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Is Unbalanced Type 2 Diabetes A Contraindication to Surgical Decompression of Dentigerous Cysts? Up-To Date Review and Case Report

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1. Abstract

1.1. Introduction: Dentigerous cysts are part of the odontogenic family of cysts and are related to a developmental anomaly of the dental organ. The treatments proposed for these cysts are of 2 types: enucleation or decompression. We report a case of management by decompression of a dentigerous cyst related to an impacted third molar in a patient with diabetes who was not well controlled despite strict endocrinological monitoring. Studies show that the existence of unbalanced diabetes, particularly for type 1, increases the patient's risk of infection.

1.2. Observation: A 50-year-old Asian patient with unbalanced type 2 diabetes was treated with surgical decompression of a dentigerous cyst for 8 months before enucleation.

1.3. Discussion: The results obtained are consistent with the literature for healthy patients and show a re-ossification during the first 8 months.

1.4. Conclusion: Unbalanced diabetes does not seem to be a contraindication to surgical decompression.

2. Introduction

Maxillary cysts are odontogenic or non-odontogenic intraosseous lesions with a particular histological structure characterized by the presence of an epithelial envelope, keratinized or not, and a liquid, semi liquid or solid content [1]. Among the cysts of the maxillae, the dentigerous cysts are part of the odontogenic cyst family and are related to an anomaly in the development of the dental organ. They are the most frequent odontogenic cysts after the apical dental cysts of inflammatory origin. They are related to impacted teeth with a preferred site in the mandibular wisdom tooth [2]. The proposed treatments for these cysts are: enucleation, decompression or marsupialization [3]. Diabetes is one of the leading causes of morbidity and mortality in the world [4]. Glycaemic imbalance is a consideration before surgery [5]. Indeed, studies show that the existence of unbalanced type 2 diabetes and particularly type 1 diabetes increases the risk of infection in the patient [4,6]. We report a case of management by decompression of a dentigerous cyst related to an impacted 3rd molar in a patient with diabetes who was not well controlled despite strict endocrinological monitoring.

3. Observation

A 50-year-old Asian man with non-insulin-dependent diabetes was referred by his dentist for extraction of tooth 36, 37 and 38. He had been suffering from severe pain for several months despite several courses of antibiotics prescribed by his physician. Despite strict endocrinological monitoring, the glycated haemoglobin was 9.2%. Clinical examination revealed a mouth opening limited to 2 fingerbreadths and a circumscribed left lower chin swelling. Teeth 38 and 48 were impacted. Vestibular filling was associated with pain on palpation of the area of teeth 36, 37 and 38. Tooth 36 had

severe decay, without clinical symptoms. Tooth 37 had mobility 2 with a positive vitality test. There were no neurological disorders in the trigeminal nerve territory (V.3).

The preoperative panoramic radiography (Figure 1A) shows a well-demarcated, large bone lesion inserted at the crown of the impacted tooth 38. The latter is pushed back into the mandibular branch, in an inverted position.

CBCT examination (Figure 2A) shows thinning of the lingual and vestibular cortices with an increased risk of fracture. The lesion measures 25 mm in long axis. The inferior alveolar nerve is pushed back to the lingual area, becoming one with the lesion in places. Our diagnostic hypothesis was a dentigerous cyst related to tooth 38.

The treatment plan consisted of surgical decompression combined with biopsy in the first instance. Complete removal was deferred until the volume of the lesion was significantly reduced. The aim was to reduce the risk of fracture and severe decay during enucleation.

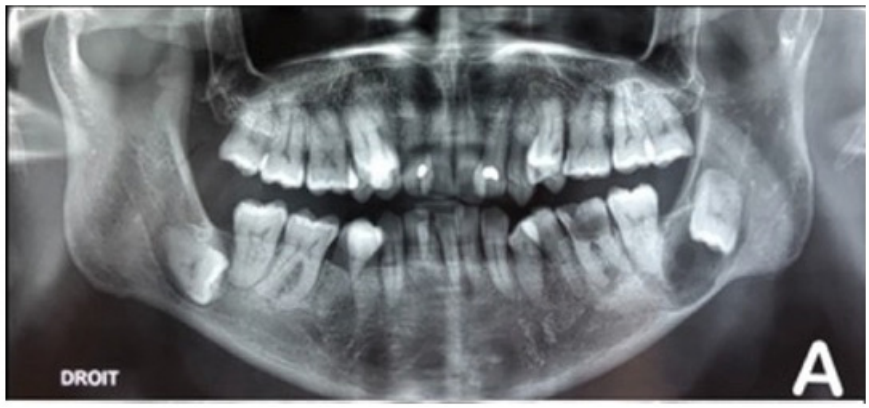

Figure 1A: Preoperative panoramic radiograph

Figure 1B: Panoramic radiography 8 months after decompression / before enucleation

Figure 1C: Panoramic radiography for check-up at 4 months

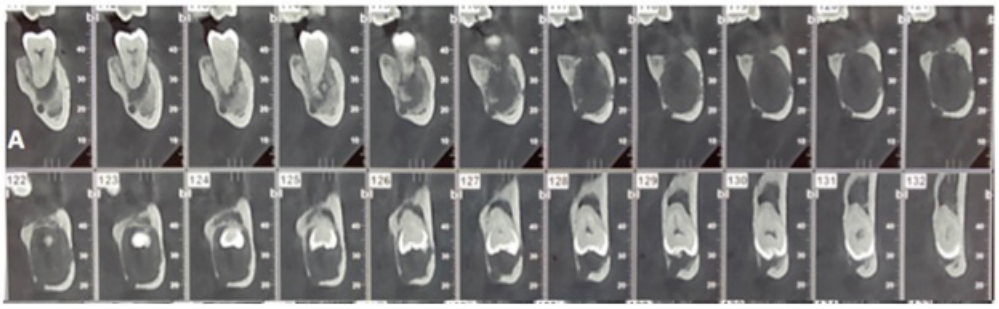

Figure 2A: Pre-operative Cone Beam CT

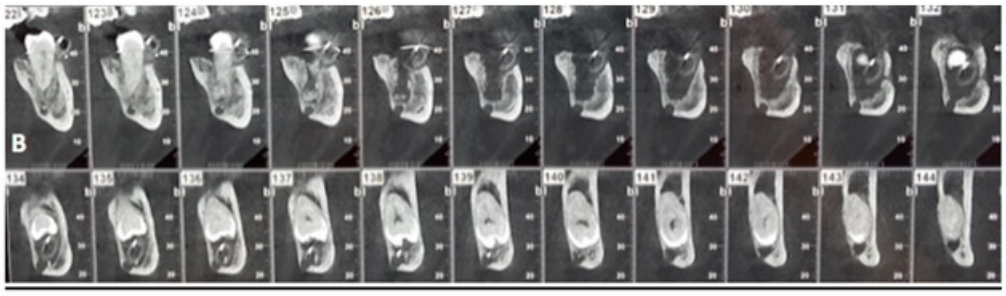

Figure 2B: Cone Beam CT 8 months after decompression

Antibiotic therapy with Amoxicillin/Clavulanic Acid (1 g/125 mg) was introduced 2 days preoperatively, 3 times a day and was continued for 7 days postoperatively.

We had performed the following surgical protocol: after detachment of a full thickness flap (intra-sulcular incision from the distal papilla of tooth 36 going up the mandibular ramus). We performed a corticotomy with a multi-blade steel ball burr (Komet, France) to access the lesion and then took a sample of it for anatomical-pathological analysis. A Redon drain (Braun) of sufficient diameter for daily irrigation was placed and secured with a steel-wire ligature at tooth 37 (Figure 3A, Figure 3B).

After checking the permeability of the drain, the flap was repositioned and sutured with 3.0 Vicryl thread (Johnson & Johnson, USA). Given the imbalance of diabetes and the mobility of tooth 37, we decided to postpone the extraction of 36. Irrigation was performed the same day with saline mixed with a 10% solution of povidone-iodine (60/40). The postoperative prescription given to the patient included a catheter, a 20ml syringe, 10% povidone-iodine and saline so that the patient could perform a daily betadine-saline cleansing.

The patient was reviewed at 7 days and then at 21 days postoperatively (Figure 3C) to verify strict compliance with the hygienic maneuvers and to test the permeability of the drain. The latter was then shortened every 2 months by about 2 mm, the aim being to promote bone healing and allow the cystic volume to decrease.

Pathological analysis indicated an appearance compatible with a dentigerous cyst. A radiographic control at 8 months by CBCT (Figure 2B) shows a significant reduction of the bone lesion with a re-ossification reaching 6 mm in thickness in some places. The patient was then operated under general anaesthesia (Figure 4). We proceeded with the extraction of the 36, the removal of the Redon drain, the extraction of the 38 and the enucleation of the cyst. Tooth 37 was retained because it was no longer mobile, as the cold test was still positive.

Antibiotic therapy with Amoxicillin/Clavulanic Acid (1 g/125 mg) was introduced 2 days preoperatively, 3 times a day and was continued until mucosal closure (the glycated haemoglobin was 8.5% on the day of the operation).

The postoperative course was simple. The patient had no sensory disturbance at the 7-day control. The final pathological examination concluded to a "composite odontogenic tumor combining aspects of a dentigerous cyst and a classic ossifying fibroma, without any sign of malignancy". The panoramic radiography (Figure 1D) at 4 months postoperatively shows complete bone healing with satisfactory mucosal remodelling (Figure 5). The patient still had uncontrolled diabetes at 4 months postoperatively (glycated haemoglobin = 8.7%).

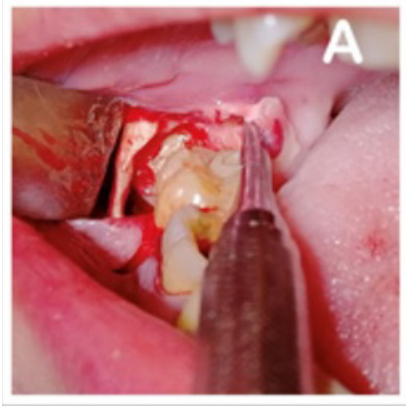

Figure 3A: Surgical access to the lesion

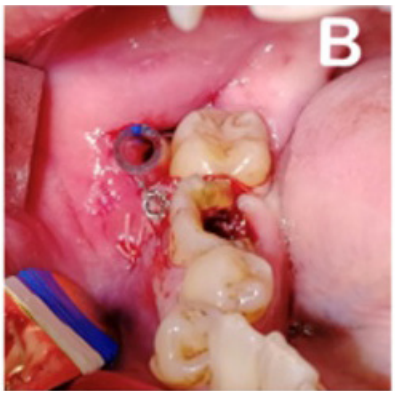

Figure 3B: Installation of a surgical drain and stabilization with steel-wire

Figure 3C: Situation at 21 days after installation of the drain.

Figure 4A: Visualisation of the wisdom tooth after flap removal and osteotomy

Figure 4B: Situation after cyst removal

Figure 4C: Segmentation of the tooth to preserve the bone stock

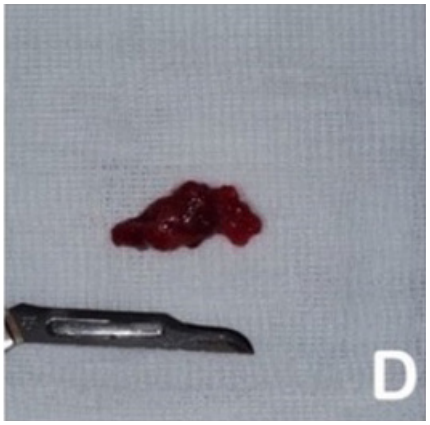

Figure 4D: Cyst

Figure 5: Healing at 4 months

4. Discussion

Decompression has been described in the literature in several forms for over a century [7]. Several authors have demonstrated its effectiveness in significantly reducing the volume of dentigerous cysts, odontogenic keratocysts and nasopalatine cysts [8,9].

In a prospective study of 73 cases, Anavi et al reported an average 79.3% reduction in lesion volume over a period of 7 to 10 months. However, these results should be interpreted with caution, as the measurement was made on a panoramic radiograph and not a 3D examination [10]. In our case, the presence of unbalanced diabetes did not increase the time to bone healing, which was 8 months.

We observed different anatomical-pathological results between the first biopsy and the complete removal after decompression with a composite appearance integrating an ossifying fibroma. Similarly, August et al. showed a histological change in the epithelium following decompression of odontogenic keratocysts for an average of 8 months, associated with a decrease in cytokeratin-10 production in 64% of cases [11].

According to Lizio et al, decompression could be considered as a definitive treatment for dentigerous cysts associated with mandibular 3rd molars. In his study, 25 patients in good general health were followed for 12 to 71 months. Unbalanced diabetic patients and patients at risk of infection were excluded from this study. In the protocol used by the authors, a drain was sutured and left in place for approximately 30 days, the time required for the formation of a continuous epithelium between the cystic cavity and the oral cavity. The rate of cyst reduction varied from 63 to 98%. No complete exeresis was performed in these patients who refused a second operation [12]. No study has shown the reproducibility of this management in diabetic patients, whether or not they are well controlled, as these patients present a delay in healing time and an increased risk of infection [13].

Several factors should be considered before decompression: the size of the lesion, the surgical site, the number of residual bone walls and the surgical risks in the case of single-stage enucleation, namely the risks of bone fracture and nerve damage. The impact of the patient's age on the speed and efficiency of decompression appears controversial.

Anavi et al. showed that decompression was faster in patients under 18 years of age [10]. For Marin et al, the results were better in patients under 30 years of age [9]. Similarly, Song et al. described that the rate of cystic volume reduction by decompression decreased with patient age [14].

However, Luis Oliveros-Lopez et al described in a study of 23 patients that the speed of healing is dependent on the age of the patient, the surgical site and the initial size of the lesion. According to these results, decompression is more effective in patients over 40 years of age. Nevertheless, the authors conceded that they did not have many young patients, with a median age in the study population of 40 years. The authors seem to agree that the larger the lesion and the more localized it is in the mandible, the faster the healing process [3,14,15].

In our case, decompression was effective in a 50-year-old patient.

In the scientific literature, decompression in diabetic patients has not been sufficiently addressed. Only Kim et al [16] compared two samples of diabetic and non-diabetic patients who were surgically treated for removal of keratocysts or dentigerous cysts. The authors evaluated only the post-operative infectious risk. Patient compliance is paramount for surgical decompression. The patient presented in this case report was rigorous in drain cleanout.

Treatment of periodontal disease has been shown to contribute to the control of diabetes [17]. Removal of dental infectious foci in this case report did not show a decrease in the patient's glycated haemoglobin. His glycaemic imbalance was due to a significant lack of dietary compliance.

5. Conclusion

Unbalanced type 2 diabetes does not appear to be a contraindication to surgical decompression in a patient who strictly adheres to the cleaning protocol. The presence of unbalanced diabetes did not increase the time to bone healing.

However, further studies would be needed to refine the results presented in this article, including the reproducibility of this protocol in other unbalanced diabetic patients, as well as the determination of the effective duration of decompression according to the patient's age and medical history.

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