CONCLUSIONES

Acerca de la descompresión seguida de la marsupialización, se puede decir que la técnica no consiste sólo en un cambio físico durante la evolución del queratoquiste odontogénico; también modifica su comportamiento biológico.[24] En el presente caso, el análisis histológico de la biopsia final mostró cambios metaplásicos evidentes del epitelio de revestimiento, lo cual concuerda con los hallazgos de otros autores.[21,24] Es importante considerar que el tratamiento empleado deberá depender de las características de cada paciente y del propio quiste, entre ellos los hallazgos histopatológicos del mismo, su extensión, la localización y las infecciones asociadas a la lesión.[21,20]

La librería Cochrane *(Cochrane Database Systematic Review)* en 2010 evaluó las estrategias para el tratamiento del queratoquiste, concluyendo que no existen ensayos clínicos controlados aleatorizados que permitan evaluar la efectividad de cada uno de los tratamientos existentes. Por lo anterior, se recomienda que el personal clínico tome en cuenta las publicaciones de series retrospectivas y su propia experiencia para decidir el mejor plan de tratamiento para cada caso.[11] Con base en la literatura revisada sobre el KC, los autores concluimos que, por su alta tasa de recurrencia, la simple enucleación representa un riesgo innecesario para el paciente. Es recomendable que se realice una biopsia en todas las lesiones quísticas de la cavidad bucal. En los casos en los que no sea posible realizar una biopsia, y se sospeche de un posible KC, se recomienda utilizar tratamientos adyuvantes como nitrógeno líquido o solución de Carnoy para eliminar restos de epitelio quístico y prevenir futuras recurrencias.

Clinical case

Treatment with decompression of an odontogenic keratocyst

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ABSTRACT

Introduction: The treatment of the odontogenic keratocyst (OKC), formerly known as keratocystic odontogenic tumor, remains controversial. The KC is an odontogenic cystic lesion that probably originates from the primitive dental lamina, commonly located in the posterior mandible, and could be what used to be known as primordial cyst. The KC is a benign lesion with an aggressive local biological behavior. A wide range of techniques has been proposed for the treatment of KC, including, enucleation, marsupialization, resection, and a combination of different methods. However, resection of the KC should be regarded as the last treatment option. **Purpose:** To present a case report of a 36-year-old female patient with a large lesion in the left inferior mandible, accompanied by chronic inflammation. **Material and methods:** The lesion was diagnosed as KC with a chronic inflammatory process. The treatment was marsupialization with decompression, followed by irrigation with 0.12% chlorhexidine. **Results:** The lesion reduced in size and was removed with secondary enucleation and peripheral ostectomy. Once the lesion had reduced by about 80% from its original size, and no signs of inflammation were present, an excisional biopsy was performed. The final histological specimen showed an OKC with squamous metaplasia. **Discussion:** In the present case, conservative treatment was successful. However, long-term follow-up is recommended for this type of lesion. The association with nevoid basal cell carcinoma syndrome should be considered in patients with extended or multiple lesions. **Conclusions:** The initial approach toward odontogenic lesions with local but aggressive behavior could have significant repercussions in the rehabilitation and the quality of life of the affected patients. Therefore, an adequate treatment plan should include the evaluation of a multidisciplinary team for each case.

Keywords: Decompression; odontogenic keratocyst; keratocystic odontogenic tumor; marsupialization, metaplasia.

INTRODUCTION

The odontogenic keratocyst (OKC) is often described as an entity with specific clinical and histological features, with a high recurrence rate when treated with enucleation alone.[1,2] The lesion is frequently located in the posterior area of the mandibular bone.[3,4] The aggressive local behavior of the lesions has been well documented.[3] The KC is a cystic lesion probably derived from the dental lamina, and it probably represent the lesions previously known as a primordial cyst.[5]

The term KC was first introduced by Philipsen in 1953, in an article originally written in Danish, and with an English abstract.[5-7] The lesion attracted interest due to its histological features, and was later recognized as an individual entity between 1970 and 1971. Immediately after that, according to Pogrel,[5] Dr. Browne described its clinical and histological characteristics. Finally, in 1963, Pingborg and Hanse suggested histological guidelines that described the essential characteristics of the lesion.[4]

The histological image of the odontogenic KC includes a squamous parakeratinazed epithelium, and

a well-defined basal lamina, often corrugated. The cells of the basal lamina are distinctively characteristic of this particular entity, with a polarized arrangement, basilar nuclear palisading and the production of parakeratin, surrounded by dense connective tissue. The cyst wall has a uniform width and is thin, between six and ten cells; this cystic wall could be enlarged due to a chronic inflammatory process.[8-11]

Extensive literature has been published regarding the KC; however, the data regarding its prevalence have produced contradicting results, and are not consistent, revealing a lack of concensus among surgeons. For example, there are few studies that used the classification of the World Heath Organization (WHO) for the diagnosis of the KC, also, it is common that reports before 1992 include the orthokeratinized variant in the diagnosis of KC.[4]

Mello et al.[12] reported a prevalence of 0.5% for the KC, in their recent meta-analysis, which includes nine publications, and consisted of 49,846 cyst and tumors associated with impacted third molars.

The OKC has a wide range of recurrence rates, varing from 0% up to 62%, and an average rate of recurrence of 30.8%.[13-18] Pogrel suggested that the recurrence rate increased with the follow-up period, and concluded that the exact recurrence rate of OKC can only be established after 20 years of follow-up.[5]

The discrepancy related to the recurrence rates could reflect the differences between sporadic OKC and the OKC associated with the nevoid basal-cell carcinoma syndrome (NBCCS).[18] Patients associated with the NBCCS present multiple skeletal abnormalities, such as rib and vertebrae anomalies, intracranial calcification, and multiple OKCs in the mandible and in the maxilla.[4,18] In addition, it has been reported that between 60 and 85% of the patients that suffer from NBCCS have a mutation in the tumor suppressor gene PTCH, therefore they are likely to develop more than one OKC in their lifetime.[19]

After six decades, the appropriate treatment for OKC remains controversial.[5] The purpose of the present report is to present a case of a 36-year-old female patient, with a large OKC associated with a chronic inflammatory process in the angular area of the left mandibular bone. The lesion was treated with marsupialization and decompression. A review of the literature regarding the treatment options for the OKC is also included.

MATERIAL AND METHODS

Case report: a 36-year-old female patient attended the Oral Medicine Clinic, at the Division of Postgraduate Studies and Research of the Faculty of Dentistry, at the National Autonomous University of Mexico, with a slight swelling in the posterior and inferior zone of the left mandible, with an evolution of between 8 months and 1 year. The patient reported pain in the zone, without loss of sensitivity. The intraoral examination revealed that soft tissues were normal in appearance, and the absence of the #38, there was swelling in the left retromolar zone, with an increased volume. The swelling was hard in consistency, and painful to palpation. The patient mentioned the extraction of the third molar 10 years ago. There was no systemic conditions or backgrounds of importance for the lesion of the patient *(Figure 1 A-C)*.

The radiographical examination revealed a radiolucid multilocular area, from the distal body of the second molar to the mandibular angle, approximately 6 × 4 cm, with well-defined and sclerotic borders, a tooth fragment, probably of the 38-dental organ was also observed.

The CT scan revealed a hypodense area in the mandibular bone, with expansion and thinning of the lingual and vestibular cortical *(Figure 1 D and E)*. For the treatment plan, it was decided to perform an incisional biopsy with a presumptive diagnostic of OKC vs ameloblastoma.

The histopathological examination showed a cystic cavity of stratified epithelial lining, with an underlining basal cell layer composed of palisaded and hyperchromatic cuboidal and columnar epithelial cells, areas of acanthosis, leucocytic exocytosis and areas of hyperplasia. However, the extensive inflammatory infiltrate resulted in the loss of the typical histological image of the OKC. The capsule was formed of dense connective, well vascularized, and with the presence of a chronic and severe inflammatory infiltrate, as well as the presence of leukocytes and plasma cells. In addition, the presence of dystrophic calcifications, cement-like areas and osteoid matrix could be observed *(Figure 2 A and B)*.

Surgical procedure: the treatment consisted of decompression of the cystic lesion, followed by marsupialization, and enucleation with controlled osteotomy. Briefly, under local anesthesia an incision over the border of the mandibular ramus was performed, and this was extended to the second molar. Then the fragments of the 38-dental organ were removed. Subsequently, a perforation of the vestibular cortical bone was found and from this area access to the lumen of the cyst was created. To achieve this, a latex Penrose tube was fixed with a suture to the healthy adjacent tooth and buccal mucosa, and the marsupialization of the cyst was

initiated *(Figure 2 C and D)*. Finally, the cavity was washed with physiological buffered solution.

After the surgical procedure was concluded, the patient was instructed to irrigate and permeabilize the tube with 0.12% chlorhexidine solution daily, two times per day. The patient returned every month for a radiological follow-up, until the lesion increased in radiopacity. After 5 months, the radiological examination showed a decrease in the size of the lesion, with a radiolucid area of approximately 1 × 1 cm in diameter *(Figure 2 E-G)*, which was equivalent to an 80% reduction from the lesion's original size. Subsequently, an excisional biopsy of the lesion was performed, accompanied with controlled osteotomy.

RESULTS

Figure 3 A and B shows the clinical and the radiographic presentation of the lesion after the second surgery. There is no evidence of recurrence after 28 months, a long-term follow-up had been programmed. The patient did not present microcephalia – however, due to her age, and to the size of the lesion, an examination searching for skeletal anomalies in the skull, and pitting in the palms of the hands or on the feet was conducted. There were no symptoms associated with NBCCS.

The final histological examination of the lesion showed a fragment of soft tissue composed of epithelium with squamous metaplasia, surrounded by a capsule of dense connective tissue, well vascularized and with moderate inflammatory infiltrate of mainly leukocytes. Also, at the adjacent connective tissue there was cement-like mineralized areas, muscular tissue, and glandular acinus of mucoserous type. Finally, the diagnosis of odontogenic keratocyst with squamous metaplasia was made *(Figure 3C)*.

DISCUSSION

In the most recent WHO Classification of Head and Neck Tumors, the name keratocystic odontogenic tumor has been changed to OKC. The terminology for OKC is a current subject of debate and confusion; also, the term «OKC» unequivocally decreased alertness regarding the local aggressive behavior of the lesion.[20] Furthermore, the treatment of OKC remains controversial due to its clinical characteristics and high rate of recurrence.[5,21] Among the treatment modalities, the most radical is the complete resection with wide surgical margins.[22,23]

In the present case, and during the evaluation of the histological slides, a loss of the typical OKC architecture was observed in most of the tissue examined, due to the inflammatory process. In the case of an odontogenic lesion with severe inflammation, it is important to examine all tissue areas to reach an accurate diagnosis. For example, the histopathological features of the OKC are often confused with those of the ameloblastoma, or with squamous cell carcinoma. The extensive and meticulous examination of the basal cells, presented with palisading and hyperchromatic nuclei, were of utmost importance in the diagnosis of the present case, and to establish a personalized treatment plan for the patient.

The terms «decompression» and «marsupialization» are often used interchangeably, but, in the technical sense, decompression means any treatment that allows the elimination of the pressure within the cystic lesion, with the aim of establishing a communication between the cyst's lumen and the oral cavity.[21,24,25] The term «marsupialization» refers to a form of decompression, and involves the creation of a self-sustained aperture; it can be used for the complete resolution of the cystic lesion.[25] The advantages of the decompression technique followed by marsupialization has been previously reported,[5] and is often continued until the lesion is about 2-3 cm. After the reduction of the cystic lesion, enucleation and peripheral osteotomy is performed to remove the remnants of the cyst.[5]

The devices generally used for marsupialization include intravenous catheter tubes, or pediatric feeding gauzes, fixed with orthodontic wires to the adjacent teeth or to the bone.[2,5,23,25] This technique requires that the orthodontic wire passes through the tube to prevent its compression. Also, to maintain the permeability of the tube, the use of adjuvants, such as 0.12% chlorhexidine solution or saline solution is necessary.[21] The former protocol was modified for the present case, in which a Penrose tube was sutured to the buccal mucosa, with the aperture oriented to the mesial area, and to the zone of the molar cuspid, making it easier for the patient to locate and facilitating constant irrigation. The Penrose tube worked efficiently during the treatment. Previous reports showed that this protocol reduced the recurrence rate, and produced changes in the cystic epithelium, reducing the lesion size and decreasing the lumen of the cyst.[9,26,27]

OKCs treated with simple enucleation have a high percentage of recurrence, varying from 23.1 to 56%.[28,29] Stoelinga,[20] in an interesting meta-analysis, reported that marsupialization accompanied by enucleation reduces and delays the recurrence rate compared to enucleation alone. However, the same study reported that most cases and studies made on OKC do not contain detailed information

regarding the treatment of the lesion. In the present case, we have tried to include the most information possible. The appropriate diagnosis and an adequate treatment plan, consistent decompression followed by marsupialization and enucleation with peripheral osteotomy, resulted in a good clinical evolution of the lesion, and after 28 months of follow-up the patient showed no signs of recurrence.

CONCLUSIONS

With regard to decompression followed by marsupialization, the technique does not just effect a physical change during the OKC evolution, it also modifies its biological behavior.[24] In the present case, the histopathological analysis of the final biopsy showed metaplastic changes in the epithelial lining of the cystic lesion, similar to previously reported findings.[21,24] It is important to consider that, the treatment for the OKC will depend on the features of each patient and the cystic lesion, together with the histopathological characteristics, its extension, localization, and associated infections of the lesion.[21,20]

The Cochrane Database Systematic Review, in 2010 evaluated the treatment modalities for the OKC and concluded that there are no controlled clinical trials that allow the proper evaluation of the OKC treatment modalities. Therefore, it is recommended that clinical personnel consider retrospective series and their own experience to decide the best treatment plan for individual patients.[11] After the review of the literature on OKC, the present authors suggest that due to its high recurrence rate, simple enucleation represents a high unnecessary risk for the patient. The performance of a biopsy of all large cystic lesions is recommended. When a biopsy is not possible, and an OKC is suspected, adjuvant treatments should be employed, such as Carnoy solution, or liquid nitrogen, to eliminate all remnants of the cystic epithelium, and to prevent possible recurrences.

REFERENCIAS / REFERENCES

1. El-Naggar AK, Chan JK, Grandis JR, Takana T, Slootweg PJ. *WHO classification of head and neck tumors*. 4th ed. Lyon, France: IACR; 2017. 347 p.
2. Pogrel MA, Jordan RC. Marsupialization as a definitive treatment for the odontogenic keratocyst. *J Oral Maxillofac Surg*. 2004; 62 (6): 651-655; discussion 5-6.
3. Chaisuparat R, Yodsanga S, Montaner S, Jham BC. Activation of the Akt/mTOR pathway in dentigerous cysts, odontogenic keratocysts, and ameloblastomas. *Oral Surg Oral Med Oral Pathol Oral Radiol*. 2013; 116 (3): 336-342.
4. González-Alva P, Tanaka A, Oku Y et al. Keratocystic odontogenic tumor: a retrospective study of 183 cases. *J Oral Sci*. 2008; 50 (2): 205-212.
5. Pogrel MA. The keratocystic odontogenic tumour (KCOT)--an odyssey. *Int J Oral Maxillofac Surg*. 2015; 44 (12): 1565-1568.
6. Gao L, Wang XL, Li SM et al. Decompression as a treatment for odontogenic cystic lesions of the jaw. *J Oral Maxillofac Surg*. 2014; 72 (2): 327-333.
7. Schlieve T, Miloro M, Kolokythas A. Does decompression of odontogenic cysts and cystlike lesions change the histologic diagnosis? *J Oral Maxillofac Surg*. 2014; 72 (6): 1094-1105.
8. Pazdera J, Kolar Z, Zboril V, Tvrdy P, Pink R. Odontogenic keratocysts/keratocystic odontogenic tumours: biological characteristics, clinical manifestation and treatment. *Biomed Pap Med Fac Univ Palacky Olomouc Czech Repub*. 2014; 158 (2): 170-174.
9. de Molon RS, Verzola MH, Pires LC et al. Five years follow-up of a keratocyst odontogenic tumor treated by marsupialization and enucleation: A case report and literature review. *Contemp Clin Dent*. 2015; 6(Suppl 1): S106-110.
10. Zhou J, Wang L, Chen Z, Qiu J, Dong Q. Giant keratocystic odontogenic tumor of the maxillary sinus and zygoma: a case report. *Oncol Lett*. 2014; 8 (6): 2675-2677.
11. Sharif FN, Oliver R, Sweet C, Sharif MO. Interventions for the treatment of keratocystic odontogenic tumours. *Cochrane Database Syst Rev*. 2015; (11): CD008464.
12. Mello FW, Melo G, Kammer PV, Speight PM, Rivero ERC. 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.
13. Telles DC, Castro WH, Gomez RS, Souto GR, Mesquita RA. Morphometric evaluation of keratocystic odontogenic tumor before and after marsupialization. *Braz Oral Res*. 2013; 27 (6): 496-502.
14. Kakarantza-Angelopoulou E, Nicolatou O. Odontogenic keratocysts: clinicopathologic study of 87 cases. *J Oral Maxillofac Surg*. 1990; 48 (6): 593-599; discussion 9-600.
15. Roopak B, Singh M, Shah A, Patel G. Keratocystic odontogenic tumor: treatment modalities: study of 3 cases. *Niger J Clin Pract*. 2014; 17 (3): 378-383.
16. Johnson NR, Batstone MD, Savage NW. Management and recurrence of keratocystic odontogenic tumor: a systematic review. *Oral Surg Oral Med Oral Pathol Oral Radiol*. 2013; 116 (4): e271-276.
17. Bataineh AB, al Qudah M. Treatment of mandibular odontogenic keratocysts. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 1998; 86 (1): 42-47.
18. Noy D, Rachmiel A, Zar K, Emodi O, Nagler RM. Sporadic versus syndromic keratocysts-Can we predict treatment outcome? A review of 102 cysts. *Oral Dis*. 2017; 23 (8): 1058-1065.
19. Li TJ, Yuan JW, Gu XM, Sun LS, Zhao HS. PTCH germline mutations in Chinese nevoid basal cell carcinoma syndrome patients. *Oral Dis*. 2008; 14 (2): 174-179.
20. Stoelinga PJW. Keratocystic odontogenic tumour (KCOT) has again been renamed odontogenic keratocyst (OKC). *Int J Oral Maxillofac Surg*. 2019; 48 (3): 415-416.
21. Zecha JA, Mendes RA, Lindeboom VB, van der Waal I. Recurrence rate of keratocystic odontogenic tumor after conservative surgical treatment without adjunctive therapies. A 35-year single institution experience. *Oral Oncol*. 2010; 46 (10): 740-742.
22. Ledderhof NJ, Caminiti MF, Bradley G, Lam DK. Topical 5-fluorouracil is a novel targeted therapy for the keratocystic odontogenic tumor. *J Oral Maxillofac Surg*. 2017; 75 (3): 514-524.
23. Pogrel MA. Decompression and marsupialization as a treatment for the odontogenic keratocyst. *Oral Maxillofac Surg Clin North Am*. 2003; 15 (3): 415-427.
24. Ecker J, Horst RT, Koslovsky D. Current role of Carnoy's solution in treating keratocystic odontogenic tumors. *J Oral Maxillofac Surg*. 2016; 74 (2): 278-282.

25. Pogrel M. The keratocystic odontogenic tumor. *Oral and Maxillofacial Surgery Clinics*. 2013; 25 (1): 21-30.
26. Kinard BE, Chuang SK, August M, Dodson TB. For treatment of odontogenic keratocysts, is enucleation, when compared to decompression, a less complex management protocol? *J Oral Maxillofac Surg*. 2015; 73 (4): 641-648.
27. Lizio G, Sterrantino AF, Ragazzini S, Marchetti C. Volume reduction of cystic lesions after surgical decompression: a computerised three-dimensional computed tomographic evaluation. *Clin Oral Investig*. 2013; 17 (7): 1701-1708.
28. Al-Moraissi EA, Dahan AA, Alwadeai MS et al. What surgical treatment has the lowest recurrence rate following the management of keratocystic odontogenic tumor?: A large systematic review and meta-analysis. *J Craniomaxillofac Surg*. 2017; 45 (1): 131-144.
29. Blanas N, Freund B, Schwartz M, Furst IM. Systematic review of the treatment and prognosis of the odontogenic keratocyst. *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology*. 2000; 90 (5): 553-558.

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