



Surgical Management of Dentigerous Cyst in Pediatric Patients: Review of the Literature and Presentation of Two Clinical Cases

Fernanda Marentes Corrales¹

Alvaro Villegas Cisneros²

Alejandro Alonso Moctezuma³

¹Dentistry undergraduate Student of Universidad Latinoamericana, México

² Professor, Oral and Maxillofacial Surgeon, UNAM- ULA, Mexico

³Coordinator of the specialty in Oral and Maxillofacial Surgery, DePEI UNAM, Mexico

Abstract

Dentigerous Cyst is the second most common odontogenic cyst after root cyst. It is commonly associated with the crown of a retained or impacted dental organ, it is observed in male patients between 10 and 30 years of age.

Two clinical cases are presented. The first is a 10-year-old male patient with a history of epilepsy and crisis of absence of 5 years of evolution, referred to the oral surgery clinic of the Universidad Latinoamericana presenting an asymptomatic increase in volume in the right mandibular body in the area Second and third lower molars with radiographic appearance of a well-defined unilocular radiolucent area. Clinical, radiographic and histopathological studies were carried out in order to obtain a diagnosis and evaluate surgical treatment, obtaining excellent results. Finally, second case of a retained canine in a 9-year-old patient is presented, in which a lesion that embraces the anterior nasoalveolar palatine region is discovered by routine imaging study, surgical treatment and application of anterior iliac bone autologous graft were evaluated in the defect.

Keywords

Cyst; Dentigerous; Graft, Bone defect; Nonvascularized iliac crest

Introduction

Dentigerous Cysts, also called follicular cysts, are developmental odontogenic cysts of epithelial origin commonly associated with impacted, non-erupted permanent teeth, supernumerary teeth, odontomas and, rarely, primary teeth [1,2], impacted mandibular third molars, followed in frequency in relation to maxillary retained canines [3]; they appear within the first three decades of life related to the moment of development of the dental organs that tend to be involved in this pathology [2]. They are presented in a 1.6:1 ratio with predilection to the male sex [4].

The presence of this pathological entity is explained by the accumulation of fluid between the reduced enamel epithelium (REE) and dental enamel. The pressure exerted by an erupting tooth on the impacted follicle obstructs the venous flow. This leads to a rapid transudation of the serum through the capillary walls. Increased hydrostatic pressure of the pooling fluid leads to separation of the crown follicle with or without REE. An intrafollicular spread of periapical inflammation of a primary tooth can also lead to the development of the dentigerous cyst [2-4].

Generally it remains asymptomatic, but it can produce inflammation and mandibular cortical expansion, the resorption of teeth adjacent to injury, as well as sensorineural alterations are not commonly found associated with this pathology [3].

These cysts, when enlarged, sometimes expand the cortical plates. Bilateral cases of dentigerous cysts are rare and generally associated with syndromes such as cleidocranial dysplasia and mucopolysaccharidosis.

Etiology

There are several theories that try to explain the origin of this pathology, Malassez states that the Dentigerous Cyst originates after the crown of the tooth has completely formed, through the accumulation of fluid between the reduced enamel epithelium and the crown of the underlying tooth already formed [4].

Gillette and Weihmann in 1958 and Bloch-Jorgensen in 1928, talk about the extrafollicular origin of the Dentigerous Cyst, which originates from periapical cysts in primary teeth that grow and encompass the germ of the permanent tooth. Thoma suggests that some dentigerous cysts may begin their formation by degeneration of the stellar reticulum during enamel apposition.

Article Information

DOI: 10.31021/jddm.20203167

Article Type: Research Article

Journal Type: Open Access

Volume: 3 **Issue:** 6

Manuscript ID: JDDM-3-167

Publisher: Boffin Access Limited

Received Date: 18 May 2020

Accepted Date: 26 May 2020

Published Date: 28 May 2020

*Corresponding author:

Dr. Alvaro Villegas Cisneros

Oral and Maxillofacial Surgery

ISSSTE- UNAM, Mexico

E-mail: arthanyz@hotmail.com

Citation: Corrales FM, Cisneros AV, Moctezuma AA. Surgical Management of Dentigerous Cyst in Pediatric Patients: Review of the Literature and Presentation of Two Clinical Cases. J Dents Dent Med. 2020 May;3(6):167.

Copyright: © 2020 Corrales FM, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 international License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Epidemiology

It commonly occurs in white-skinned male patients in the second and third decades of life, 70 to 75% in the mandible [2]. In order of frequency, it appears in mandibular third molars, upper canines, upper third molars, second, lower premolars or may be associated with supernumerary teeth and odontomas [1].

Clinical Features

The symptoms of this pathology are few. During the development of the dentigerous cyst, we can consider a subclinical period in which no symptoms are seen and its presence can only be detected through an x-ray. During its growth, cortical expansion occurs with deformation at the cyst birth site (vestibular, palate, among others), producing facial asymmetry, tooth loss due to intense root resorption of adjacent teeth, and after a longer period, the Cortical ends up thinning and can later become infected and present the signs and symptoms of inflammation until fistulized, leaking a purulent fluid, or it can become an aggressive lesion such as ameloblastoma or squamous cell carcinoma. Bilateral cases of dentigerous cysts are rare and generally associated with syndromes such as cleidocranial dysplasia and mucopolysaccharidosis.

Radiographic Characteristics

The gold standard of choice in imaging is computed tomography, although it is routinely discovered on radiographic examination of the maxilla that is affected by a dentigerous cyst which will reveal a well-defined radiolucent lesion with cortical around the crown of an unerupted tooth [1,5,6]. Small lesions smaller than 2 cm in diameter are unilocular. However, if they are not detected early, the lesion can grow and become a large, multilocular dentigerous cyst, making confusion with other more aggressive lesions, such as ameloblastoma, possible. To establish the differential diagnosis, the radiolucent space surrounding the crown of the tooth must be at least 3-4 mm in diameter, since odontogenic and non-odontogenic cysts may have radiographic characteristics identical to those of the dentigerous cyst [1], which is why it is important to not make the diagnosis of a dentigerous cyst only on the radiographic evidence since the keratinized cystic odontogenic tumor, follicular and unilocular ameloblastomas involve adjacent non-erupted teeth and are at risk of being misdiagnosed as dentigerous cysts [2]. Radiographically, the dentigerous cyst in relation to the The crown shows 3 variations as seen in Figure 1 [2]. This pathology can displace the involved tooth by a considerable distance, causing root resorption of adjacent erupted teeth [2].

Histopathological Characteristics

It is usually made up of a connective tissue wall with 2 or 3 layers of flat or cubic epithelial cells that line the lumen of the cyst. The lumen content of the cyst is usually a thin, yellowish liquid, sometimes stained with blood. Gorlin describes the presence of mucus-secreting cells present in the stratified squamous epithelium lining, the respiratory epithelial lining, the sebaceous cells in the connective tissue wall, and the lymphoid follicles with germinal centers. The connective tissue wall is made up of fibrous tissue or a non-dense collagenized myxomatous and has therefore been misdiagnosed as an odontogenic fibroid or myxoma. Generally, it does not present keratin, but some may present this characteristic, which is often a sign of transformation to other more aggressive lesions, such as keratinized cystic odontogenic tumor. Others may show proliferation of epithelial debris in the lumen of the cyst indicating that a benign but aggressive neoplasm, such as ameloblastoma, has developed [6-11].

Diagnostic Tests

In order to establish an accurate diagnosis of this pathology, it is necessary to take into account different characteristics that are established from clinical, radiographic and histopathological

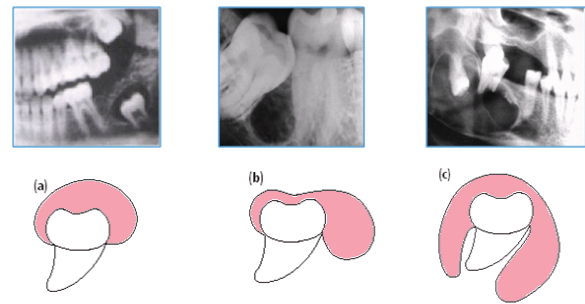


Figure 1: a) Central: the cyst surrounds the crown of the tooth, the crown projects into the cystic cavity. b) Lateral: the cyst grows laterally along the root and a part of the cyst surrounds the crown. c) Circumferential: the cyst surrounds the crown and extends for a certain distance along the root, and a significant part of it appears to be within the cyst.



Figure 2: Facial asymmetry is observed due to increased volume

studies. In the clinical study, data is obtained through observation, symptomatology of the patient and epidemiological parameters of the pathology. The complete radiographic study is carried out to detect the possible existence of any pathology that is not clinically observed, for this the dentist uses a series of radiographic techniques that provide a complete view of the jaws, the most widely used at present is orthopantomography and Computed Tomography they are studies that provide us with exact details in the three dimensions of the lesions without distortion or overlap. Regarding the histopathological aspect, different studies are carried out depending on the clinical and radiographic characteristics of the lesion, an incisional biopsy during the "marsupialization" in which, during the surgical procedure, an adequate window is opened in the external wall of the cyst through which its content is obtained, leaving the membrane remaining, which will allow bone formation around the cyst and, through decompression, achieve its decrease; an excisional biopsy also called enucleation of the cyst or cystectomy, that means the complete removal of the lesion [12].

Treatment

The treatment for this pathology is variable and depends on the size and extent of the lesion. Small unilocular lesions are removed through osteotomy, extraction of the impacted tooth, and removal of the lesion. Larger injuries may require more extensive surgery. There are two surgical procedures that are used to remove these cysts, marsupialization and enucleation [3].



Figure 3: Volume increase is seen in the retromolar region



Figure 4: Circumscribed radiolucent lesion associated with the second molar and related to the third molar

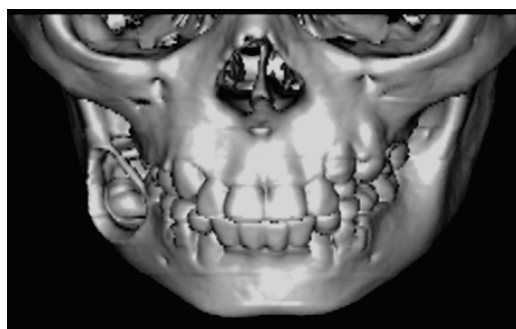
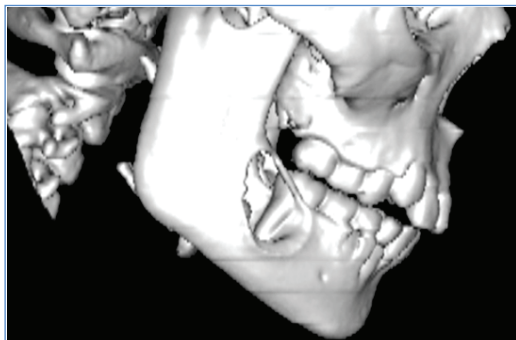


Figure 5: CT 3D reconstruction

Marsupialization is a procedure indicated in those cases where a large dentigerous cyst occurs, which involves serious bone loss and dangerously thin the bone; It is widely used, especially in children, in cases where the eruption of the impacted tooth can be guided to bring it to a normal position [4,10]. The main disadvantage of marsupialization is that the pathological tissue is left in situ, without complete histological examination; Although the tissue taken from the window can be presented for histological examination, there

is the possibility of a more aggressive injury to the residual tissue [10]. Regarding enucleation, it is indicated when there is no risk of damaging anatomical structures, such as apices. of vital teeth, maxillary sinus or inferior alveolar nerve [10] and whenever possible, this procedure is preferred, because there may be ameloblastic or carcinomatous transformations associated with the wall of the dentigerous cyst, which makes it necessary to enucleate the cyst and submit it to a histopathological study of this way, a total excision of the pathological tissue is made, reducing the chances of recurrence and unfavorable transformations. There is a different modality which includes keeping the tooth permanent during surgery, where in the postoperative period orthodontic appliances will be required to help the eruption process [4].

Clinical Case 1

10-year-old male patient with a history of epilepsy and controlled crisis of absence of 5 years of evolution, was referred to the Oral Surgery clinic of the Universidad Latinoamericana (ULA), North campus of Mexico City, for presenting an increase in volume in the right mandibular body in the second and third lower molar area, mother refers the patient asymptomatic without locating evolution time (Figure 2).

In the intraoral examination, a slight expansion of the right vestibular bone cortex was observed, involving the area of dental organs 47 and 48, asymptomatic on palpation (Figure 3). Orthopantomography and computed tomography are indicated. The orthopantomography shows a well-defined unilocular radiolucent area of approximately 3x2 cm in diameter in the mentioned area; Likewise, the right lower second molar is retained in a vertical position on the periphery of the lesion compatible with odontogenic cyst (Figure 4,5).

Under general anesthesia with nasotracheal intubation, asepsis and antisepsis are performed, an intraoral circumvestibular incision is made on the right side of the deciduous second molar to the anterior edge of the mandibular branch, subperiosteal dissection is performed, and edges of the dentigerous cyst are located, enucleation with extraction of the second The related mandibular molar and the germ of the mandibular third molar are verified by surgical bed, corroborating hemostasis and repositioning the flap with 3-0 polyglactine suture. No complications during and after the surgical act (Figure 6,7).

The lesion was sent to a pathological study where the diagnosis was correlated with clinical and radiographic findings, which revealed a mandibular dentigerous cyst associated with the impacted second molar. Postoperative control has been carried out for 1 year with adequate healing of both bone and adjacent soft tissue, with no evidence of recurrence of the disease (Figures 8 and 9).

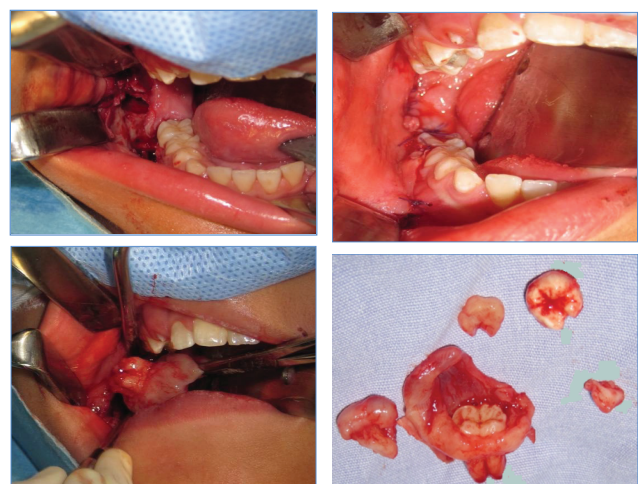


Figure 6: Surgical Procedures



Figure 7: Front photograph. Facial contour symmetry is observed



Figure 8: Wound healing

Clinical Case 2

A 9-year-old male patient is presented to the oral surgery clinic of the ULA north campus referred by pediatric dentistry when finding a cystic lesion in the routine imaging study. On examination of the premaxilla region, a firm increase in volume with cortical expansion was palpable, there was no associated pain. It was not mobile, not pulsatile, with no signs of discharge. Dental examination reveals a central incisor of the first dentition associated with a permanent central incisor without eruption. The patient's medical history was not significant and did not show associated syndromes.

Computed tomography shows well-defined radiolucency data of 3x3 cm in the premaxilla region involving the retained left central incisor; horizontally impacted with palatal nasolevelous bone involvement (Figure 10).

It was decided to perform enucleation of the cyst, in addition to taking and applying a non-vascularized autologous graft of the anterior iliac crest. Under general anesthesia, by means of a circumvestibular incision (Figure 11), the mucoperiosteal flap was raised and carefully dissected with blunt forceps in order to be able to carry out the enucleation with excision of the involved dental organ (Figure 12). Then, the bone surrounding the impacted tooth was osteotomized with a burr and abundant saline irrigation (Figure 13 and 14).

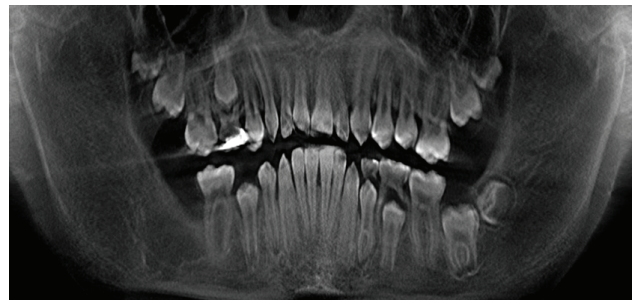


Figure 9: Post-operative control orthopantomography is presented one year after the surgical intervention, where adequate bone tissue formation is observed in the cavity

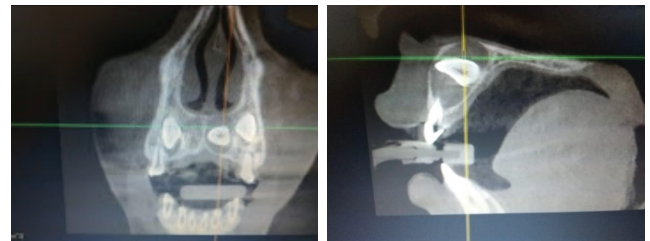


Figure 10: The dimensions of the cystic lesion associated with the upper central incisor are observed in the coronal and sagittal sections.

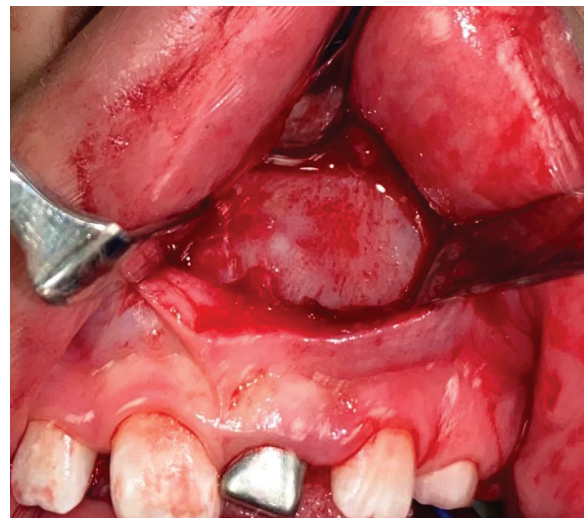


Figure 11: approach that exposes cortical expansion secondary to cystic lesion

Another surgical team was in charge of carrying out the graft. The patient was previously placed in the supine position with a small support of fields under the gluteal region to lift the anterior iliac crest from the operating table. The operating field was prepared with povidone-iodine and covered to expose the iliac crest. A gentle upward pull is made using the edge of the ulnar face of the hand placed in the iliac fossa to lift the skin over the iliac crest. A marker is used to mark the skin over the iliac crest from the anterior superior iliac spine to the posterior superior iliac spine while maintaining the pull. A note is then made of the mark that should now be just below the prominence of the iliac crest when the gentle tug of the skin is released (Figure 15). This will cause the posterior scar to be below the prominence of the iliac crest and below the level of the belt for pants and skirts in male and female patients, respectively, thus avoiding future irritation of the scar by clothing. An incision is made over the mark and deepened to the deep fascia, which is incised. The



Figure 12: Approach that exposes cortical expansion secondary to cystic lesion



Figure 13: Residual bone defect after enucleation

wide musculoskeletal junction of the muscles of the abdominal wall to the iliac crest is defined and any fatty covering must be removed to expose the junction of these fasciae. A small-blade osteotome (1-cm-wide blade) is used to elevate the musculoskeletal junction of the muscles of the abdominal wall to the iliac crest approximately 2 mm in bone thickness. The length of the graft will determine the extent of the incision.

The raised muscle with attached bone is lifted medially to expose the cut surface of the iliac bone, then the periosteal elevator is used to clear the soft tissue attached to the ilium about 2 cm from the cut surface on the medial and lateral surfaces. An abdominal pad is placed along the exposed medial surface of the iliac wing, while the 1 cm thick iliac bone of the cut surface is taken using the osteotome with a back pressure applied to the iliac bone by the assistant from the medial aspect ilium. Care must be taken to ensure that the osteotome does not traverse the entire thickness of the ilium in one fell swoop, it is advisable that the entire length of the graft is marked by the osteotome that is half the depth of the ilium. going back to complete the osteotomy. The abdominal pad will prevent the osteotome from entering the contents of the iliac fossa. The anterior extent of the osteotomy should be approximately 1 cm from the anterior superior iliac spine to avoid damage to the Sartorius muscle junction. The osteotomy must be completed before lifting the graft to avoid breaking it. A "trap door" dislocation of the bone segments

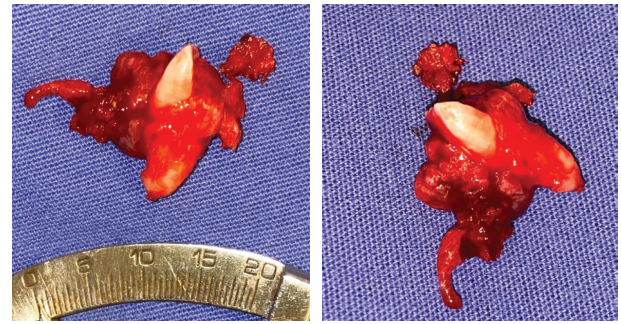


Figure 14: Cystic lesion specimen associated with the dental organ

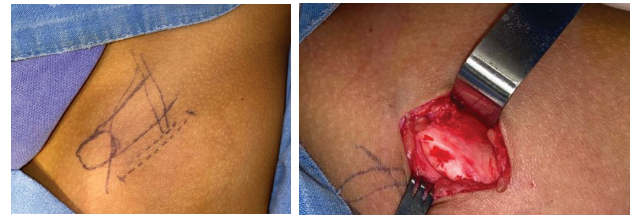


Figure 15: Marking and approach that exposes the anterior crest of the iliac bone where the graft was obtained



Figure 16: Application of the autologous bone graft



Figure 17: Closure of the surgical wound

is performed to collect medullary bone from inside the iliac crest, the bone obtained must be enough to close the bone defect that left the cyst enucleation. In general, the union of the soft tissues to the graft will be found later, this should be incised with a scalpel. Hemostasis must be achieved and the drain must be inserted. The muscle junction in the thin layer of bone approaches the iliac bone by suturing the fibrous muscle junction to the deep fascia that will bring the muscle junction closer to the iliac bone. The skin is closed, 10 ml of 0.5% bupivacaine diluted with 10 ml of water for injection is injected around the incision wound to reduce postoperative pain. The dressing is applied to the wound.

Once an approximate 6 cc of medullary bone was obtained, the bone defect was grafted (Figure 16) and repositioning of the flap was carried out, the entire surgical area was irrigated and closed with 3-0 polyglactine sutures (Figure 17). The healing was uneventful.

Discussion

Malignant transformations are one of the important points in relation to the dentigerous cyst, since an ameloblastoma, squamous cell carcinoma, or mucoepidermoid carcinoma can develop from the cyst's lining epithelium. There are numerous reported cases related to ameloblastoma. In the study carried out by Holmlund et al in 1991, it is concluded that the ameloblastic transformation of the epithelial edges of the dentigerous cyst, whether primordial, radicular or residual, is the main pathogenesis of ameloblastoma, not only unicystic but also in solid, plexiform and follicular. Another study carried out by Shear in 1994 reveals that the dentigerous cyst shares the expression of cytokeratin 18 with some cases of ameloblastoma, which is a sign of oncofetal transformation for these lesions.

In relation to squamous cell carcinoma, there is a study carried out by Eversole et al in 1975 in which a review of 30 cases is reported, reporting 75% associated with intraosseous cysts, 22% with dentigerous cyst, 19% with apical cysts, 55 % with residual cysts and 4% with lateral periodontal cysts.

As for mucoepidermoid carcinoma, there are few associated with dentigerous cysts that affect the impacted lower third molars.

Another controversial point to take into account is that, as previously mentioned, there are 2 treatment possibilities. In relation to marsupialization, Takagi and Koyama (1998) report a case of a dentigerous cyst associated with the crown of a second upper premolar impacted in the maxillary sinus in a 6-year-old girl in which this procedure is carried out using the tooth. to the desired position, indicating as advantages that it is less invasive, reduces the risk of damage to the paranasal sinuses, avoids marked bone defects such as paresthesia, in addition to promoting the tooth associated with the dentigerous cyst to the eruption, mentions as the main disadvantage the possible recurrence of injury due to leaving pathological tissue.

Regarding enucleation, a clinical case by Goss in 1983 was reported, referring to a dentigerous cyst associated with a retained lower left canine in a 55-year-old male patient in whom enucleation was performed as treatment of the lesion. in order to remove all pathological tissue at once. Postoperative control is reported one year after the defect had disappeared, however, it is important to mention that each case must be evaluated in isolation [12].

Conclusions

An early recognition of the pathology will prevent it from increasing in size and increasing the incidence of unfavorable transformations.

It is essential that all tissues from the dentigerous cyst undergo a histopathological examination, because changes in the epithelial cell level may occur in some areas of the cyst wall, which is important to recognize for evaluation.

Preventive removal of impacted third molars is recommended, since dental cysts associated with these dental organs are frequent, as well as taking X-rays in case of suspicion of a retained tooth [12]. The maxillofacial surgeon should identify the sequelae of the treatment and propose strategies surgical reconstruction of the bone defect. Therefore, early treatment strategies will avoid or decrease the morbidity associated with it.

References

1. Brad W. Neville et al. Oral And Maxillofacial Pathology. Second Edition 2002:590-593.
2. Shear M, Speight SP. Cysts of The Oral and Maxillofacial Regions. Blackwell Mundsgaard. Fourth Edition 2007;59-75
3. Martínez-Pérez D, Varela-Morales M. Conservative Treatment of Dentigerous Cyst In Children: A Report of 4 Cases. 2001 Mar;59(3):331-333.
4. Regezi, Sciubba: Quistes De La Boca, En Regezi Y Sciubba: Patología Bucal 3rd Ed. México, McGraw- Hill Interamericana. 1999.
5. Killey H, Kay L, Seward G. Lesiones Quísticas Benignas De Los Maxilares, Su Diagnóstico Y Tratamiento. Buenos Aires, Argentina. Editorial Mundi. 1979.
6. Shafer W, Hine M, Levy B. Tratado De Patología Bucal. 2da. Edición. Mexico. Editorial Interamericana. 1986.
7. Fonseca, Marciani, Turvey. Oral And Maxillofacial Surgery 2nd. Edition Volume II.
8. Marx RE, Stern D. Oral and Maxillofacial Pathology A Rationale For Diagnosis and Treatment.
9. Clauser C; Zuccati G; Barone R. Simplified Surgical Orthodontic Treatment of A Dentigerous Cyst. J Clin Orthod. 1994 Feb;28(2):103-106.
10. Ertas U, Yavuz SM. Interesting Eruption Of 4 Teeth Associated With A Large Dentigerous Cyst In Mandible By Only Marsupialization. J Oral Maxillofac Surg. 2003 Jun;61(6):728-730.
11. Fujji R, Kawadami 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 Feb;66(2):272-276.
12. Dentigero Q. Revision bibliografica y presentacion de un caso. Tami-Maury I, et al. 38;2:2000.