Combined surgical and orthodontic treatment of impacted second lower premolar – Case report

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SUMMARY
Impacted tooth is a tooth that has failed to reach occlusal plane, with 2/3 of completed root growth. There are various reasons for teeth impaction, however, lack of space for its emergence is considered to be the main reason. The most commonly impacted teeth are lower wisdom teeth, then upper wisdom teeth, upper canines, and less frequently lower premolars. There are only few studies that have addressed the issue of impacted lower premolars, their etiology, prevalence and treatment. The patient (22 years old) visited orthodontist for the lower jaw aesthetic teeth corrections, due to crowding. Ortopantomography analysis revealed impacted lower right second premolar that caused resorption of mesial root of the first molar. The treatment plan included tooth #46 extraction and placing orthodontic brackets on the impacted second premolar. The next step was extrusion of the tooth #45, its introduction to occlusal plane and orthodontic treatment resumption. Orthodontic treatment of impacted teeth with fixed orthodontic appliance provides excellent therapeutic results. The treatment success depends primarily on adequate planning, cooperation and joint work of oral surgery and orthodontic specialists.

Keywords: impacted lower premolar; orthodontic extrusion; tooth extraction; root resorption

INTRODUCTION
Impacted lower premolars are not so rare in everyday dental practice. Lower premolars are most frequently impacted teeth, after lower and upper third molars and upper canines [1]. Mandibular premolars erupt after first lower molars and canines, so the lack of space for the eruption of both premolars may lead to impaction of one of them, usually the second premolars [2]. Some of the reasons for their impaction are: lack of space, ectopic position of the tooth bud, presence of obstacles (primary tooth, tumor, scar tissue) on the way of eruption, presence of supernumerary teeth or odontomas. Some of the systemic and genetic diseases such as ccd dysplasia, osteoporosis, Down syndrome, hypothyroidism and hypopituitarism may affect premolars eruption as well [3-5].

Treatment of impacted mandibular premolars depends on tooth position, depth of impaction, relationship with surrounding teeth, as well as planned orthodontic treatment. Treatment includes teamwork: orthodontist who makes treatment plan and oral surgeon who performs surgery to allow access to the impacted tooth. The treatment procedure involves surgical release of the impacted premolar’s crown, bonding orthodontic bracket and further fixed orthodontic treatment. One of the conditions for successful therapy is that the angle of the impacted premolars does not exceed 45° [6].

This case report presents surgical release of impacted lower right second premolar with subsequent orthodontic treatment.

CASE REPORT
The patient (22 years old) presented for an orthodontic examination in order to address the problem of irregular position of the tooth (lack of space) in the lower jaw (Figure 1). After ortopantomography analysis it was observed that lower right second premolar is impacted with suspected resorption of mesial roots of the first molar. Also, the first lower left premolar was noticed to be missing as well as unerupted wisdom tooth in the fourth quadrant (Figure 2). The patient was healthy and did not have any previous tooth extraction or orthodontic intervention in dental history. Also, he did not report pain or discomfort in the orofacial region.

Orthodontist sent patient to oral surgeon for consultation. Mutual treatment plan was done which included combined surgical-orthodontic treatment. It included extraction of the first lower right molar (#46) and then orthodontic extrusion of the lower right second premolar (#45). First molar was suggested to extraction primarily due to the resorption of mesial root but also making enough room for premolar.

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Oral surgery was performed under local anesthesia after the placement of fixed orthodontic appliance. A corner gingival flap of full thickness was carefully lifted between canine and second molar, with taking care of the mental nerve. The tooth #46 was extracted carefully with forceps when midroot resorption of the mesial root caused by emergence of the impacted premolar #45 was observed. The remaining apical part of the root was extracted as well (Figure 3). The entire crown of the impacted second premolar was exposed (Figure 4). The bone around the crown of #45 was removed with carbide burs under constant cooling with sterile saline. This allowed orthodontic bracket placement on the tooth (Figure 5). Individual sutures were placed for 7 days. The patient was prescribed antibiotics (Dovicin 100 mg, 7 days), Chymoral Forte (5 days) for quicker resorption of edema and hematoma and pain killers as needed.

Further orthodontic treatment was focused on the extrusion of the impacted premolar over the next 6 months, its positioning in the dental arch and reaching the occlusal plane (Figure 6). At the same time the lack of space was corrected as well. Orthodontic therapy will be fully completed after wisdom tooth emergence in the fourth quadrant that will fully stabilize occlusion in lateral region.
DISCUSSION

Literature does not provide sufficient data related to the impacted lower premolars, regardless the fact that frequency of these tooth impaction is quite high [7]. The treatment of these teeth is multidisciplinary and includes cooperation of orthodontics with oral and maxillofacial surgeons, pediatric dentists and sometimes endodontists [8]. Treatment plan depends on several factors, primarily on the amount of space available to initiate the emergence of impacted tooth, depth of impaction, degree of root formation, need for first molar extraction, duration of the therapy and presence of keratinized gingiva. In addition, treatment plan is significantly influenced by the patient’s state of general health, other teeth and oral hygiene, as well as function and occlusion [9,10]. Andreasen recommended surgical exposure of impacted premolar to be limited to cases where the angulation of the tooth is not greater than 45° in both jaws. However, in practice, we can find cases of surgical and orthodontic treatment of horizontally impacted mandibular premolars that were successfully placed in their dental line position [8].

In cases where OPT and clinical examination show lack of space for impacted mandibular premolars, regular checkups are needed, extraction of the primary teeth as well as monitoring of the permanent premolars position. If necessary, surgical release of the tooth crown, with or without orthodontic traction or repositioning (autotransplantation) may be performed. However, if impossible to align impacted mandibular premolar in dental arch then surgical removal of the tooth should be done [11].

To align impacted mandibular premolar, orthodontic treatment should be divided into the three phases. The first phase starts 2 to 5 months after surgical exposure of a tooth. The second stage starts when tooth is tracted to its position in dental arch and lasts 12 to 18 months. The third stage is the end of orthodontic treatment when the tooth is in its place in the arch, having in mind that additional 10 to 18 months are required for completion of orthodontic treatment [12].

One of the possible complications of impacted mandibular premolars is the occurrence of developmental cyst of odontogenic origin [3]. These cysts are common in impacted, retained or developing teeth. As they give none or minor symptomatology they are usually diagnosed accidentally during routine examination or radiography. These cystic lesions often reach large dimensions that may lead to mobility and migration of surrounding teeth or resorption of their roots. Therefore, complete removal of cystic lesions (cystectomy) with impacted tooth extraction are necessary [13]. Sometimes, in order to keep the tooth, marsupialization, that has aim to decompress and fenestrate cystic wall is performed with release of impacted tooth and continuation of the orthodontic treatment [14].

There is an increasing number of young patients with impacted permanent teeth problem (not just wisdom teeth) and successful correction of existing orthodontic anomaly is often complex and lengthy process. Careful and thorough treatment planning, as well as good cooperation of oral surgeon and orthodontists, is crucial to achieving treatment success. Teamwork, regular check-ups and good patient cooperation eventually lead to excellent results.

REFERENCES

1. Andreasen JO. The impacted premolar. In: Andreasen JO, Petersen JK, Laskin DM, editors. Textbook and color atlas of tooth impactions; diagnosis, treatment and prevention. Copenhagen: Munksgaard, 1997. p. 177-95.
2. Peterson LJ. Principles of management of impacted teeth. Contemporary Oral and Maxillofacial Surgery. 4th ed. Philadelphia, PA: Mosby; 2003. p. 185.
3. Mishra R, Tripathi AM, Rathore M. Dentigerous Cyst associated with Horizontally Impacted Mandibular Second Premolar. Int J Clin Pediatr Dent. 2014 Jan-Apr; 7(1).
4. S4-7. [DOI: 10.5005/jp-journals-10005-1235]
5. Mariano RC, Mariano Lde C, de Melo WM. Deep impacted mandibular second molar: a case report. Quintessence Int. 2006; 37:773-6. [PMID: 17078275]
6. McDonald RE, Avery DR. Eruption of the teeth: local, systemic and congenital factors that influence the process. In: Dentistry for the child and adolescent. 6th ed. Mosby; 1994. p. 186-213.
7. Collett AR. Conservative management of lower second premolar impaction. Aust Dent J. 2000; 45:279-81. [DOI: 10.1111/j.1834-7819.2000.tb00264.x] [PMID: 11225531]
8. Topkara A, Sari Z. Impacted teeth in a turkish orthodontic patient population: prevalence, distribution and relationship with dental arch characteristics. Eur J Paediatr Dent. 2012 Dec; 13(4):311-6. [PMID: 23270290]
9. Aizenbud D, Levin L, Lin S, Michtei EE. A multidisciplinary approach to the treatment of a horizontally impacted mandibular second premolar: 10-year follow-up. Orthodontics (Chic.). 2011 Spring; 12(1):48-59. [PMID: 21789290]
10. Kaczor-Urbanowicz K, Zadurska M, Czochrowska E. Impacted Teeth: An Interdisciplinary Perspective. Adv Clin Exp Med. 2016; 25(3):575-85. [DOI: 10.17219/acem/37451] [PMID: 27629748]
11. Proffit WR, Field HW. Contemporary Orthodontics. 3rd ed. St. Louis, Mo, USA: Mosby; 2000.
12. Šimček-Kaya G, Melih-Ormezi M, Yapiç G, Dayi E, Ertaş Ü. Prevalence of impacted premolars in a Turkish population and considerations for surgical treatment. Med Oral Patol Oral Cir Bucal. 2011 Sep; 16(6):e781-6. [DOI: 10.4317/medoral.17027] [PMID: 21966868]
13. Wawserstein A, Shalish M. Adequacy of mandibular premolar position despite early loss of its deciduous molar. ASDC J Dent Child. 2002; 69:254-8, 233-4. [PMID: 12613307]
14. An S, Manjunatha B, Asstekar M, C.S. Dentigerous cyst associated with ectopically impacted maxillary second premolar. J Exp Ther Oncol. 2016 Nov; 11(4):309-13. [PMID: 27849342]
15. Qian WT, Ma ZG, Xie QY, Cai XY, Zhang Y, Yang C. Marsupialization facilitates eruption of dentigerous cyst-associated mandibular premolars in preadolescent patients. J Oral Maxillofac Surg. 2013 Nov; 71(11):1825-32. [DOI: 10.1016/j.joms.2013.06.023] [PMID: 23973048]
Hirurško-ortodontska terapija impaktiranog drugog donjeg premolara – prikaz slučaja

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KRATAK SADRŽAJ
Impaktirani zub je onaj koji nije uspeo da dosegne okluzalnu ravan, sa završenim rastom 2/3 korena. Različiti su razlozi impakcije zuba, ali glavnim razlogom se smatra nedostatak prostora za njegovo nicanje. Njegovo dovođenje u okluzalnu ravan može biti od 45° [6]. Uzroci mogu biti različiti, i to od adekvatnog planiranja od samog početka, kao i saradnje i zajedničkog rada specijalista oralne hirurgije i ortodoncije.

Ortodontski tretman impaktiranih premolara daje odlične terapijske rezultate. Uspešnost terapije zavisi od mesta impaktiranog premolara, njihovog vertikalnog i horizontalnog položaja, kao i od prisustva prekobrojnih zuba. Hrani se našla na put nicanja premolara, prisustva prekobrojnih zuba (mlečni zub, tumor, ožiljno tkivo) koja se pojavljuju početkom rasta zuba ili u stadiju srednjeg rasta zuba, uzrokujući resorpciju mezijalnog korena prvog molara. Plan terapije bilo je važno da se na dnu premolara postavlja bravica (Slika 5) i dodatno olakšan lečenje premolara.

UVOD
Impaktirani donji premolari nisu tako retka pojava u svakodnevnoj stomatološkoj praksi. Nakon donjih i gornjih umnijaka, impaktirani donji premolari nisu tako retka pojava u svakodnevnoj stomatološkoj praksi. Nakon donjih i gornjih umnijaka, gornjih očnjaka i donjih premolara, ali glavnim razlogom značaj prekobrojnosti zuba za uspešnu terapiju je dezinfekcija premolara i konsultacije sa ortodontom užitkom opsežne konsultacije sa ortodontom u trećem kvadrantu, kao i prisustvo neizniklog umnijaka na iziskivanju premolara. Pacijentkinja (22) javila se kod ortodonta zbog korekcije gornji umnjaka u četvrtom kvadrantu (Slika 2). Pacijentkinja je potpisala za smeštanje premolara.

Prikaz bolesnika
Pacijentkinja (22) javila se kod ortodonta na pregled zbog rešavanja problema nepravilnog položaja zuba (teskoba) u donjoj vilici (Slika 1). Nakon analize ortopan snimka utvrđeno je da je desni premolar u donjoj vilici impaktiran, sa sumnjom da postoji resorpcija mezijalnog korena premolara koji je u kontaktu sa impaktiranim zubom. Takođe, primećen je nedostatak prostora za njegov nicanje.
Dalji ortodontski tretman se tokom narednih šest meseci zasnovao na ekstruziji impaktiranog premolara, kao i njegovom postavljanju na mesto u zubnom luku i dostizanju okluzalne ravni (Slika 6). Ujedno je korigovana i teskoba zuba u donjoj vilici uopšte. Ortodontska terapija će u potpunosti biti završena nakon nicanja umnjaka u četvrtom kvadrantu, kojim će se u potpunosti postići stabilna okluzija u boćnoj regiji.

**DISKUSIJA**

Podaci o problemima impaktiranih donjih premolara nisu prisutni u literaturi u većoj meri bez obzira na to što je učestalost impakcije tih zuba kod pacijenata prilično velika [7]. Princip leče- nja ovakvih zuba je multidisciplinaran, uz saradnju ortodonata sa oralnim i maksilo-facialnim hirurzima, dečjim stomatolozima, a nekada i endodontistima [8]. Kakav način terapije će biti odabran zavisit od više faktora, pre svega od postojanja dovoljno prostora za nicanje impaktiranog zuba, dubine impakcije, stepena formiranosti korena, potrebe za ekstrakcijom prvog molara, dužine trajanja terapije, prisustva keratinizovane gingive. Osim njih, značajan uticaj imaju i opšte zdravstveno stanje pacijenta, stanje zuba i oralne higijene, kao i funkcija i okluzija zuba [9, 10]. Andreasen [1] preporučuje da hirurško eksponiranje impaktiranih premolara treba biti ograničeno samo na slučajeve kada angulacija zuba nije veća od 45° i u gornjoj i donjoj vilici. Međutim, u praksi se mogu sresti slučajevi horizontalne impakcije mandibularnih premolara koje su uspešno sprovedenom hirurško-ortodontskom terapijom postavljeni na svoje mesto u zubnom nizu [8].

U slučajevima kada se na osnovu analize OPT snimka i kliničkog pregleda dijagnostikuje nedostatak prostora za nicanje impaktiranih mandibularnih premolara, obavezni su redovni kontrolni pregledi, zatim ekstrakcije mlečnih zuba i praćenje položaja stalnih premolara. Ukoliko je potrebno, vrši se hirurško oslobađanje krunice zuba, sa ortodontskom vućom ili bez nje, ili repozicija (autotransplantacija). Međutim, nekada nije moguće na bilo koji način impaktirani mandibularni premolar dovesti na njegovo mesto u zubnom nizu i tada se vrši hirurško vađenje tog zuba [11].

Ukoliko impaktirani mandibularni premolar želimo da sme-stimo na svoje mesto u zubnom nizu, primenjuje se ortodontska terapija zuba, koja se može podeliti u tri faze. Prva faza obuhva-ta početak ortodontske terapije hirurškog ekstrakcionalnog zuba u trajanju od dva do pet meseci, u zavisnosti od vrste anomalije. Druga faza nastupa od početka vuče zuba do njegovog smeštanja u zubni luk i traje od 12 do 18 meseci. Treća faza je završetak ortodontske terapije, kada je zub na svom mestu u luku. S tim da se obično planira još oko 10–18 meseci za potpuni završetak ortodontske terapije [12].

Jedna od mogućih komplikacija koje srećemo kod impakti-ranih mandibularnih premolara je i pojava razvojne ciste odontogenog porekla [3]. Ove ciste su česta pojava kod impaktiranih, retiniranih zuba ili kod zuba u nicanju. Pošto ne daju nikakvu ili daju slabu simptomatologiju, obično se dijagnostikuju slučajno tokom rutinskog pregleda ili radiografije. Ove cistične lezije daju velike dimenzije koje mogu dovesti do mobilnosti i migracije okolnih zuba ili resorpcije njihovih korenova. Zbog toga je neophodno njihovo uklanjanje u celosti (cistektomija) uz vađenje impaktiranog zuba [13]. Nekada se u cilju zadržavanja zuba vrši marsupijalizacija uz dekompresiju i fenestraciju cističnog zida [14], uz oslobađanje impaktiranog zuba i nastavlja ortodontski tretman.

Sve je veći broj mladih pacijenata sa problemom impakti-ranih i drugih stalnih zuba (ne samo umnjaka) i teži se uspešno korekciji postojeće ortodontske anomalije, što predstavlja prilično složen i dugotrajan proces. Za postizanje uspeha od ključne važnosti je pažljivo i temeljno planiranje terapije, kao i dobra saradnja oralnog hirurga i ortodonta. Timski rad, redovni kontrolni pregledi uz dobru saradnju pacijenta na kraju daju odlične rezultate u lečenju ovakvih ortodontskih malformacija.