

EXTRACTION OF MAXILLARY IMPACTED CANINE USING PIEZOSURGERY - CASE REPORT

ЕКСТРАКЦИЈА НА ИМПАКТИРАНИ МАКСИЛАРНИ КАНИНИ СО ПОМОШ НА ПИЕЗОХИРУРГИЈА - ПРИКАЗ НА СЛУЧАЈ

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Abstract

Aim: The aim of this study is to present a piezosurgery-assisted extraction of an impacted canine, evaluating advantages and disadvantages compared to osteotomy with conventional rotatory instruments. **Material and Method:** A 14 year-old female visited the University Clinic for Oral Surgery and Implantology complaining for absence of the right maxillary canine, fully asymptomatic. CBCT scan revealed impacted maxillary right canine, Class III by Archer. Due to the unfavorable position and curved root, orthodontic traction treatment was considered as contraindicated, therefore we proceeded with a tooth removal using piezo surgical device. **Results:** Piezosurgery showed less damaging of adjacent soft tissue and less heating during the procedure, shortened post-operative period and patient discomfort, as well as lower inflammatory response measured according to pre-determined criteria. **Conclusion:** Taking into account most of the resulting advantages over disadvantages of using the piezo approach for extraction of impacted canines, we can recommend this method with full confidence and highly predictable outcome. **Keywords:** impacted canine, piezo surgery, tooth extraction.

Апстракт

Цел: Целта е да се прикаже екстракција на импактиран канин со помош на пиезохирургија евалуирајќи ги предностите и недостатоците во споредба со остеотомијата со конвенционални ротациони инструменти. **Материјал и метод:** 14-годишна пациентка ја посети Универзитетската клиника за орална хирургија и имплантологија со поплака за отсуство на десниот максиларен канин, целосно асимптоматски. CBCT-скенот потврди импактиран максиларен десен канин, класа III според Арчер. Поради неповолната положба и закривениот корен, ортодонтскиот третман со влечење беше оценет како контраиндициран, со индикација за екстракција на забот со помош на пиезохируршки апарат. **Резултати:** Пиезохирургијата покажа помало оштетување на соседното меко ткиво и помало загревање на коската за време на процедурата, скратен и полесен постоперативен период кај пациентот, како и помал инфламаторен одговор измерен според однапред одредени критериуми. **Заклучок:** Земајќи ги предвид предностите во однос на недостатоците од користењето на пиезо пристапот за екстракција на импактирани канини, можеме да го препорачаме овој метод со целосна доверба и високо предвидливи резултати. **Клучни зборови:** импактиран канин, пиезохирургија, екстракција на заб.

Introduction

Impacted tooth is defined as a tooth which doesn't erupt in the dental arch within the expected age. The impacted tooth fails to pass through the gum line to grow into the right position and instead remains stuck or impacted in the gum tissue or bone. After third molars, the maxillary canine is the second most frequently impacted tooth with an incidence of

0.92-1.7%¹. Any tooth can be impacted, but this is most frequently the case with mandibular third molars, maxillary canines, mandibular and maxillary second premolars, and maxillary central incisors, as well as supernumerary teeth². The etiology of tooth impactions is often complex and has been related to disproportions between arch length and mesiodistal dimension of all teeth. There are hereditary factors leading to impaction, but also etiologic factors such as

prolonged retention of primary teeth, localized pathologic lesions, and shortening of the length of the arch².

According to Bishara et al.³, there are several reasons for impaction of maxillary canines: 1. primary causes: rate of root resorption of deciduous teeth; trauma of the deciduous tooth bud; disturbances in tooth eruption sequence; availability of space in the arch; rotation of tooth buds; premature root closure; canine eruption into the cleft area in persons with cleft palate; and 2. secondary causes: abnormal muscle pressure; febrile diseases; endocrine disturbances; vitamin D deficiency. In cases where there is a discrepancy between tooth size and arch length, the teeth that erupt later can be diverted or remain impacted. Maxillary canines have a longer eruption path to its correct position in the arch, and since the lateral incisor and permanent first premolar have already erupted and fill the space for the upper canine, it can remain impacted. This is due to the length of the development period and the fact that the germ of the maxillary canine is placed deepest in the bone compared to the other teeth, as well as the fact that it has the longest path of emergence between all teeth⁴. Radicular cysts of the deciduous teeth, infection, trauma at an early age, are factors that can cause dental deviation that can lead to impaction⁵. Although arch-length deficiency is known to be common etiologic factor for impaction of canines, this is not valid for palatal impactions. Rodrigues et al.⁵ state that when there is less space, vestibular impaction is expected, but palatal positioned canines are usually a result of path abnormalities.

Potential complications of canine impactions are malposition of the impacted tooth, migration of the neighbouring teeth and loss of arch length, internal resorption, dentigerous cyst formation, external root resorption of the impacted tooth, as well as the neighbouring teeth, infection particularly with partial eruption, pain, as well as aesthetic problems⁶.

Ideal treatment of maxillary impacted canines is its prevention. However, in cases where it is not possible, orthodontic treatment followed by surgical exposure of the canine to bring it into occlusion is preferable. After surgical exposure, the impacted canine can be allowed to erupt naturally, or orthodontic forces can be applied to move the tooth⁷. Sometimes, when treatment options are unpredictable or contraindicated, a surgical extraction of an impacted tooth is a method of choice.

Surgical treatment of an impacted maxillary canine requires removing the bone and, in many cases, odontosection as well, and these techniques may damage the surrounding tissue. In order to minimize the risks of intraoperative and post-operative complications, piezosurgery can be used.

The piezoelectric surgery is an atraumatic and revolutionary osteotomy technique which, compared to conventional surgery, offers precise and extremely selective cut, a great visibility and, most important, it is inert and doesn't damage the surrounding soft tissues. Its biggest disadvantage

is the longer surgical time, even though this tends to decrease as the surgeon gains experience.

The piezosurgery device with frequency of 25-30 kHz, the created micromovements with an amplitude of 60-210 μm , and the 5W power of the handpiece allow the removal of mineralized tissue only. It is inert to soft tissue, because a frequency above 50 kHz is required to work on the soft tissues⁸. The piezo surgical extension vibrates in the range 60-210 μm which is equal to a force of 45W, thus enabling effective bone cutting with the surgical handpiece and the drill.

Aim

The aim of this study is to present a piezosurgery-assisted extraction of an impacted canine, evaluating the advantages and disadvantages compared to osteotomy with conventional rotatory instruments.

Case report

A 14 year-old female visited the University Clinic for oral surgery and implantology complaining of absence of the right maxillary canine, fully asymptomatic. CBCT scan revealed impacted maxillary right canine, Class III by Archer.



Figure 1. Position of the impacted right maxillary canine

The impacted canine was positioned horizontally in the alveolar process of the maxilla between the roots of the upper lateral incisor and first premolar, with the root placed

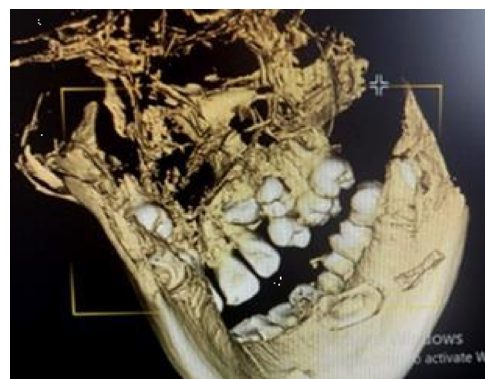


Figure 2. Position of the impacted right maxillary canine

buccally, and the crown was placed palatally, and it also had a 90 degree curvature of the root (Figure 1. and Figure 2.).

Due to the unfavourable position and the curved root, in consultation with an orthodontist, orthodontic traction treatment was considered as contraindicated, so we proceeded with a tooth removal using piezo surgical device. The patient had no other symptoms and was classified as ASA I. The patient underwent surgery under local anaesthesia (mepivacaine hydrochloride 3%). The buccal and palatal as well the flaps with full thickness (mucoperiosteal) were detached, and partial visualisation of the impacted canine was allowed. We proceeded with piezosurgical osteotomy of the surrounding bone with piezosurgical device Woodpecker surgic Touch LED (Figure 3.), Guilin Woodpecker Medical Instruments Co. Ltd, Guilin, Guangxi, P.R. China and then odontosection, after which the root was extracted from the buccal side, and the crown from the palatal.



Figure 3. Piezosurgical device

After tooth extraction, curettage and irrigation, both flaps were sutured using non absorbable suture threads (silk 3-0) (Figure 4. and Figure 5.). The patient received instructions regarding the post-operative care and was prescribed antibiotics (amoxicillin + clavulanic acid 875/125mg every 12 hours for 7 days).



Figure 4. Extraction of the impacted maxillary right canine



Figure 5. Sutures in place

The patient reported mild pain, no oedema or infection.

Discussion

When selecting a proper treatment plan for impacted maxillary canines, oral surgeons, together with an orthodontist, should take into account several factors in order to appropriately manage each case. When the impaction is very deep in the bone, when the root is completely formed, as well as when there is angulation (root dilaceration) present, too little space in the dental arch, unfavourable position of the canine between the roots of the central and lateral incisor, or if the orthodontist estimates that the neighbouring teeth will be damaged by the orthodontic movement of the canine, then, orthodontic traction is contraindicated⁹. If the orthodontic traction is found to be impossible or unpredictable depending on the angulation of the tooth, another method is autotransplant. This procedure depends on the degree of tooth development and is more effective in cases where the impacted tooth has an incompletely developed root (rhizogenesis). Also, the tooth that needs to be extracted and transplanted in the right position in the dental arch has to be whole. Very extensive osteotomy is necessary for full extraction of the impacted tooth and its placement, which will compromise the neighbouring vital tissue. This was not possible in this case and these options were not taken into account⁵.

Surgical extraction was performed as a prophylactic measure against the formation of pathologic structures, as well as for the future orthodontic treatment of the patient to be accomplished successfully. When dealing with impacted teeth, osteotomy and odontosection are required and they can damage the surrounding tissue. The low pressure that is applied when using piezosurgery allows precise and selective cut of the bone only and it does not damage the surrounding soft tissue¹⁰.

Trauma is minimal with piezosurgical osteotomy compared to conventional osteotomy performed with rotatory instruments and burs which causes more trauma because of the applied pressure and heating to the bone and soft tissues¹¹.

Conclusions

Impacted maxillary canine extraction had good clinical outcome, with no intraoperative or post-operative complications. Piezosurgical osteotomy minimized the trauma of the hard and soft tissues, and this approach proved to be the most efficient.

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