https://doi.org/10.62243/edr.1524049

Long-Term Treatment of Dentigerous Cyst Developing as a Result of Incorrect Total Amputation of Primary Tooth

Oyku PEKER[1], Ahmet Can HASKAN[2]

Abstract

Aim Cysts are pathological formations lined with epithelium that may show different characteristics depending on the epithelial tissue from which they originate, filled with liquid or semi-liquid material, showing localized development, usually with a connective tissue wall. Dentigerous cysts are often associated with impacted teeth and are benign developmental lesions. Rarely, they may occur due to inflammatory causes. Our aim was to report the management of inflamatuar dentigerous cycst related with total amputation in mixt dentition.

Case Report In this case report, we present the three-year clinical follow-up after surgical marsupialization of an eight-year-old young patient who applied to our clinic with a complaint of swelling in the lower jaw.

Discussion Inflammatory dentigerous cysts could occur in immature permanent teeth as a result of inflammation from a non-vital primary tooth. In cases of dentigerous cysts in children, various appliances and methods can be used for marsupialization. Marsupialization consists of uniting the cyst lining to the oral mucosa. This method has fewer complications than enucleation regarding the preservation of important anatomical structures and developing tooth germs.

Conclusion Although the development of odontogenic cysts in children is rare, their formation and progression can be much more rapid and aggressive than in adults. In the treatment of lesions observed in childhood, marsupialization has been reported to be an effective treatment method for the protection of erupting permanent teeth and surrounding tissues.

Keywords Deciduous teeth, Dentigerous cyst, Impacted teeth, Marsupialization, Odontogenic cyst

Introduction

Dentigerous cysts, radicular cysts, odontogenic keratocyst, eruption cysts and calcified odontogenic cysts are an important group of cystic lesions seen in the jaws in pediatric age groups (1). Dentigerous cysts are the second most common form of benign developmental odontogenic cysts that result from the accumulation of fluid between reduced enamel epithelium and the crown of an unerupted tooth (2).

In its histopathology, dentigerous cyst epithelium consists of 2-4 layers of smooth nonkeratinized cells, and the interface of epithelium and connective tissue is smooth. There may be mucous, ciliated columnar, and fat cells in dentigerous cyst epithelium (3). Although dentigerous cysts are considered to be developmental, it has been reported that inflammatory dentigerous cysts may also form when periapical infection from a devitalized deciduous tooth adversely affects the underlying permanent tooth germ for a long time (4).

In childhood, the three-dimensional growth of the maxillofacial skeletal structure and the development process, including the odontogenesis of the teeth, affect the distribution of cysts (1).

Dentigerous cysts usually appear in male patients and the mandibular region (6). Clinically, a dentigerous cyst is asymptomatic unless it is inflamed and grows, causing tooth displacement and jawbone expansion (6).

Radiographically, dentigerous cysts appear as well-demarcated, unilocular radiolucency located at the cementoenamel junction of the tooth. They may appear radiographically similar to an odontogenic keratocyst or ameloblastoma (6).

The presence of dentigerous cysts can cause severe consequences, such as pathological fracture and facial asymmetry (7).

Nevertheless, their surgical removal might present complications, such as nerve injuries, post-operative infections, and iatrogenic mandibular fractures. Therefore, the clinical conduct regarding those cysts should weigh the risks of removal and the benefits of tooth preservation (8). Hence, the interest of surgical marsupialization or decompression is the two most conservative treatment options described for the management of dentigerous cysts (9). Dentigerous cysts can be treated by enucleation or marsupialisation. While enucleation is a treatment method that can be applied in the treatment of small cysts, marsupialization, and decompression procedures, which can be applied in large cysts that can cause damage to the surrounding tissue, are minimally invasive procedures characterized by draining the cyst content and opening it into the mouth and based on patient follow-up (10).

The treatment decision takes into account different cri-

Correspondence: Oyku PEKER, oykupeker@mersin.edu.tr

[1]Mersin University, Faculty of Dentistry, Department of Pediatric Dentistry, Mersin, Türkiye

[2]Mustafa Kemal University, Faculty of Dentistry, Department of Dentomaxillofacial Surgery, Hatay, Türkiye

Received: 29.07.2024 / Accepted: 30.10.2024 / Published: 30.12.2024

teria, including cyst size, cyst location, removal of an unerupted tooth, and follow-up possibilities (2). In the treatment of lesions observed in childhood, it has been reported that marsupialization is an effective treatment method for the protection of erupting permanent teeth and surrounding tissues (11).

The aim of this article is to present the treatment of dentigerous cysts caused by infected primary teeth with marsupialization and its long-term prognosis.

Case Report

An eight-year-old young patient was referred to our department with a complaint of facial swelling in his lower jaw. An intraoral examination revealed a bone expansion in the region of the right mandibular primary first and second molars and primary molars with broken restorations. The patient's right vestibular mucosa showed painless swelling due to bone expansion. There were no lymph nodes palpable and no active discharge of pus. Radiographic examination revealed a large, circular, clearly circumscribed, unilocular radiolucent area starting from the right mandibular deciduous first molar and extending to the mesial aspect of the right mandibular permanent first molar (Figure 1). Three-dimensional Dental Volumetric Tomography images obtained from the patient showed that the lesion grew expansively and caused thinning of the cortical bone layer on the buccal side (Figure 2).

Figure 1: Pre-Operatif Panoramic Radiography

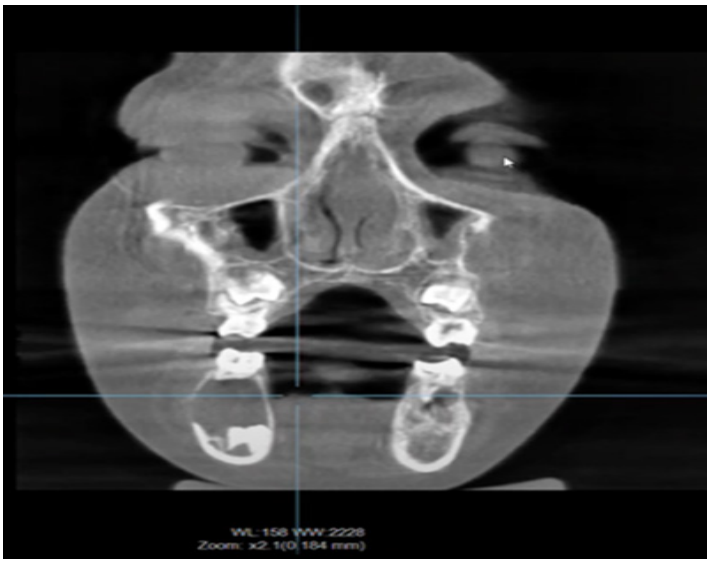

Figure 2: Pre-Operatif CBCT Coronal Section

The cystic lesion surrounded the impacted and displaced right permanent premolars (Figure 3). No signs of root resorption were observed in the neighboring teeth. The lesion, which was presumed to be a dentigerous cyst, was also associated with an improperly/incompletely treated and infected deciduous second molar in this area. Informed consent was obtained from the patient and his family regarding the surgical treatment. The primary right first and second molars were extracted, and the cyst was marsupialized. A tissue sample was also taken for the biopsy. A silicone tube was inserted into the extraction socket of the second primary molar to relieve the pressure (Figure 4).

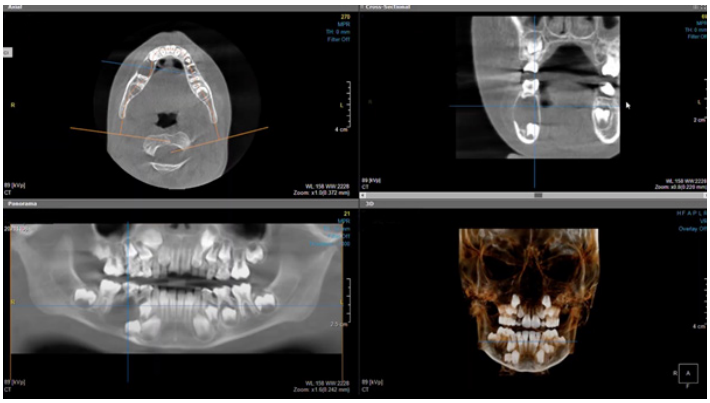

Figure 3: Pre-Operatif CBCT

Figure 4: Post-Operatif Panoramic Radiography

A histopathologic examination of the sample confirmed our initial diagnosis as a dentigerous cyst. The silicone tube was replaced weekly for one month postoperatively. The drain was fixed to the adjacent teeth with a composite wire so that it would not move. It was renewed every two weeks during the next five months post-operative period. Monthly control films were taken. The patient was advised to keep the relevant area clean and wash it regularly with saline. The radiograph taken during the first month's follow-up visit showed a decrease in the radiolucency at the cyst site and the impacted teeth straightening. After five months, the impacted teeth were in a vertical position, and new bone formation was evident at the former cyst site. The drain was removed at the six-month follow-up (Figure 5). The panoramic radiograph taken at the 36-month follow-up revealed the spontaneous eruption of the impacted first and second primary premolars with no radiolucency around the teeth (Figure 6). The vital response was observed in the vitalometer test performed on the related teeth. The patient is being followed up in terms of continued root development and

apex closure.

Figure 5: Post-Operatif 3th Month Panoramic Radiography

Figure 6: Post-Operatif 36th Month Panoramic Radiography

Follow-up appointments were scheduled to monitor the patient's dental health and ensure successful treatment outcomes. The asymptomatic PFs on both sides were observed and deemed clinically insignificant, requiring no immediate intervention.

Discussion

Cysts are pathological formations that may be filled with a liquid or semi-liquid material, lined with epithelium, and surrounded by a connective tissue capsule, expanding from the center to the periphery (12). Dentigerous cysts are the most common type of developmental odontogenic cysts. It is also stated that a dentigerous cyst can be caused by inflammation of the periapical tissues due to necrosis or a periapical infection originating from the primary tooth, which could stimulate the developing tooth germ follicle (13). Benn and Altini categorized dentigerous cysts as developmental and inflammatory cysts (14). Inflammatory dentigerous cysts could occur in immature permanent teeth as a result of inflammation from a non-vital primary tooth (14). Similarly, in our case, the patient's age and the clinical, radiographic, and histological findings suggest an inflammatory dentigerous cyst. In this case, painless buccal expansion was clear when the patient was referred to our clinic. The growth of odontogenic cysts is very slow, and asymmetries and deformations may be observed in adjacent tissues as a result of their growth. Although odontogenic cysts grow towards the vestibular, lingual, and palatinal sides, it has been reported that they often grow towards the vestibular side (15).

As in the treatment of most odontogenic cysts, dentigerous cysts are treated with surgical methods such as marsupialization, decompression, and enucleation (16). Marsupialization and decompression procedures have been reported to be effective treatments for large dentigerous cysts, especially in pediatric patients, to prevent damage to permanent tooth germs (8). Koca et al. reported in a study of 35 pediatric patients that all dentigerous cysts were successfully treated with marsupialization; no further treatment was needed for the eruption of permanent teeth, and bone regeneration was successful after five years of follow-up (11). In cases of dentigerous cysts in children, various appliances and methods can be used for marsupialization.

In the study by Koca et al., in which they evaluated 35 dentigerous cysts in 35 patients aged 8-13, it was reported that a custom acrylic obturator was used for marsupialization (11). In various studies, A space maintainer with an acrylic and wire extension was applied to keep the cystic cavity open after marsupialization, this appliance was followed up at 3-week intervals and removed after 6 months (17). In another study by Ryu et al., they placed a 16-gauge needle metal tube connected to the adjacent tooth in the extraction socket after marsupialization and extraction of primary teeth (18). In the study by Taysi et al. they use a silicone tube to the extraction socket to relieve the pressure (19).

In our study, we used a biocompatible silicone tube and renewed it every 2 weeks due to the cystic structure with a large defect and in order not to create resistance to the eruption of neighboring teeth and teeth to come.

Marsupialization consists of uniting the cyst lining to the oral mucosa. This method has fewer complications than enucleation regarding the preservation of important anatomical structures and developing tooth germs (20).

The size of dentigerous cysts is an important factor in the choice of treatment method. In their literature review, Hou et al. reported that marsupialization is the first choice for the treatment of large cysts regardless of the diagnosis. They also reported that the risk of recurrence after marsupialization was low, and no malignant transformation was detected in any of the cases (21).

It is a known fact that, although dentigerous cysts inhibit the eruption of the cyst-associated permanent teeth, maturation of the roots of these teeth continues (22). Miyawaki et al. reported that an impacted tooth might erupt faster if marsupialization is performed at a time when the tooth has the ability to erupt (23).

In the literature, it has been reported that radicular cysts can be seen together with dentigerous cysts, and thus, the lesions can become infected and cause symptoms such as pain and swelling (24).

It is mentioned that three different mechanisms may be effective in the development of inflammatory dentigerous cysts. The first one is that; intrafollicular developmental dentigerous cysts become infected due to periapical inflammation spreading from devital deciduous teeth; the second one is that the inflammatory exudate spreading from devital deciduous teeth causes separation of the reduced enamel epithelium from the enamel, and the third one is that extrafollicular dentigerous cysts may rarely form when radicular cysts formed in devital deciduous teeth merge with the underlying permanent tooth germ (25). After pulp treatments, dentigerous cysts may develop due to stimulation in the periradicular region, affecting the underlying permanent tooth germ

follicle. They are most commonly seen in relation to deciduous mandibular second molars because the distance between the permanent tooth germ follicle is the smallest, and the risk of caries is the highest (26). In children and adolescents, the formation and growth of cysts can occur more rapidly (27).

Cysts in children can cause bone expansion and resorption, delayed eruption, malposition of teeth, enamel defects, or damage to developing permanent tooth germs. Even if the position of the underlying permanent teeth is considered to be very unfavorable for eruption due to the effect of cysts, it is observed that in most cases, the teeth can erupt spontaneously after the causative cyst is removed (28).

In some cases, tooth eruption does not always occur spontaneously after decompression or marsupialization, especially when there is not enough space to allow eruption or no favorable axis is available (29).

Thus, orthodontic traction can be performed later. Combined orthodontic-surgical techniques may help promote cyst-related tooth eruption (30). In our case, the eruption of the related teeth was measured using a standardized radiographic method before treatment, and no space restriction was detected. Therefore, no eruption problem was experienced in the related teeth.

Conclusion

Although the development of odontogenic cysts in children is rare, their formation and progression can be much more rapid and aggressive than in adults. The treatment decision takes into account different criteria, including cyst size, cyst location, removal of an unerupted tooth, and follow-up possibilities. In the treatment of lesions observed in childhood, marsupialization has been reported to be an effective treatment method for the protection of erupting permanent teeth and surrounding tissues. In this case, the marsupialization protocol was applied and it was observed that the cyst shrank and disappeared over time and the impacted permanent teeth erupted.

Declarations

Author Contributions: *Conception/Design of Study- O.P., A.H.; Data Acquisition- O.P.; Data Analysis/Interpretation- O.P.; Drafting Manuscript- O.P., A.H.; Critical Revision of Manuscript- O.P., A.H.; Final Approval and Accountability- O.P., A.H.; Material and Technical Support- O.P., A.H.; Supervision- O.P.*

Conflict of Interest: *Authors declared no conflict of interest.*

Financial Disclosure: *Authors declared no financial support.*

REFERENCES

1. Özkurt, B.; Hazar Bodrumlu, E. Çocukluk Döneminde Çenelerde Sık Görülen Kistik Lezyonlar Common Cystic Lesions on The Jaws in Childhood. Aydın Dental. 2015, 8 (1), 43–56.

2. Rajae, E. G.; Karima, E. H. Dentigerous Cyst: Enucleation or Marsupialization? (a Case Report). Pan Afr. Med. J. 2021, 40, 149.

3. Jain, N.; Gaur, G.; Chaturvedy, V.; Verma, A. Dentigerous Cyst Associated with Impacted Maxillary Premolar: A Rare Site Occurrence and a Rare Coincidence. Int J Clin Pediatr Dent 2018, 11 (1), 50–52.

4. Cumulated Index Medicus; 1996.

5. AlKhudair, B.; AlKhatib, A.; AlAzzeh, G.; AlMomen, A. Bilateral Dentigerous Cysts and Ectopic Teeth in the Maxillary Sinuses: A Case Report and Literature Review. Int. J. Surg. Case Rep. 2019, 55, 117–120.

6. Khalifa, C.; Garma, M.; Mabrouk, R.; Slim, A.; Bouguezzi, A.; Selmi, J. Conservative Management of Dentigerous Cyst in Children: Report of Two Clinical Cases. Clin Case Rep 2023, 11 (4), e7051.

7. Rajendra Santosh, A. B. Odontogenic Cysts. Dent. Clin. North Am. 2020, 64 (1), 105–119.

8. Mello, F. W.; Melo, G.; Kammer, P. V.; Speight, P. M.; Rivero, E. R. C. Prevalence of Odontogenic Cysts and Tumors Associated with Impacted Third Molars: A Systematic Review and Meta-Analysis. J. Craniomaxillofac. Surg. 2019, 47 (6), 996–1002.

9. Demiriz, L.; Misir, A. F.; Gorur, D. I. Dentigerous Cyst in a Young Child. Eur. J. Dent. 2015, 9 (4), 599–602.

10. Aydinli, N.; Saruhan, N.; Dereci Ö.; Açikalin, F.; Koşar, Y.; Tekin, G. Odontojenik Kistlerin Cerrahi Tedavi Protokollerinin Değerlendirilmesi. OSMAN. J. OF MED. 2023. https://doi.org/10.20515/otd.1298831.

11. Koca, H.; Esin, A.; Aycan, K. Outcome of Dentigerous Cysts Treated with Marsupialization. J. Clin. Pediatr. Dent. 2009, 34 (2), 165–168.

12. Yıldırım, Ö.; Barış, E. Sağ Maksiller Sinüste Gelişim Gösteren Radiküler Kist: Vaka Raporu. ADO Klinik Bilimler Dergisi 2023, 12 (1), 119–123.

13. Bozdogan, E.; Cankaya, B.; Gencay, K.; Aktoren, O. Conservative Management of a Large Dentigerous Cyst in a 6-Year-Old Girl: A Case Report. J. Dent. Child. 2011, 78 (3), 163–167.

14. Benn, A.; Altini, M. Dentigerous Cysts of Inflammatory Origin. A Clinicopathologic Study. Oral Surg. Oral Med. Oral Pathol. Oral Radiol. Endod. 1996, 81 (2), 203–209.

15. Harris, M. Odontogenic Cyst Growth and Prostaglandin-Induced Bone Resorption. Ann. R. Coll. Surg. Engl. 1978, 60 (2), 85–91.

16. Cakarer, S.; Selvi, F.; Isler, S. C.; Keskin, C. Decompression, Enucleation, and Implant Placement in the Management of a Large Dentigerous Cyst. J. Craniofac. Surg. 2011, 22 (3), 922–924.

17. Kumar R, Singh RK, Pandey RK, Mohammad S, Ram H. Inflammatory dentigerous cyst in a ten-year-old child. Natl J Maxillofac Surg 2012;3:80-3.

18. Ryu, Jiyeon, Teo Jeon Shin, Hong-Keun Hyun, Young-Jae Kim, Jung-Wook Kim, Chong-Chul Kim, Ki-Taeg Jang and Sang-Hoon Lee. "Minimally Invasive Marsupialization for Treat-

ing Odontogenic Cysts: Case Reports." THE JOURNAL OF THE KOREAN ACADEMY OF PEDIATRIC DENTISTRY 44 (2017): 235-242

19. Özden, C., Tayşi, M., Çankaya, A. B., Yıldırım, S., et al. (2016). CONSERVATIVE APPROACH TO A LARGE DENTIGEROUS CYST IN AN 11 YEAR OLD PATIENT. Journal of Istanbul University Faculty of Dentistry, 50(3), 51-56.

20. Hupp, J. R. Contemporary Oral and Maxillofacial Surgery, 6e; Elsevier India, 2013.

21. Hou, R.; Zhou, H. Articles of Marsupialization and Decompression on Cystic Lesions of the Jaws: A Literature Review. Journal of Oral and Maxillofacial Surgery, Medicine, and Pathology 2013, 25 (4), 299–304.

22. Golden, A. L.; Foote, J.; Lally, E.; Beideman, R.; Tatoian, J. Dentigerous Cyst of the Maxillary Sinus Causing Elevation of the Orbital Floor. Report of a Case. Oral Surg. Oral Med. Oral Pathol. 1981, 52 (2), 133–136.

23. Miyawaki, S.; Hyomoto, M.; Tsubouchi, J.; Kirita, T.; Sugimura, M. Eruption Speed and Rate of Angulation Change of a Cyst-Associated Mandibular Second Premolar after Marsupialization of a Dentigerous Cyst. Am. J. Orthod. Dentofacial Orthop. 1999, 116 (5), 578–584.

24. Demirtaş, N.; Mihmanli, A.; Bayer, S.; Özalp, Ş. KARIŞIK DİŞLENME DÖNEMİNDE GÖRÜLEN DENTİGERÖZ KİSTLER: ÜÇ OLGU SUNUMU. Ankara Univ. Hekim. Fak. Derg. 2015, 25 (1). https://doi.org/10.17567/dfd.00588.

25. Narang, R. S.; Manchanda, A. S.; Arora, P.; Randhawa, K. Dentigerous Cyst of Inflammatory Origin-a Diagnostic Dilemma. Ann. Diagn. Pathol. 2012, 16 (2), 119–123.

26. Asián-González, E.; Pereira-Maestre, M.; Conde-Fernández, D.; Vilchez, I.; Segura-Egea, J. J.; Gutiérrez-Pérez, J. L. Dentigerous Cyst Associated with a Formocresol Pulpotomized Deciduous Molar. J. Endod. 2007, 33 (4), 488–492.

27. Yilmaz, B.; Yalcin, E. D. Retrospective Evaluation of Cone-Beam Computed Tomography Findings of Odontogenic Cysts in Children and Adolescents. Niger. J. Clin. Pract. 2021, 24 (1), 93–99.

28. Talukdar, M.; Kumar, A.; Goenka, S.; Mahajani, M.; Ambhore, M. P.; Tattu, V. D. Management of Radicular Cyst in Deciduous Molar: A Case Report. J Family Med Prim Care 2020, 9 (2), 1222–1225.

29. Nahajowski, M.; Hnitecka, S.; Antoszewska-Smith, J.; Rumin, K.; Dubowik, M.; Sarul, M. Factors Influencing an Eruption of Teeth Associated with a Dentigerous Cyst: A Systematic Review and Meta-Analysis. BMC Oral Health 2021, 21 (1), 180.

30. Celebi, N.; Canakci, G. Y.; Sakin, C.; Kurt, G.; Alkan, A. Combined Orthodontic and Surgical Therapy for a Deeply Impacted Third Molar Related with a Dentigerous Cyst. J. Maxillofac. Oral Surg. 2015, 14 (Suppl 1), 93–95.