case report

EXTERNAL ROOT RESORPTION DUE TO IMPACTED THIRD MOLARS

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SUMMARY

The external resorption of permanent teeth is a very complex phenomenon where odontoclasts resorb the outer surface of the tooth. In these cases, careful clinical and radiographic examination is indicated to identify the location and extent of the defect. In the present paper, four patients exhibiting multiple impacted molars causing advanced root resorption to adjacent teeth are presented.

Key words: impacted molars, root resorption, Cone Beam CT, early extraction.

Introduction

The external resorption of permanent teeth is a very complex phenomenon involving odontoclasts resorbing the outer surface of the tooth. This most commonly affects the root surface but may also involve the crown of an unerupted tooth. The resorption may first attack cementum and dentin but may gradually extend to the pulp. Because the recruitment of odontoclasts requires an intact blood supply, only sections of the tooth with soft tissue coverage are susceptible to this procedure (1). Common sites of external root resorption are the apical and cervical regions (2).

The prevalence of root resorption, as determined by Nitzan et al., was 7.5% of the investigated impaction cases, 2% of which showed extensive resorptive changes (3). Other studies report a lower prevalence of resorption ranging from 0 to 4.7% (1). External root resorption appears commonly in mandibular molars and upper central, as well as the lateral incisors due to impacted canines (2).

External resorption may occur to a single tooth, multiple teeth, or in rare cases, the entire dentition (1). The etiology is frequently unknown, but in other cases it can be attributed to local etiologic factors (4), including occlusal trauma, orthodontic tooth movement, periodontal disease, periapical inflammation, pulpal necrosis of adjacent teeth, mechanical injury of the periodontal soft tissues, tumors, cysts, traumatic dental injuries and the proximity of an impacted tooth (3). It is well documented that impacted teeth can lead to the root resorption of adjacent teeth, usually at the point where the coronal part of the tooth follicle is in contact with adjacent roots. In

such cases, early extraction of the impacted tooth is indicated. Third molars present the highest frequency of semi- or full impaction, particularly maxillary third molars. Although there are some morphologic factors related to the greater incidence of third molar impaction, the final tooth position and the possibility of third molar eruption cannot be predicted with absolute certainty. Prophylactic extraction of third molars has become a matter of controversy among academics; however, a consensus has been reached regarding the removal of third molars where there is with evidence of cysts, tumors, destruction of adjacent teeth and bone, and whenever required by orthodontic treatment planning (5, 6). For orthodontic reasons, the extraction of the third molars is indicated when there is a symptomatology of obstruction and an ectopic eruption path of the second molar is evident. In addition, in cases requiring the posterior movement of molars, something which can result in the impaction of third or even of second molars, it may be advisable to remove third molars before starting retraction procedures (7, 8).

In this retrospective study of 7,750 panoramic radiographs of patients aged 17-35 who visited the Out Patients Clinic of the Dental School in Aristotle University Thessaloniki between 1998 and 2012, to have their third molars checked, we identified, and now present, four patients with multiple impacted molars which caused advanced root resorption in adjacent teeth. Since resorbed teeth are mostly free of pain or other characteristic signs or symptoms, early detection by radiographic examination is essential to establish a proper diagnosis (5) and start treatment in order to prevent further complications.

Case reports

Case A. A 32-year-old male with good general health presented at the Out Patients Clinic complaining of pain in the right side both upper and lower jaws during mastication. The symptoms had persisted for about a week.

Clinical examination of the patient revealed that several teeth were missing. Specifically, in the right maxilla, only the first molar remained and laterally from this tooth there was a bone expansion buccally at the location of the two missing molars. Probing revealed reduced bone support buccally. In the right mandible only the third molar existed; this exhibited a mesial inclination up to 60°; effectively covering the space between it and the second premolar.

Ectopic tooth development was suspected in the patient, with four teeth missing from the right side of the arch. A panoramic radiograph confirmed this suspicion (Figure 1). The second and the third maxillary molars were impacted with the inclined third molar presenting an obstacle in the eruption path of the second molar. The delay

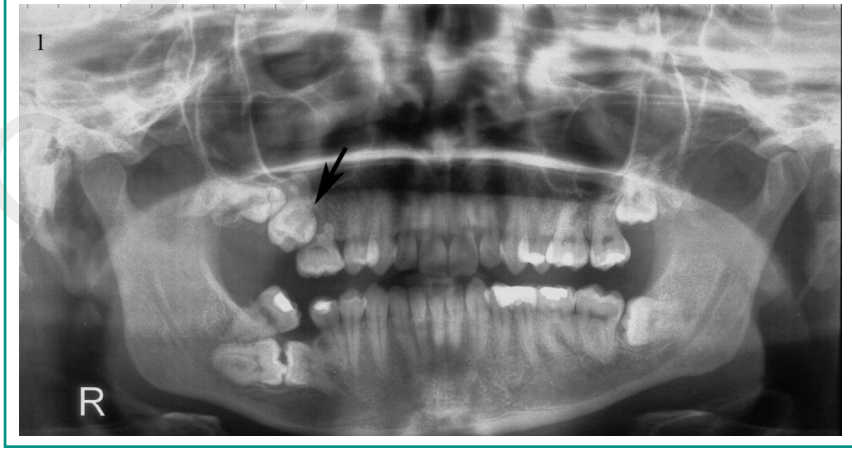

Figure 1
Panoramic radiography of Case A revealing resorption of the first maxillary molar and impaction of the two maxillary and two mandibular molars in the right side of the jaws.

in eruption of the maxillary second molar was attributed to severe the mesial angulation of the third molar and the distal angulation of the second molar. To exacerbate the situation, the impacted second molar was superimposed over the distal root of the first molar bucally. As a result the distal root appeared to be resorbed, including the pulp.

Radiographic examination also revealed two mandibular molars impacted in a very uncommon position. The two molars were lying horizontally, with their occlusal surfaces facing towards each other and in contact. Lack of space might have led to follicle collision between the first and the second molar tooth germs, resulting in the impaction of both teeth. The treatment plan decided upon was the extraction of the first and third molars and the application of orthodontic therapy to the impacted second molar. Radiographic images of the left upper and lower jaw revealed the presence of both third molars mucosally impacted, the lower one lying horizontally and totally asymptomatic.

The resorption defect of the maxillary molar seemed to be unrestorable with endodontic treatment and bisection because of the minimal bone supporting structures proximal to the distal root. This led to a treatment plan involving the extraction of the first and third maxillary molars and the application of orthodontic forces to the remaining second impacted molar.

Case B: A 20-year-old male patient visited the Out Patients Clinic for radiographic examination because of the absence of several permanent teeth in the mandible. The clinical examination demonstrated swelling of the alveolar mucosa (hyperplasia), asymmetry of facial bone structures of the mandible, malocclusion (very deep bite), and several missing teeth without evidence of extraction [35, 37, 45, and 17]. A Panoramic radiograph (Figure 2) revealed a congenital absence of 35, 37, 45, and 17 and of all the third molars except 48, an uncommonly extensive development of the maxillary sinuses, late persistence of the deciduous second mandibular molar 75, but submerged. The mandibular right third molar was impacted, and in contact with the middle distal root of second molar at an angulation of more than 90° which was interpreted as complete root resorption. As before, in this case the treatment plan recommended extraction of the resorbed and impacted teeth together with the submerged 75. The extraction confirmed the complete resorption of the distal root of 47 (Figures 3, 4).

Case C. A 30-year-old male patient visited the Out Patients Clinic complaining about pain in the left side of the upper jaw during mastication. The symptoms had started six months before.

Figure 2
Panoramic radiography of Case B demonstrating impacted 48 and resorpted 47.

Figure 3
Case B. The two extracted teeth.

Figure 4
Better presentation of the resorpted root in Case B.

Clinical examination demonstrated swelling of alveolar mucosa at the location of the second maxillary molar.
The radiographic examination revealed that the crown of the impacted third maxillary molar was superimposed over the root of the second molar. Additionally, a radiolucent shadow at middle half of the root of the second molar was interpreted as complete resorption of the tooth substance (Figure 5). Since resorption had progressed to such an extent, endodontic treatment was not feasible. So the treatment plan that was proposed was the extraction of the second molar and orthodontic treatment of the third molar.
Panoramic radiography also indicated complete bony impaction of the right third mandibular molar together with an inclination beyond the horizontal and slight absorption of the distal root of the adjacent molar. Resorption was described as a discontinuity and irregularity of the root surface. In the left side of the mandible, there was a partially impacted third molar lying horizontally, totally asymptomatic. The treatment plan proposed, once again, the extraction of the two impacted mandibular molars.

Case D. A 35-year-old female patient presented at the clinic complaining about one of the four still remaining deciduous teeth that she had. This patient had a congenital absence of permanent premolars and impacted third molars 28 and 38 lying horizontally in close proximity to the second molars (Figure 6). In this patient a CBCT radiographic examination was performed to assess the situation. The CBCT examination (axial images) showed the precise location of 28 and 38 and confirmed the resorption of both the second

Figure 5
Panoramic radiograph of Case C depicting complete resorption of the root of 27.

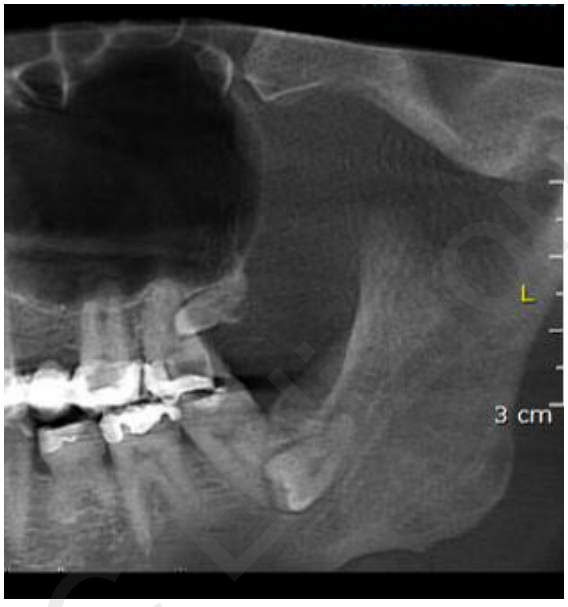

Figure 6
Case D. Section of the panoramic view from the CBCT revealing 28 and 38.

Figure 7
Case D. Axial image of 28. The arrow shows the crown of 28 and the resorption in 27.

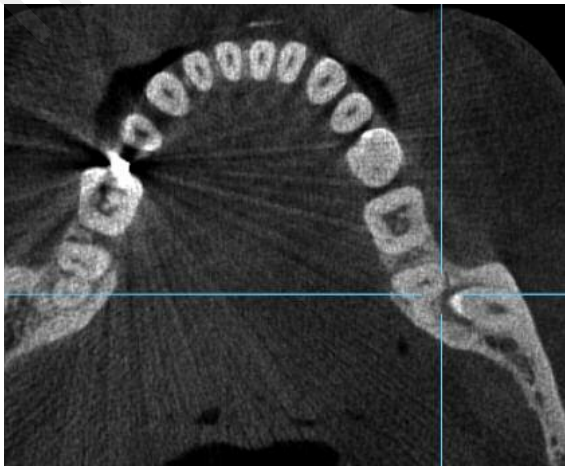

Figure 8
Case D. Axial image of 38 showing the resorption at 37.

molars (Figures 7, 8). Tooth 27 appeared to be resorbed at the level of trifurcation and 37 at the distal root (Figure 9). As the CBCT has no limitations regarding the third dimension, it showed the actual size and position of resorption, excluding the possibility of one tooth being projected over another (Figure 10 A, B).

Discussion

Tooth impaction is defined as cessation of the eruption procedure due to a clinically or radiographically detectable physical barrier in the eruption path or an ectopic position of the tooth

Figure 9
Case D. Coronal image of 38.

such as case C, are usually not detected in radiographs and may be self-limited if the impacted tooth is removed (1). That is why early extraction of impacted third molars is advocated by many researchers (7, 8). Early diagnosis demands clinical examination to identify the missing teeth, and radiographs to identify the location of the ectopic tooth and prevent complications like resorption (1). Resorption on the roots is often difficult to diagnose from intraoral films or in orthopantomograms, especially when the dentine loss is located buccally or lingually or exactly in the middle like with 27 in case D. Cone beam computer tomography has proved to be most effective in detecting resorptions like these according to Oenning et al. (9) who compared CBCT and panoramic radiography for the assessment of

Figure 10
Case D. A) Three dimensional image of 28 located at the trifurcation of 27.
B) The arrows show the three dimensional image of 28 and 38.

germ (6). These conditions have been found to affect both the second and the third molars in the mandible and the maxilla. Regarding cases A and C root, resorption of maxillary molars due to impacted tooth is a relatively rare phenomenon; it more frequently appears in maxillary incisors and in the distal root of the second mandibular molar, as in cases B and D. Mild resorptions, resorption. Cone beam CT is also outstanding for assessing the positions of teeth, and their mutual relationship provides a good basis for clinical considerations when complications occur during eruption (10). The only consideration to be assessed with these systems is the size of the dose of radiation involved. It is preferable to select the smallest field of view, depending on case, be-

cause this limits the radiation dose, and the resolution is higher. Since the smaller volume size results in better image resolution (10).

Early diagnosis of root resorption could be helped by the disappearance of the lamina dura in area of contact of the root with the impacted tooth, alterations in the periapical status of the adjacent teeth and a noticeable radiolucent space surrounding the crown of the impacted tooth (1). However, in the present study, in cases A, C and D the diagnosis for resorption concerning the distal root was made very late, resulting in complete resorption, including the pulp, to the trifurcation, so the extraction of the resorbed tooth became mandatory. In case B, the patient also lost the impacted tooth because the inclination was not appropriate for orthodontic treatment. The reason for the extensive development of resorption lies in the lack of characteristic symptoms or pain. Even when considerable loss of tooth structure has occurred, the tooth in question is frequently firm and immobile in the dental arch. In case A, the rare buccal angulation of the tooth caused the crown and the root to appear overlapping one another so that almost none of the latter could be seen in the radiograph. The positive outcome in this case was that it was possible to preserve the second maxillary molar in the dental arch, bringing it in the position of the extracted one with orthodontic forces, thus eliminating the tooth loss and malocclusion. In the case of the horizontal impacted mandibular molars in case A, it should be emphasized that this situation could have been prevented with an early consultation at the age of seven years old. The diagnosis would be determined by a delay or asymmetry in molar eruption with radiographical confirmation.

In a case where a non-erupted third molar in close proximity to the distal root of the second results in root resorption, early and appropriate radiographic examination can identify the location and extent of the defect. Depending on these facts, treatment can be planned and the resorbed tooth extracted if it is unrestorable, thus preserving and moving the impacted into the dental arch, or extracting the impacted tooth and leave a mild resorption to be self repaired. Early extraction of the third molars facilitates the eruption of the second molar, especially in cases where evidence of crowding and lack of space in the posterior region exists. In this way, the loss of teeth is avoided and serious future orthodontic problems prevented (7, 8).

Conflict of interest

Athina Kondylidou-Sidira, Eugenia Koliniotou-Koumpia, Eleftherios G. Kaklamanos, Smaragda Kavadia-Tsatala, Kostantinos Antoniades declare they have no conflict of interest.

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