

Surgical Treatment of Odontogenic Keratocyst with Application of Carnoy's Solution: Case Report

Tratamento Cirúrgico de Queratocisto Odontogênico com Aplicação de Solução de Carnoy: Relato de Caso

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Recebido em: 21/12/2018

Aprovado em: 28/02/2019

Abstract

Odontogenic cysts are benign non-neoplastic lesions that originate from epithelial cells (Arachnida-Araneae) community in the process of the teeth development. Among them, the odontogenic keratocyst is a developmental cyst characterized by its epithelium of parakeratinized stratified and aggressive squamous cells as well as infiltrative behavior. Thus, the objective of this study was to describe a clinical case of surgical treatment of odontogenic keratocysts in a 52-year-old female patient, who presented for the treatment of a large lesion in a region of the left mandibular body and angle. After incisional biopsy and installation of a decompression device, the histopathological diagnosis of odontogenic keratocyst was obtained. Subsequently to a period of 9 months with the decompression device in place, a decrease of the lesion was noticed, thus allowing intervention to be performed the excision of the lesion. Thus, the patient was subjected, under general anesthesia, to enucleation of the lesion as the main treatment, with complementary maneuvers of peripheral ostectomy and application of Carnoy solution over the remaining bone bed. After an outpatient follow-up of 16 months, no signs of recurrence of the lesion were observed. The proposed treatment was efficient in removing the keratocyst with minimal surgical morbidities. In conclusion, the treatment protocol was effective and conservative in the surgical management of the lesion, allowing rapid recovery and return of the function.

Keywords: Bone Cysts. Decompression. Dental Care.

Resumo

Cistos odontogênicos são lesões benignas não-neoplásicas que tem por origem células remanescentes epiteliais do processo de formação do órgão dental. Dentre elas, o queratocisto odontogênico é um cisto de desenvolvimento caracterizado por seu epitélio de células escamosas estratificadas paraqueratinizadas, pelo comportamento agressivo e infiltrativo. Sendo assim, o objetivo desse estudo foi descrever um caso clínico de tratamento cirúrgico do queratocisto odontogênico em uma paciente do gênero feminino de 52 anos de idade, que compareceu para o tratamento de uma lesão de grande porte em região de corpo e ângulo mandibulares à esquerda. Após biópsia incisional e instalação de um dispositivo descompressivo, obteve-se o diagnóstico histopatológico de queratocisto odontogênico. Posteriormente a um período de 9 meses com o dispositivo de descompressão em posição, notou-se uma diminuição da lesão, permitindo assim a execução de intervenção para exérese da lesão. Assim, a paciente foi submetida, sob anestesia geral, à enucleação da lesão como tratamento principal, com manobras complementares de ostectomia periférica e aplicação de solução de Carnoy sobre o leito ósseo remanescente. Após um acompanhamento ambulatorial de 16 meses, não foi observado nenhum sinal de recorrência da lesão. O tratamento proposto foi eficiente em remover o queratocisto com as mínimas morbidades cirúrgicas. Concluindo, o protocolo de tratamento foi efetivo e conservador no manejo cirúrgico da lesão, permitindo rápida recuperação e retorno da função.

Palavras-chave: Cistos Ósseos. Descompressão. Assistência Odontológica.

1 Introduction

First described by Phillipsen in 1956, the Odontogenic Keratocyst is a pathological entity that has involved discussions in terms of classification, treatment options and rates of recurrence in the world literature^{1,2}. Recently, in 2017, it had its classification changed by the World Health Organization of Keratocyst odontogenic tumor to Odontogenic Keratocyst^{2,3}. Despite the reclassification, it keeps its description of odontogenic lesion, unicystic or multicystic, with a characteristic coating of parakeratinized stratified squamous epithelium, and a potential for aggressive, infiltrative behavior and with high rates of recurrence².

The enigma of keratocyst is centered on the lack of recognition of the true biological nature of its condition. It comprises approximately 11% of all the cysts of the maxillofacial region¹.

Odontogenic Keratocysts are generally derived either from germs as epithelial remnants of the dental germs or layer of basal cells of the epithelium surface and account for between 4-12% of all 4.5 odontogenic cysts. They are usually seen in the mandible, with its majority occurring between the mandibular branch and angle^{1,2,5}. In 25-40% of cases, there is a non-erupted tooth involved to the lesion. Its growth tends to anteroposterior direction, in the medullary cavity of the

bone, with minimal bone expansion apparent in the initial stages, which leads to its delayed observation on the part of the patients^{4,5}.

Radiographically, they appear as a radiolucent, uni or multilocular lesion, with a radiopaque contour^{4,6}. Its effect on adjacent structures is the displacement of non-erupted teeth, as well as the displacement of the superior or inferior mandibular canal⁶. Histopathologically, they include a thin and uniform layer of epithelium, a well-defined cell basal layer cells with cuboidal palisade cells and a corrugated laminar and keratinized surface, which is primarily parakeratinized^{5,7}. The presence of small "satellite" cysts can be observed microscopically in the wall of the connective tissue of the cyst.

Another peculiar characteristic is the fineness and fragility of the lesion, which hinders their enucleation in a single piece^{6,7}. The lesions, parakeratinized by essence, tend to return after the surgical treatment^{5,7}. The high mitotic activity in cystic epithelium and the possible association with the Syndrome of Nevoide Basocelullar Carcinoma increase the risk of recurrence⁵.

The treatment of Keratocyst remains controversial^{1-3,5,7,8}. Less invasive measures include simple enucleation, with or without curettage, preceded or not by complementary therapies as the marsupialization/decompression^{1,6}. More invasive treatments include approaches to the remnant bone bed (peripheral ostectomy, application of Carnoy solution or cryotherapy) or even the resection of the lesion^{7,9}. The choice of treatment should be based on multiple factors, such as patient's age, size and location of the cyst, involvement of tissues and prior history of treatment^{7,9}. The objective should be the choice of a treatment modality that involves the lower risk of recurrence and lower morbidity potential^{1,3,7,8}.

The Carnoy solution is a cautery agent that causes a rapid surface chemical necrosis⁹. The solution was initially described to be used within the cyst to facilitate the complete removal of the cystic membrane and more currently is applied directly on the remnant bone bed after the enucleation fibrosis to detect and eliminate the remainder of the keratocyst epithelium, reducing the likelihood of recurrence^{8,9}.

The Carnoy solution was first described by Cutler and Zollinger in 1933 as a treatment for cystic lesions, and fistulas; also, currently, its use in the treatment of unicystic ameloblastoma and ossifying fibroma is reported in the literature^{8,9}. It is also likely that it penetrates spongy spaces and thus, devitalizes and binds to cystic cells⁸. The solution is composed of 1 g of ferric chloride dissolved in 6 ml of absolute alcohol, 3 ml of chloroform and 1 ml of acetic acid⁹. The reformulated solution is generally accepted since that the exposure to chloroform has been associated with cancer and toxicity⁸.

The technique of enucleation associating both peripheral ostectomy and the application of Carnoy solution refers to the surgical detachment of bone cyst to remove the entire lesion

without leaving any microscopic remnant^{8,10}. This is followed by the reduction of the bone edges with a piece of hand and the application of Carnoy solution⁸.

The objective of this study is to describe a clinical case of odontogenic keratocyst treated by enucleation decompression followed with peripheral ostectomy and application of Carnoy solution.

2 Development

2.1 Case Report

52-year-old patient, female gender, attended the Municipal Emergency Hall of Cuiabá for evaluation by the team of Maxillofacial Surgery with complaint of pain and drainage of purulent content in the left body and mandibular angle. As personal history, the same reported smoking 10 years ago, and having been subjected to corrective surgery for cerebral aneurysm seven months ago. She made use of captopril 50 mg twice a day, and atenolol 50 mg once a day for control of hypertension.

On physical examination, there was presence of drainage of purulent collection and mild edema in the region of the mucosa of the left mandibular body and angle. Upon the images examination (panoramic radiography), it was noted the presence of large multiloculated radiolucent lesion, well delimited, surrounded by a radiopaque halo, involving body and mandibular angle, since the first pre-molar to the third molar in the region between the teeth 34 and 38 (Figure 1). Based on these clinical and radiographic findings, the raised hypothesis raised was odontogenic keratocyst.

Figure 1 - Initial panoramic radiograph demonstrating radiolucent multiloculated lesion, well circumscribed with areas of bone resorption.

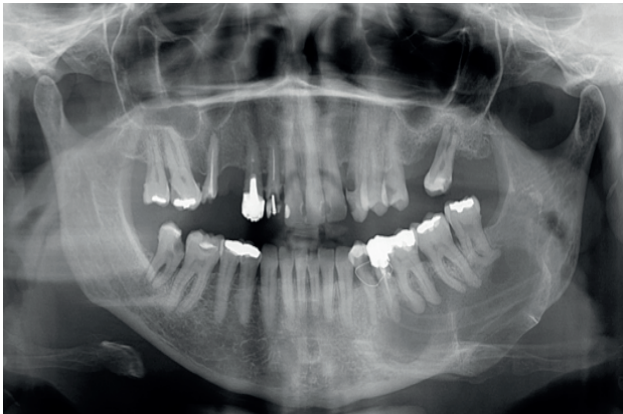


Source: The authors.

After the request and completion of appropriate preoperative evaluation, the patient was transferred to the General Hospital of Cuiabá (HG) with proposed surgery under general anesthesia for performing an incisional biopsy of the lesion and installation of decompressive device in an attempt to reduce the volume of the lesion, if the cystic nature of the same was confirmed. The histopathological report after incisional biopsy confirmed the diagnosis of odontogenic keratocyst.

The patient was then accompanied postoperatively, with regular visits to the clinic of Maxillofacial Surgery and Traumatology of HG for guidance regarding sanitation and irrigation of the decompressive device. In the 3-month post-operative (PO), it was not noticed edema anymore in the region of left body and mandibular branch, and upon the imaging exam (panoramic radiography) an image suggestive of bone formation was noticed at the periphery of the lesion, with consequent reduction of its diameter (Figure 2).

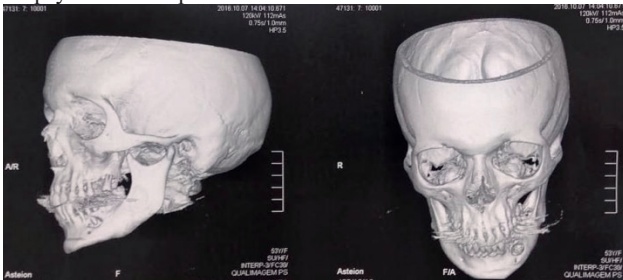
Figure 2 - Panoramic radiography of the post-operative period of 3 months of incisional biopsy and decompression device installation.



Source: The authors.

In the 6-month PO, replacement of the decompressive device was performed by one of lesser length, and upon the imaging exam (TC) continuous neoformation was observed in the periphery of the lesion, as well as the reduction of its diameter. These findings also remained in the 9-month postoperative period (Figure 3).

Figure 3 - Tridimensional reconstruction of computerized tomography of the 9-month post-operative period of incisional biopsy and decompression device installation.

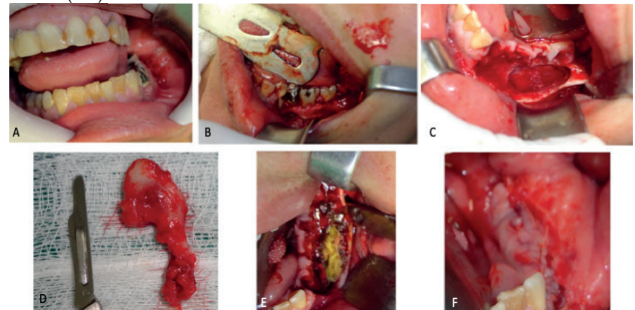


Source: The authors.

Before the favorable evolution with preliminary treatment of decompression, surgery was then proposed with resolute character of removal of the lesion, with removal of the decompressive device 15 days earlier. The patient underwent surgical enucleation of the lesion with peripheral osteotomy and application of Carnoy solution on the remnant bone bed (3 applications of 3 minutes each). During the procedure, it was seen broad commitment around the roots of the teeth associated with the lesion (34 to 38), which required the extraction of the same (Figure 4). In the postoperative period

of 7 days of intervention of enucleation, the patient evolved with suture dehiscence and exposure of the bone bed. The recommended treatment was placing of gauze with ointment Nitrofuril (Furacin) at the surgical site. It was thus observed the healing by granulation tissue in the region after weekly monitoring for 2 months.

Figure 4 - Clinical aspect of the mucosa in the region of the lesion (4A); Exposure of the lesion, with impairment of the roots of the teeth 34-38 (4B); bone bed remnant after the extraction of the teeth 34 to 38, surgical excision of the lesion and peripheral osteotomy (4C); Macroscopic aspect of the lesion after excision of bone bed (3D); application of Carnoy solution on the remaining bone bed (4E); Aspect of the mucosa after suture (4F).



Source: The authors.

Four months after the procedure of enucleation of the lesion, complete healing was observed of the surgical site, with the formation of the soft tissue in good aspect in the bone defect. In the imaging exam (TC), good bone formation was observed on site, without signs of recurrence of the lesion, remaining only the bone defect caused by enucleation (Figure 5).

Figure 5 - 7-day PO (5A); 7-day PO 7 days after placement of gauze with ointment Nitrofuril (5B); 30-day PO (5C); 45-day PO (5D); 4-month PO (5E); TC in the postoperative period of 4 months (5F).



Source: The authors.

The patient is currently in preparation for implementation of reconstruction of the bone defect by means of graft.

2.2 Discussion

As previously explained, the odontogenic keratocyst is a benign odontogenic lesion, but locally aggressive. High rates

of recurrence have been described for this lesion, depending mainly of treatment modality applied to each case⁹.

The treatment of this lesion remains controversial and several surgical modalities have proven to decrease the rate of recurrence, including enucleation, curettage, marsupialization, decompression, application with Carnoy solution, cryotherapy with liquid nitrogen, and resection (with or without loss of continuity of the mandible)⁶.

Large cysts are usually treated initially by marsupialization, which relieves intra-cystic pressure and allows the bone neoformation to fill the defect with minimal surgical morbidity. Adjacent structures such as teeth, maxillary sinus or mandibular canal can be saved from damages. The procedure is highly successful in decreasing the cyst prior to its enucleation, and is useful to avoid extensive surgery, being considered the first option for the management of large lesions^{2,4,6}.

Resection proved to be the most predictable treatment, but the morbidity associated with the reconstruction of the defect seems unjustifiable in most cases for a lesion without any real metastatic potential, despite its aggressive nature^{4,9}. Using less invasive treatments, recurrences must be anticipated⁹. In cooperative patients, with more chances to return to the post-operative follow-ups, Carnoy solution seems to be the least invasive procedure with the lowest rates of recurrence; for several large cysts, the decompression followed by enucleation also showed low rates of recurrence⁶.

Enucleation is the most commonly method used to treat the majority of keratocysts, despite its high rate of recurrence. In addition, adjuvant techniques such as the use of Carnoy solution before the enucleation or directly on the bone bed after enucleation have been proposed to eliminate residual tissue and thus prevent relapses. The application time of 10 to 15 minutes is the routine protocol, however, if the inferior alveolar nerve is visible within the cystic cavity, the application may not last longer than 3 minutes to avoid damages^{8,9}.

It is suggested that the marsupialization with subsequent enucleation is best for larger cysts, since it reduces the morbidity and thus being less invasive. Techniques of higher morbidity as the resection should be reserved for recurrent keratocysts⁸⁻¹⁰.

3 Conclusion

The modality of treatment in the management of

odontogenic keratocysts should be based on the age of the patient, extension, aggressiveness and the nature of the lesion. In this case, the use of the decompression technique was effective to initially reduce the size of the initial lesion and was followed by enucleation with peripheral ostectomy and application of Carnoy solution, allowing for a more efficient and complete enucleation of the cyst. There was no sign of recurrence of the lesion until the present time, 16 months after the surgical intervention of enucleation.

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