Eruption of Impacted Permanent Teeth after Treatment of a Dentigerous Cyst: A Case Report

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ABSTRACT

Dentigerous cysts are the most common developmental odontogenic cysts. It is a benign and asymptomatic intraosseous lesion that affects the bones of the maxillofacial complex, interfering with tooth eruption. Although enucleation is the treatment of choice, marsupialization is the better option for large cysts involving unerupted permanent teeth. The purpose of this article is to report the eruption of impacted permanent mandibular right canine and first and second premolars after marsupialization of an infected dentigerous cyst. Two years after marsupialization and orthodontic treatment, the cyst disappeared and the canine and premolars erupted uneventfully. (J Dent Child 2013;80(2):92-6)

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A dentigerous cyst is a radiolucent, well-defined, odontogenic lesion that surrounds the crown of an unerupted tooth and prevents its eruption.[1-3] It is caused by an alteration of the reduced enamel epithelium (after completion of amelogenesis), which results in fluid accumulation between the epithelium and the tooth crown.[4-6] Dentigerous cysts occur over a wide age range; most reports show a peak incidence in the second and third decades of life,[7-19] and they are rarely seen during childhood.[7-9,17,19] According to some authors, however, most patients with a dentigerous cyst are younger than 20 years old.[18,20]

The two principal methods of treating a dentigerous cyst are enucleation and marsupialization. Marsupialization has the advantage of promoting the eruption of a dentigerous cyst-associated tooth and preserving the tooth without orthodontic traction.[20-24] An impacted tooth associated with a dentigerous cyst, however, does not always successfully erupt following marsupialization. In this case, orthodontic traction of the tooth should be considered. Enucleation and tooth extraction can lead to functional, cosmetic, and psychological consequences for the patient.

The purpose of this manuscript is to discuss the treatment of an odontogenic cyst associated with unerupted permanent mandibular right canine and first and second premolars.

CASE DESCRIPTION

A 9-year-old girl was referred to the Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, University of Selçuk, Konya, Turkey, for the treatment of a submucosal lesion in the lower right vestibule (Figure 1), which was first detected by the parents two months before. Her medical history was unremarkable. She had several carious lesions present. Radiographic examination showed a well-defined osteolytic lesion measuring 4 cm in diameter, surrounding the permanent mandibular right canine and first and second premolars, and displacing the canine and first premolars to the lower border of the mandible (Figure 2).

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The apices of the involved teeth were still open. No signs of root resorption were present in the adjacent teeth. The patient and her parents were informed of the advantages and disadvantages of the treatment options, and informed consent was obtained for marsupialization.

Figure 1. Preoperative view showing a bony expansion in the lower right vestibule.

Figure 2. Preoperative panoramic radiographic showing an osteolytic lesion surrounding and displacing the permanent mandibular right canine and first and second premolars.

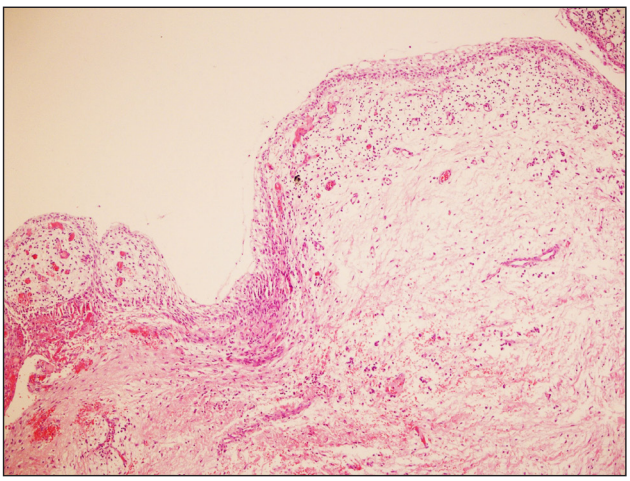

Figure 3. Histopathologic appearance of nonkeratinized, squamous epithelium–lined dentigerous cyst. (hematoxylin and eosin stain X 100).

After an inferior alveolar nerve block and buccal nerve block were done with 2 cc (80 mg) articaine HCL with 0.020 mg epinephrine (Maxicaine fort, VEM, Ankara, Turkey), the primary mandibular right first and second molars were extracted. After a buccal mucoperiosteal flap was elevated, the cyst membrane was fenestrated. A biopsy specimen was taken and sent for histopathologic examination. The cyst membrane was sutured to the oral mucosa to create a window. The histopathologic examination revealed a dentigerous cyst (Figure 3). A space maintainer was also designed as an obturator, which the patient wore for 8 months.

She was recalled for irrigation with saline solution every week for 1 month, then twice a month for 3 months, and once a month for 4 months. The follow-up visits were uneventful. The unerupted teeth were examined via panoramic radiographs for the assessment of the eruption level.

Eight months after marsupialization, all the carious lesions were treated and the patient was referred to the orthodontic department (Figures 4a-b). The aim was to align the teeth in the dental arch. The first molars and incisors were bonded to allow leveling and overbite correction simultaneously. A 0.014-inch archwire was used for leveling. The primary teeth which showed mobility during treatment were extracted for accelerating the tooth eruption. After eruption, each

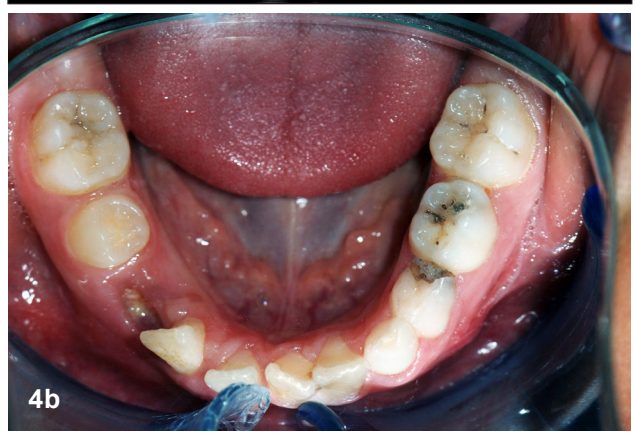

Figure 4. (a) Panoramic film prior to orthodontic treatment. (b) Occlusal view of the patient prior to orthodontic treatment.

Figure 5. Panoramic film of the patient 2 years after marsupialization. Note disappearance of the cyst and eruption of the canine and premolars.

tooth was bonded. Space for the mandibular right first premolar and maxillary left canine was gained with open coil springs. The orthodontic treatment currently continues with leveling.

Two years after marsupialization, a panoramic radiograph revealed that the cyst had disappeared, and the permanent mandibular right canine and premolars had erupted (Figure 5).

DISCUSSION

There are 2 types of dentigerous cysts.[4] The first is developmental in origin and occurs in mature teeth, usually as a result of impaction. These cysts usually occur in the late second and third decades and predominantly involve mandibular third molars.[4] The second type is inflammatory and occurs in immature teeth as a result of inflammation from a nonvital primary tooth or other source, subsequently spreading to the tooth follicle. These are often diagnosed in the first and early part of the second decade of life, and predominantly involve mandibular premolars.[25] The case presented might be classified as inflammatory, due to the lesions related with the carious primary mandibular right first molar and the patient's age.

The idea of an inflammatory origin for dentigerous cysts was first offered by Bloch-Jorgensen,[26] who suggested that all follicular cysts in his series originated from the overlying necrotic primary tooth. The resultant periapical inflammation had spread to involve the follicle of the unerupted permanent successor, and inflammatory exudates ensued, with resultant dentigerous cyst formation. Azaz and Shteyer[27] suggested that persistent and prolonged inflammation may cause chronic irritation to the dental sac of an unerupted tooth, which, in turn, leads to the development of a dentigerous cyst. Shaw et al.[28] reported on 13 further cases of follicular cysts involving premolars that were apparently associated with infected primary teeth.

Dentigerous cysts are frequently discovered when radiographs are taken to investigate failure of tooth eruption, a missing tooth, or misalignment. There is usually no pain or discomfort associated with the cyst unless it becomes secondarily infected. It progresses slowly and may exist for several years without being noticed. It may cause displacement of adjacent teeth and resorption of roots. Dentigerous cysts appear as unilocular lucent cysts of varying sizes, with well-defined sclerotic borders, associated with the crown of an unerupted tooth.[7,29-33] If a follicular space is more than 5 mm in a radiograph, an odontogenic cyst may be suspected.[31]

Other odontogenic cysts, such as radicular cysts, and odontogenic tumors, such as ameloblastoma, Pindborg tumor, odontoma, odontogenic fibroma, and cementomas, may present characteristics similar to those of a dentigerous cyst.[7,29-33] Microscopic evaluation is usually necessary to determine the type of lesion.[29]

Marsupialization or total enucleation may be considered as treatment options for a dentigerous cyst. Enucleation is the process in which the cyst is completely removed without rupturing; this is generally indicated for small cysts. For large lesions, this procedure can cause fracture of the mandible, tooth devitalization, or removal of impacted teeth associated with the lesions that do not need to be removed. Enucleation is indicated when there is no likelihood of damaging anatomic structures such as apices of vital teeth, maxillary sinus, or the inferior alveolar nerve. Marsupialization consists of a surgical cavity on the wall of the cyst, emptying its content, and maintaining continuity between the cyst and the oral cavity, maxillary sinus, or nasal cavity.[34] This technique is indicated for large cysts or unerupted teeth associated with cysts in pediatric patients or in patients with systemic diseases, including the elderly.[35]

The choice of treatment should be based on the cyst size and location, patient's age, affected dentition, and relationship with surrounding vital structures.[36] In an attempt to preserve the tooth associated with the cystic lesion, the marsupialization technique has been successfully performed and indicated for growing children and adolescents. This conservative procedure leads to a reduction in the size of the cystic cavity and allows for the spontaneous eruption of the unerupted/impacted tooth.[16,36-38]

The major disadvantage of marsupialization is that pathologic tissue is left in situ, without a thorough histologic examination.[20,34] Furthermore, an obturator is usually required to decompress the cystic lesion and prevent entry of food debris into the cystic cavity.[39] Although this technique is found to be quite successful, full compliance with recommended postoperative oral hygiene measures is required.

It is known that, although a dentigerous cyst inhibits eruption of the cyst-associated permanent tooth, development of the roots continues.[40] Miyawaki et al.[23]

reported that an impacted tooth is able to erupt more rapidly if marsupialization is performed at a time when the tooth has the ability to erupt. There is a close correlation between tooth eruption and development of roots.[20,23] Speed of eruption and rate of angulation of the cyst-affected permanent teeth were faster than those of the teeth on the noncyst side.[23] Orthodontic traction of impacted teeth has often been performed after marsupialization of a large cyst.[21,40] There is limited knowledge, however, of the optimal timing to determine whether the impacted tooth in a cyst should be removed or preserved to erupt after marsupialization in preadolescent patients. Conservative approaches have better prognosis in young patients because, in addition to the greater bone regeneration capacity of children, immature teeth have an optimal eruption potential.[16,37,38]

In this case, marsupialization was the treatment of choice because the patient was a child, the cyst was very large, leading to the displacement of permanent teeth, and mandibular development had not been completed. Although the cystic lesion had displaced the germ of the permanent mandibular right canine and first premolar, the teeth returned to satisfactory positions and erupted uneventfully after the treatment.

In children, marsupialization should be the first choice of treatment because it provides an opportunity for tooth eruption. Additionally, the treatment plan must be multidisciplinary. After the marsupialization, eruption of the permanent teeth must be followed closely, both clinically and radiographically, and must involve the expertise of an oral and maxillofacial specialist as well as a pediatric dentist. When the permanent teeth do not erupt spontaneously, it is advisable to consult with an orthodontist.

REFERENCES

1. Lucas RB. Dentigeorus Cyst. In: Lucas RB, ed. Pathology of Tumors of the Oral Tissues. 4th ed. Edinburgh: Churchill Livingstone; 1984:366-9.
2. Neville BW, Damm DD, Allen CM, Bouquot JE. Odontogenic cysts and tumors. In: Neville BW, Damm DD, Allen CM, Bouquot JE, eds. Oral and Maxillofacial Pathology. 2nd ed. Philadelphia: WB Saunders; 2002:589-642.
3. Gulbranson SH, Wolfrey JD, Raines JM, McNally BP. Squamous cell carcinoma arising in a dentigerous cyst in a 16-month-old girl. Otolaryngol Head Neck Surg 2002;127:463-4.
4. Benn A, Altini M. Dentigerous cysts of inflammatory origin. A clinicopathologic study. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1996; 81:203-9.
5. Shear M. Dentigerous Cyst. In: Shear M, ed. Cysts of the Oral Region. 3rd ed. Oxford: Wright; 1992: 75-98.
6. Brook AH, Winter GB. Developmental arrest of permanent tooth germs following pulpal infection of deciduous teeth. Br Dent J 1975;139:9-11.
7. O'Neil DW, Mosby EL, Lowe JW. Bilateral mandibular dentigerous cysts in a five-year-old child: Report of a case. ASDC J Dent Child 1989;56: 382-4.
8. Yamalık K, Bozkaya S, Erkmen E, Barıs E. Nonsyndromic bilateral mandibular dentigerous cysts: Report of a rare case. Turkiye Klinikleri J Dental Sci 2007;13:129-34.
9. Prabhakar V, Sandhu SV. Nonsyndromic bilateral maxillary dentigerous cysts: Review of literature and report of an unusual case. Int J Pediatr Otorhinolaryngol Extra 2011;6:5-8.
10. Daley TD, Wysocki GP, Pringle GA. Relative incidence of odontogenic tumors and oral and jaw cysts in a Canadian population. Oral Surg Oral Med Oral Pathol 1994;77:276-80.
11. Grossmann SM, Machado VC, Xavier GM, et al. Demographic profile of odontogenic and selected nonodontogenic cysts in a Brazilian population. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2007;104:e35-e41.
12. Ochsenius G, Escobar E, Godoy L, Penãfiel C. Odontogenic cysts: Analysis of 2,944 cases in Chile. Med Oral Patol Oral Cir Bucal 2007;12:e85-91.
13. Tortorici S, Amodio E, Massenti MF, Buzzanca ML, Burruano F, Vitale F. Prevalence and distribution of odontogenic cysts in Sicily: 1986-2005. J Oral Sci 2008;50:15-8.
14. Aguilo L, Grandıa JL. Dentigerous cyst of mandibular second premolar in a five-year-old girl, related to a non-vital primary molar removed one year earlier: A case report. J Clin Pediatr Dent 1998;22:155-8.
15. Shear M, Speight PM. Dentigerous Cyst. In: Shear M, Speight PM, eds. Cysts of the Oral and Maxillofacial Regions. 4th ed. Hoboken: Blackwell Publishing; 2007:59-75.
16. Martinez-Pérez D, Varela-Morales M. Conservative treatment of dentigerous cysts in children: A report of 4 cases. J Oral Maxillofac Surg 2001;59: 331–3.
17. Ustuner E, Fitoz S, Atasoy C, Erden I, Akyar S. Bilateral maxillary dentigerous cysts: A case report. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2003;95:632-5.
18. Ertas U, Yavuz MS. Interesting eruption of 4 teeth associated with a large dentigerous cyst in mandible by only marsupialization. J Oral Maxillofac Surg 2003;61:728-30.
19. Smith JL II, Kellman RM. Dentigerous cysts presenting as head and neck infections. Otolaryngol Head Neck Surg 2005;133:715-7.

20. Takagi S, Koyama S. Guided eruption of an impacted second premolar associated with a dentigerous cyst in the maxillary sinus of a 6-year-old child. J Oral Maxillofac Surg 1998;56:237-9.
21. Thoma KH. Oral Surgery II. 5th ed. St. Louis: Mosby Co; 1969:891-904.
22. Ziccardi VB, Eggleston TI, Schneider RE. Using fenestration technique to treat a large dentigerous cyst. J Am Dent Assoc 1997;128:201-5.
23. Miyawaki S, Hyomoto M, Tsubouchi J, Kirita T, Sugimura M. Eruption speed and rate of angulation change of a cyst-associated second premolar after marsupialization of a dentigerous cyst. Am J Orthod Dentofacial Orthop 1999;116:578-84.
24. Fujii R, Kawakami M, Hyomoto M, Ishida J, Kirita T. Panoramic findings for predicting eruption of mandibular premolars associated with dentigerous cyst after marsupialization. J Oral Maxillofac Surg 2008;66:272-6.
25. Mintz S, Allard M, Nour R: Extraoral removal of mandibular odontogenic dentigerous cysts: A report of 2 cases. J Oral Maxillofac Surg 2001;59:1094-6.
26. Bloch-Jorgensen K. Follicular cysts. Dent Cosmos 1928;70:708-11.
27. Azaz B, Shteyer A. Dentigerous cysts associated with second mandibular bicuspids in children: Report of five cases. ASDC J Dent Child 1973;40:29-31.
28. Shaw W, Smith M, Hill F. Inflammatory follicular cyst. J Dent Child 1980;47:97-101.
29. Weber AL. Imaging of the cysts and odontogenic tumors of the jaw: Definition and classification. Radiol Clin North Am 1993;31:101-20.
30. Norris LH, Piccoli P, Papageorge MB. Multiple dentigerous cysts of the maxilla and the mandible: Report of a case. J Oral Maxillofac Surg 1987;45: 694-7.
31. Ko KS, Dover DG, Jordan RC. Bilateral dentigerous cysts: Report of an unusual case and review of the literature. J Can Dent Assoc 1999;65:49-51.
32. Roberts MW, Barton NW, Constantopoulos G, Butler DP, Donahue AH. Occurrence of multiple dentigerous cysts in a patient with the Maroteaux-Lamy syndrome (mucopolysaccharidosis, type VI). Oral Surg Oral Med Oral Pathol 1984;58:169-75.
33. Miller CS, Bean LR. Pericoronal radiolucencies with and without radiopacities. Dental Clin North Am 1994;38:51-61.
34. Ellis E. Surgical Management of Oral Pathologic Lesions. In: Peterson LJ, Ellis E, Hupp JR, Tucker MR, eds. Contemporary Oral and Maxillofacial Surgery. 4th ed. St Louis: Mosby; 2002:479-502.
35. Nishide N, Hitomi G, Miyoshi N. Irrigational therapy of a dentigerous cyst in a geriatric patient: A case report. Spec Care Dentist 2003;23:70-2.
36. Motamedi MH, Talesh KT. Management of extensive dentigerous cysts. Br Dent J 2005;198: 203-6.
37. Aziz SR, Pulse C, Dourmas MA, Roser SM. Inferior alveolar nerve paresthesia associated with a mandibular dentigerous cyst. J Oral Maxillofac Surg 2002;60:457-9.
38. Koselj V, Sotosek B. Inflammatory dentigerous cysts of children treated by tooth extraction and decompression: Report of four cases. Br Dent J 1999;187:587-90.
39. Delbem AC, Cunha RF, Vieira AE, Pugliesi DM. Conservative treatment of a radicular cyst in a 5-year-old child: A case report. Int J Paediatr Dent 2003;13:447-50.
40. Golden AL, Foote J, Lally E, Beideman R, Tatoian J. Dentigerous cyst of the maxillary sinus causing elevation of the orbital floor. Oral Surg Oral Med Oral Pathol 1981;52:133-6.