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Case Report

Orthodontic and Surgical Treatment of an Impacted Tooth in a Large Dentigerous Cyst

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Orthodontic and Surgical Treatment of an Impacted Tooth in a Large Dentigerous Cyst

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Abstract

Standard treatment of a dentigerous cyst involves enucleation of the cyst and extraction of the involved teeth. The aim of this case report was to present an alternative combined surgical and orthodontic treatment of an impacted mandibular premolar within a large dentigerous cyst. An 11-year-old female patient was referred to the orthodontic clinic due to a swelling of the left lower jaw. Radiographic evaluation revealed a large dentigerous cyst with an impacted premolar. A CBCT scan showed a radiolucency in close proximity to the roots of the adjacent teeth. In the initial stage of treatment, the cyst was marsupialized. Spontaneous eruption of the impacted tooth was observed following decompression of the cyst, and orthodontic treatment was used to bring the impacted tooth into a proper occlusion. Total surgical and orthodontic treatment time was 19 months. Class I canine and molar occlusion with complete permanent dentition was achieved through combined surgical and orthodontic treatment. No recurrence was observed, and the position of the mandibular premolar was judged successful. Marsupialization of a dentigerous cyst and orthodontic traction may be an appropriate alternative method for treating impacted teeth in young patients with no tooth resorption.

Keywords: Dentigerous cyst, impacted tooth, orthodontic treatment.

Introduction

A dentigerous cyst is an odontogenic cyst of unknown pathogenesis (1) that contains an unerupted tooth crown within its borders (2) and generally inhibits the eruption of the involved permanent tooth. Dentigerous cysts have been observed in preadolescents during tooth development. After radicular cysts, dentigerous cysts are the most common developmental cysts of the jaws, accounting for 14%-20% of all jaw cysts (3). While they are most often located in proximity to the mandibular third molars or maxillary canines (4), dentigerous cysts are also frequently encountered in the mandibular premolar region (5).

Dentigerous cysts are usually asymptomatic and discovered during routine radiographic examination. Sometimes the cysts are identified during radiographic evaluation when a patient is referred to an orthodontist due to failure of eruption following eruption of the symmetric tooth. In such patients, treatment usually involves removal of the entire cyst and associated teeth; however, extraction of these teeth can be difficult, as they may have been displaced due to pressure from the cyst (5). Another treatment approach that protects the associated teeth is marsupialization, which causes the cyst to gradually decrease in size, leading to a change in tooth angulation and direction that helps to accelerate eruption (6). One study reported that 81% of impacted mandibular premolars spontaneously erupted approximately 100 days after marsupialization (5), while another study reported spontaneous eruption of the impacted premolar to be related to cyst position, jaw angulation and patient age (7).

This case report presents a large dentigerous cyst with an impacted mandibular premolar treated using a combined surgical and orthodontic approach.

Case Presentation

A female patient aged 11 years and 2 months was referred to the Ondokuz Mayıs University Faculty of Dentistry for a consultation on a swelling in the area of the left mandible. The patient was physically healthy with no systemic diseases. Extra-oral examination revealed a slight expansion, but the patient reported no pain or sensitivity in the associated tissue. Intra-oral clinical examination showed the patient to be in mixed dentition with all second deciduous molars present in the dental arches. Radiographic evaluation showed a large cyst with an impacted and displaced tooth (Fig.1). Clinical and radiographic evaluation also showed the patient to have a Class II, Division I malocclusion with an increased overjet and overbite.



Figure 1. Panoramic radiograph showing well-defined radiolucent lesion with left second premolar which was placed in the lesion. The root apex of the impacted tooth is open.

A CBCT scan was taken to identify the borders of the cyst and its proximity to the adjacent teeth roots (Fig. 2). While no root resorption was observed, the cyst had expanded to the lateral border of the mandible (Fig. 3).



Figure 2. A CBCT record showed the border of the cyst and relation of the cyst border with the adjacent teeth. There were no root resorption areas on the roots

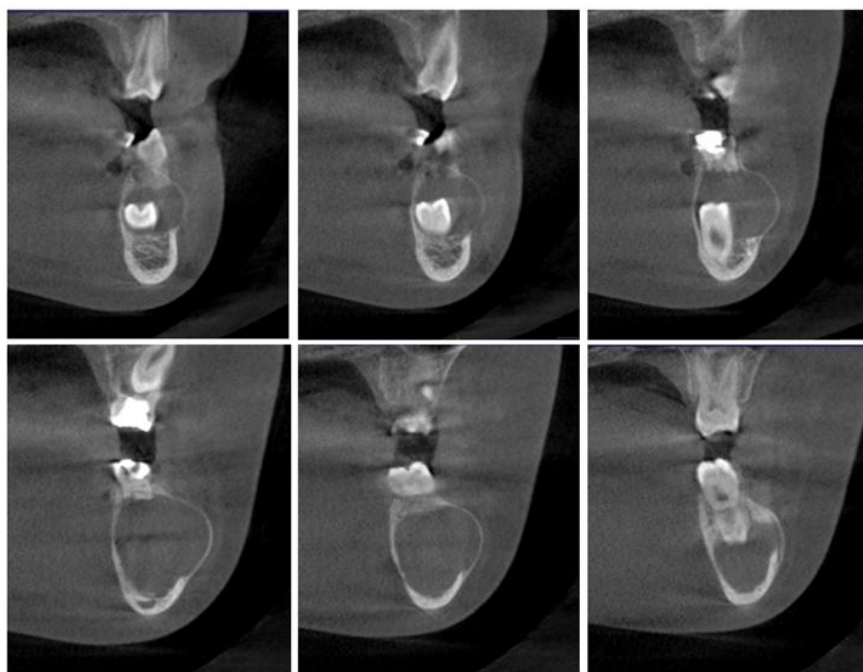


Figure 3. The cyst made an expansion on the lateral border of mandible.

Based on clinical and radiographic examinations, it was determined that treatment objectives should include obtaining healthy bone-formation in the area of the left mandible and correcting the Class II skeletal malocclusion to achieve a proper overbite and overjet relationship with good occlusion and vertical facial proportions.

Two surgical treatment alternatives were considered and discussed with the patient and her parents, as follow: (1) Standard treatment for a dentigerous cyst, with enucleation and extraction of the associated impacted and displaced tooth; or (2) Extraction of the deciduous tooth, suppression of the cyst through marsupialization, and spontaneous eruption of the impacted and displaced tooth.

Orthodontic treatment was suggested in connection with both surgical alternatives, with functional treatment to correct the skeletal discrepancy and close the extraction space suggested in the first case, and fixed orthodontic mechanics to move the mandibular premolar into the proper position as well as functional treatment of the skeletal Class II malocclusion in the second case.

In consultation with the patient's parents, who provided their written consent prior to treatment the second treatment alternative was selected, given the patient's age and the possibility of spontaneous eruption of the impacted premolar.

Marsupialization was performed by excising the overlying mucosa and opening an appropriately sized window into the cystic cavity under local anesthesia. Next, the mandibular left deciduous second molar was extracted, also under local anesthesia. The biopsy material was also taken from the cyst epithelium. The cavity was kept open by suturing a short piece of tubing from a dental syringe, and the patient was instructed to irrigate the cyst cavity 3-4 times a day, especially after meals, to prevent food accumulation and closure of the fistula. The patient was also prescribed antibiotics and analgesics before being discharged. Pathological examination revealed a dentigerous cyst.

Follow-up examinations were conducted after 1 week, 1 month (Fig. 4A) and 2 months (Fig. 4B). After 1 week, eruption of the premolar was observed to have begun, but to have stopped due to obstruction by the alveolar bone ledge. Therefore, a removable appliance was designed to erupt the tooth. A metal button with a hook constructed from ligature wire was bonded to the enamel surface of the impacted premolar, and intra-oral 3/16" lumen elastics were used to attach the button to the appliance, which the patient was advised to wear at all times. The force level of the intra-oral elastics was checked at monthly intervals. At the end of the first phase of orthodontic treatment (2-month follow up), the impacted premolar had been brought into alignment in the dental arch (Fig. 4C), and the cyst was reduced in size; however, the patient still had a Class II skeletal malocclusion with increased overjet (Fig. 5)

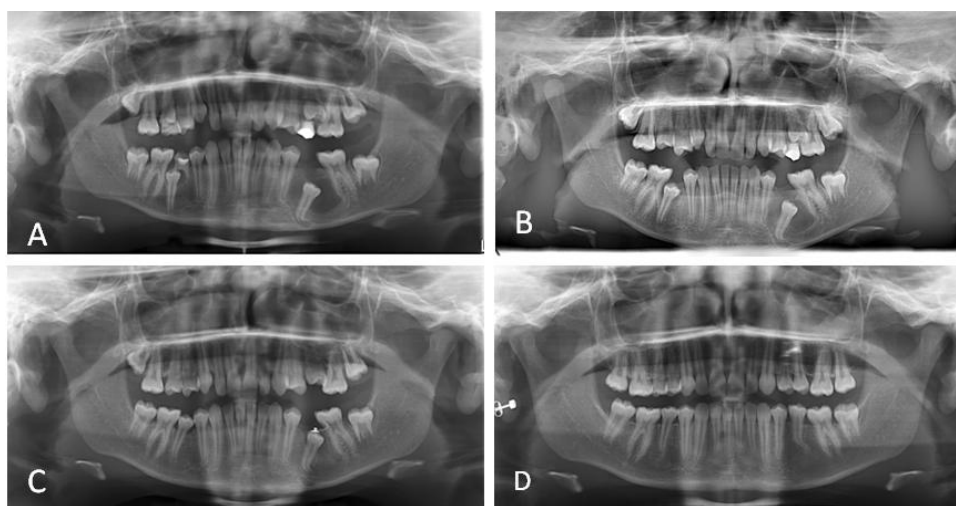


Figure 4. A) Panoramic radiograph 1 month after marsupialization; B) 2 month after marsupialization; C) after orthodontic traction with removable appliance; D) Panoramic radiograph after fixed orthodontic treatment.



Figure 5. Intra oral and extra oral photographs of the patient before fixed orthodontic treatment.

In the second phase of orthodontic treatment, 0.022" slot brackets (Gemini, 3M Unitek, Monrovia, Calif, USA) were placed in both the maxillary and mandibular arches. Fixed orthodontic treatment was started with light continuous force. A 0.014" NiTi arch wire was used for aligning and leveling, with the left mandibular second premolar excluded from the arch wire in this phase. After alignment and leveling of the maxillary and mandibular arches was achieved, 0.019"x0.025" stainless-steel arch wires were installed, and an auxiliary arch wire was used to bring the mandibular left second premolar into alignment with the dental arch. Once this tooth was leveled, 0.021"x0.025" stainless-steel arch wires were installed and a Forsus Fatigue Resistant Device (Forsus; 3M Unitek, Monrovia, CA, USA) was connected to correct the Skeletal Class II malocclusion.

The total surgical and orthodontic treatment time was 19 months. At the end of treatment, the impacted mandibular premolar was erupted (Fig. 4D); Class I molar and canine relationships were achieved; and an ideal overjet and overbite were provided (Fig. 6). In the final panoramic radiograph taken at the end of fixed orthodontic treatment, ideal root alignment with no new cystic formation was observed.

Discussion

The adverse effects of dentigerous cysts include resorption of surrounding tissue, tooth roots and bone; tooth displacement; and expansion of bone and soft tissue, with or without facial asymmetry (8), Inferior alveolar nerve paresthesia resulting from a dentigerous cyst has

also been reported (9); however, in most cases, cysts are asymptomatic and are diagnosed during routine dental visits (6). In the case reported here, swelling was present in the left mandibular region, but the patient had no pain or sensitivity.



Figure 6. Intra oral and extra oral photographs of the patient just after fixed orthodontic appliances were removed.

Treatment modalities for jaw cysts include marsupialization, enucleation, enucleation with bone grafting, and resection. Marsupialization, or decompression of the cystic lesion, relieves the pressure within the cyst and reduces the size of the lesion so that subsequent enucleation or curettage can be performed more easily and with less risk to adjacent vital structures (10). In some cases, marsupialization by itself can lead to complete resolution and cyst disappearance (11), and in other cases, marsupialization is followed by cyst enucleation. Hyomoto et al. found that natural eruption of the impacted tooth associated with a dentigerous cyst occurred in 72.4% of subjects after marsupialization of the cyst (5).

Whether or not orthodontic traction will be performed should be decided within three months following marsupialization. Miyawaki et al. recommended that orthodontic traction be initiated 3 months after marsupialization in preadolescents when there is sufficient space for spontaneous eruption (12). Tooth position and angulation have an effect on eruption, with a greater change of spontaneous eruption occurring when the angle between the long axis of the impacted tooth and that of adjacent teeth is small (5). Unerupted maxillary teeth located less than 9 mm above the alveolar bone are also good candidates for eruption. In the present case the angle between the long axes of the impacted second premolar and adjacent teeth was small, and spontaneous eruption began within the first 2 months following marsupialization.

However, the crown of the impacted tooth was blocked by the alveolar bone, which prevented further eruption; thus, the decision was made to apply orthodontic traction.

Clinicians should also take patient age into consideration in selecting among treatment alternatives. Children and young adults have a greater and quicker capacity for bone regeneration than older individuals, and teeth with open apices are also more likely to undergo spontaneous eruption (3).

In the case presented here, radiographic and clinical examinations indicated sufficient space for the eruption of the impacted premolar. While the cyst was observed to be relatively large, cyst size and shape were not considered the main factors to affect eruption (5).

The outcome of the case reported here supports the choice of treatment of a dentigerous cyst and impacted premolar by marsupialization of the cyst and orthodontic traction mechanics in young patients with no tooth resorption.

Competing Interests

The authors declare that they have no competing interests.

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