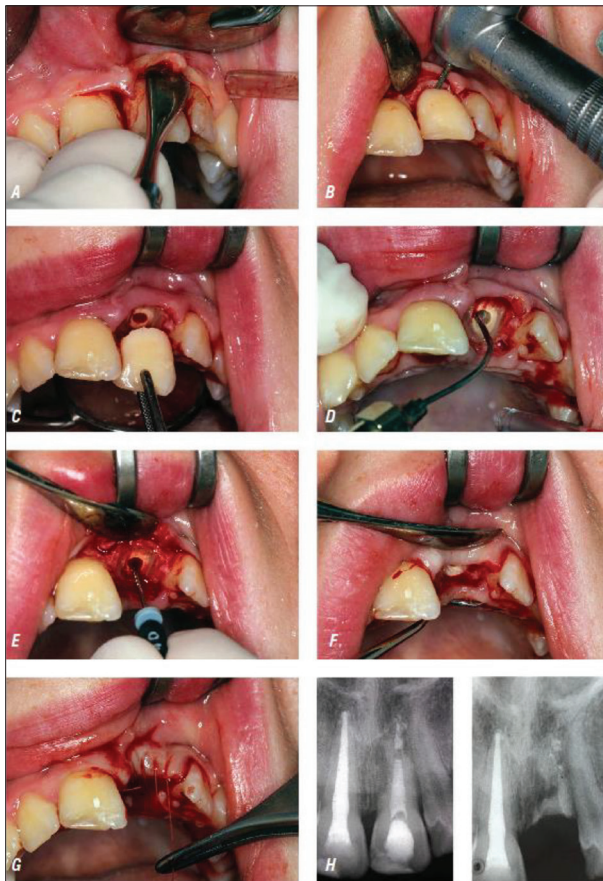


Figure 1. Decoronation of ankylosed and infrapositioned upper left central incisor in a 9.5-year-old boy; A – following administration of local anesthesia, a full-thickness buccal mucoperiosteal flap is elevated; the palatal tissue is left intact; B – The crown of the ankylosed incisor is cut with a diamond bur 1–2 mm below the alveolar bone crest under continuous saline irrigation; C – the dental crown is removed; D – from the root canal, calcium hydroxide is washed out (Calxyl, OCO Präparate GmbH, Dirmstein, Germany); E – the root canal is endodontically instrumented and copiously rinsed with saline; F – As bleeding filled the empty root canal; G – the mucoperiosteal flap is repositioned and sutured; H – on x-rays taken two months after the dental trauma (the incisor was reimplemented 1.5 hours after avulsion); I – after decoronation

tenderness on palpation and was pathologically mobile. X-ray taken at this visit displayed inflammatory and replacement resorption of the right and left incisor, respectively. Therefore, we started root canal treatment of both non-vital teeth.

Seven weeks later, a root canal of the right incisor was tightly sealed with guttapercha and root canal sealer AH Plus (Dentsply Sirona, York, PE, USA). In the root canal of the left incisor, calcium hydroxide (Calxyl, OCO Präparate, Dirmstein, Deutschland) was replaced periodically, with the tight placement of temporary coronary filling after each section.

Six months after dental trauma, minor infraocclusion was already observed. High metal percussion sound and decreased mobility of the tooth were also noted. Over the months, we observed progression of clinical (e.g., infraocclusion) and radiographic pathological signs (disappearance of the width of the periodontal ligament, progression of the root resorption, and its replacement with bone). Two years after the occurrence of dental trauma, decoronation of the ankylosed tooth crown was performed to prevent

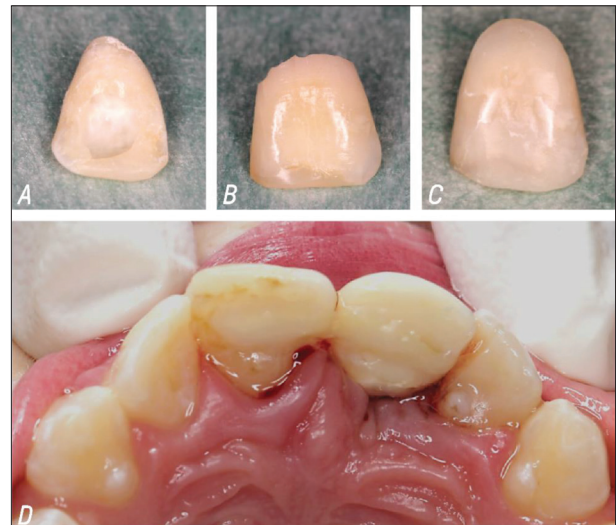


Figure 2. After decoronation; A – the cut tooth crown is thoroughly cleaned, the pulp chamber filled in layers with composite; B and C – appropriately shaped; D – the palatal surfaces of the crown and both adjacent teeth are then etched with 37% phosphoric acid, washed, and dried; this is followed by application and polymerization of an adhesive, adjustment of resin-soaked polyethylene fibers, and application and polymerization of low-viscosity composite; the result is the immediate aesthetic and functional outcomes, with which the patient is also satisfied

the local arrest of alveolar ridge growth and tilting of adjacent teeth (Figure 1). Immediately afterward, the boy was aesthetically and functionally rehabilitated with his dental crown (Figure 2).

This case report was approved by the institutional ethics committee, and written consent was obtained from the patient for the publication of this case report and any accompanying images.

DISCUSSION

Normally during the growth of children, the forces of periodontal and gingival fibers allow bone apposition on top of the interdental septum [6]. In the area of an ankylosed tooth, with partly or completely resorbed periodontal fibers, the marginal bone development terminates and the tooth eruption arrests. Due to cessation of the formation of the alveolar bone formation, infraposition of an ankylosed tooth develops, which may result in an unaesthetic dento-gingival complex and/or a complication in future prosthetic rehabilitation [4]. Furthermore, the still present interdental fibers between the ankylosed tooth and the adjacent ones cause tipping of the adjacent teeth as they continue to erupt. In the growing patient, progressive replacement resorption not only leads to the inevitable loss of the traumatized tooth but also affects the alveolar bone formation and the eruption of adjacent teeth [7, 8].

A slowly progressive resorption process of the ankylotic root allows the dentist to decide on the appropriate timing for therapy; the prosthetic rehabilitation can be a postponement to an appropriate time. The ankylotic tooth should be monitored regularly, without any intervention, unless tilting of adjacent teeth or moderate infraposition

develops. The progression of infraposition depends on the age, gender, and skeletal growth pattern of the patient [8]. Cases with severe infraposition of ankylosed teeth indicate serious aesthetic and functional disturbances. To avoid such complications, one or more appropriate treatment procedures should be performed in a timely manner.

Unlike in an adult patient, in growing individuals' therapy with a dental implant is not recommended. Osseointegrated implants lack the compensatory growth mechanism of the natural teeth; in young patients' implants behave similarly to ankylosed teeth. It is not until skeletal growth and development are completed that the placement of dental implants can be considered [4]. Immediate extraction upon diagnosis of irreversible ankylosis is also not routinely recommended. Extraction of the ankylosed tooth often leads to major bone loss, compromising the subsequent implantation and prosthetic solutions [5].

Decision on the selected treatment of ankylosed permanent teeth should include additional considerations, such as diagnosis of adjacent teeth, type of occlusion, age of the patient, and the root development of potential donor teeth if autotransplantation is planned [9]. In some cases, orthodontic space closure provides esthetic solution and rehabilitation of the alveolar bone ridge. Composite built-up of a crown improve the appearance of an orthodontically-translocated tooth. Autotransplantation of a premolar is also an alternative treatment option in a child. Viable periodontal ligament of the transplanted tooth will induce continuous development of bone formation and if necessary, enable orthodontic treatment [10]. The premolar crown builds up with composite and the gradual grinding of the tip of the palatal cusp will provide the appropriate esthetics.

REFERENCES

1. Albertsson J, Lauridsen E, Andreasen JO, Gerds TA, Andersson L. The risks of ankylosis of 89 avulsed human teeth stored in saliva prior to replantation-A re-evaluation of a long-term clinical study. *Dent Traumatol.* 2021;37(4):537–45.
2. Yoon H, Song M. Long-Term Retention of Avulsed Maxillary Incisors with Replacement Root Resorption: A 9-Year Follow-Up. *Case Reports Case Rep Dent.* 2021; 2021:8872859.
3. Perić T, Marković D, Petrović B. Mineral trioxide aggregate for the treatment of external root resorption in an avulsed immature tooth – ten years of follow-up. *Srp Arh Celok Lek.* 2020;148(3–4):231–5.
4. Cohenca N, Stabholz A. Decoronation - a conservative method to treat ankylosed teeth for preservation of alveolar ridge prior to permanent prosthetic reconstruction: literature review and case presentation. *Dent Traumatol.* 2007;23(2):87–94.
5. Consolaro A, Ribeiro Júnior PD, Cardoso MA, Oliveira Miranda DA, Salfatis M. Decoronation followed by dental implants placement: fundamentals, applications and explanations. *Dental Press J Orthod.* 2018;23(1):24–36.
6. Denes BJ, Ait-Lounis A, Wehrle-Haller B, Kiliaridis S. Core Matrisome Protein Signature During Periodontal Ligament Maturation From Pre-occlusal Eruption to Occlusal Function. *Front Physiol.* 2020;11:174.
7. Krug R, Kremer K, Krastl G. Long-term retention of avulsed maxillary permanent incisors replanted after prolonged non-physiological storage. *Dent Traumatol.* 2019;35(2):147–52.
8. Zhang L, Wang M, Xue L, Zhou W, Zhang X, Jin L, et al. A retrospective analysis of the optimal time and psychological impact of decoronation in children and adolescents. *Dent Traumatol.* 2021;37(3):440–6.
9. Kafourou V, Tong HJ, Day P, Houghton N, Spencer RJ, Duggal M. Outcomes and prognostic factors that influence the success of tooth autotransplantation in children and adolescents. *Dent Traumatol.* 2017;33(5):393–9.
10. Rohof ECM, Wouter Kerdijk W, Jansma J, Christos Livas C, Yijin Ren Y. Autotransplantation of teeth with incomplete root formation: a systematic review and meta-analysis. *Clin Oral Investig.* 2018;22(4):1613–24.

Conflict of interest: None declared.

Декоронизација – могућност лечења анкилозираног сталног зуба код деце и адолесцената

Борис Гашпирц¹, Тина Лебан², Зоран Мандинић³, Аленка Павлич²

¹Универзитет у Љубљани, Медицински факултет, Одељење оралне медицине и периодонтологија, Љубљана, Словенија;

²Универзитет у Љубљани, Медицински факултет, Одељење педијатријске и превентивне стоматологије, Љубљана, Словенија;

³Универзитет у Београду, Стоматолошки факултет, Клиника за дечју и превентивну стоматологију, Београд, Србија

САЖЕТАК

Увод Код деце и адолесцената у развоју анкилоза (тзв. прогресивна заменска ресорпција) сталног зуба представља озбиљну компликацију. Анкилозирајући корен зуба континуирано се ресорбује и замењује га кост, нормалан раст алвеоларне кости бива поремећен, што доводи до инфрапозиције крунице зуба.

Овај чланак представља декоронизацију као одличну могућност лечења сталних секутића код којих је дијагностикована прогресивна заменска ресорпција код деце и адолесцената.

Приказ болесника Дечак од девет и по година долази са оба авитална горња централна стална секутића због трауме зуба. Код левог, који је био реимплантиран 90 минута након

авулзије, током месеци је примећено напредовање клиничких и радиографских патолошких знакова анкилотичке ресорпције. Да бисмо спречили локално заустављање раста алвеоларног гребена и нагињање суседних зуба, декоронизирали смо анкилозирани зуб. За естетску и функционалну рехабилитацију извршено је лепљење сопствене крунице зуба.

Закључак Стоматолог треба да буде упознат са декоронизацијом као ефикасном методом лечења са предвидљивим исходом код деце и адолесцената са прогресивном заменском ресорпцијом корена зуба.

Кључне речи: декоронизација; прогресивна заменска ресорпција; анкилоза; очување костију; инфрапозиција