

Surgical Approach to Dentigerous Cyst with Protection of the Inferior Alveolar Nerve

SUMMARY

Aim: To stress the importance of surgical planning when treating large dentigerous cysts.

Case Report: In a routine radiographic examination, a dentigerous cyst was revealed in a 20 years old male. A surgical approach that ensured the integrity of the inferior alveolar nerve (IAN) was applied. The incision was exceeded to the mesial surface of the first molar in order to create adequate surgical field and visibility. The final result was that the exposed nerve was protected successfully.

Conclusion: This case shows the necessity of a meticulous preparation, even in routine operations.

Key words: Dentigerous Cyst, Enucleation, Inferior Alveolar Nerve, Impacted Lower Molar

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CASE REPORT (CR)

Balk J Dent Med, 2016; 20:178-181

Introduction

Dentigerous cyst is an epithelial-lined developmental cavity that encloses the crown of an unerupted tooth at the cement-enamel junction^{1,2}. Dentigerous cysts are the second most common odontogenic cysts after radicular cysts, accounting for approximately 24% of all true cysts in the jaws³.

These lesions are becoming larger with osmotic pressure that is beard at cyst's wall itself, and it is transferred to the environmental bone. That has as a result the absorption of bone. Usually this cyst type can be found united with unerupted third lower molars and upper canines. They are asymptomatic and they are diagnosed on routine radiographs, or during clinical examination disclosing that these teeth are not erupted in the oral cavity at the appropriate time. In some cases if they reach sizes, they may penetrate the lamina dura and come in contact with the oral flora.

Radiographs show the cyst as a monocular fine (clarificant area) with clear boundaries that surrounds the tooth's crown to the limit of enamel-cement border.

When cyst has big dimensions it makes difficult surgical ablation, especially when it is near at noble structures as the inferior alveolar nerve.

This article shows a case of dentigerous cyst in the right side of the mandible, which surrounded the third molar. The

cyst was enucleated, the unerupted molar surgically removed, and the inferior alveolar nerve protected.

Case Report

A twenty-year-old patient was examined in a routine consultation. A panoramic radiography was taken, in order to detect unerupted third molars. The radiography revealed four impacted third molars. The right mandibular molar was surrounded by a dentigerous cyst reaching the distal root of the first mandibular molar. The floor of the lesion was so close to the mandible margin, giving the impression that the inferior alveolar canal was disappearing (Fig. 1). As patient refused cone-beam computed tomography, the overall management of the case was based upon clinical and radiological examination. The patient was free of symptoms and no sign of paresthesia of the inferior alveolar nerve was detected. Pulp tests for vitality of the first and second mandibular molars were positive. The plan was to remove the cyst by enucleation and simultaneously extract the mandibular third molar. The operation was based on the basis of minimal invasive technique with protection of the inferior alveolar nerve and of the lingual nerve as well.

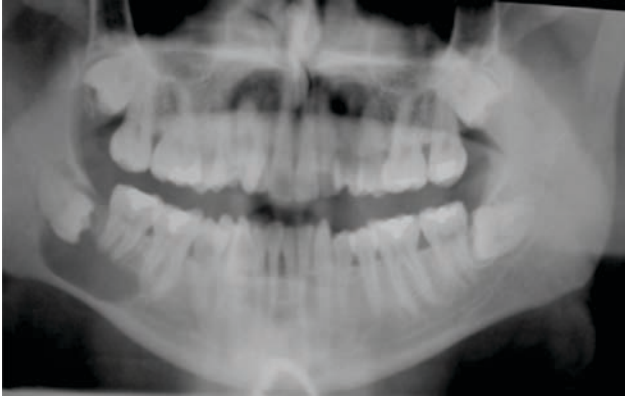


Figure 1. Radiographic appearance of the impacted tooth surrounded by a large dentigerous cyst

The incision was done similarly to the routine incision for surgical removal of impacted third molars, with a slight difference - due to the fact that the cystic lesion was large enough to reach the roots of the first mandibular molar, the incision was drawn to the proximal aspect of the crown of the first molar. This approach assured the integrity of bone underneath the detached mucosa at the end of the operation exactly at the line of suturing (Fig. 2).



Figure 2. Vertical incision is designed till the mesial aspect of the first molar

After elevation of a triangular mucoperiosteal flap, the bone was exposed in the area of retromandibular triangle. Removing a considerable amount of bony substance, the cystic sac became visible. Within the cyst was the crown of the unerupted third right mandibular molar. A bony window was created in order to remove the impacted molar, along with the surrounding cyst (Figs. 3-5). The tooth was removed first and the enucleation of the cyst was performed at the end of the procedure. Special care was taken during the manipulations in order to preserve the integrity of the underlying inferior alveolar

nerve. After enucleation of the dentigerous cyst, the inferior alveolar nerve was liberated from the suppression of the lesion and was clearly visible in the bottom of the bony cavity. The overlying mucosa was sutured with a simple intermittent suture, using silk 3-0. Postoperatively, the patient left given a prescription of antibiotics and analgesics.

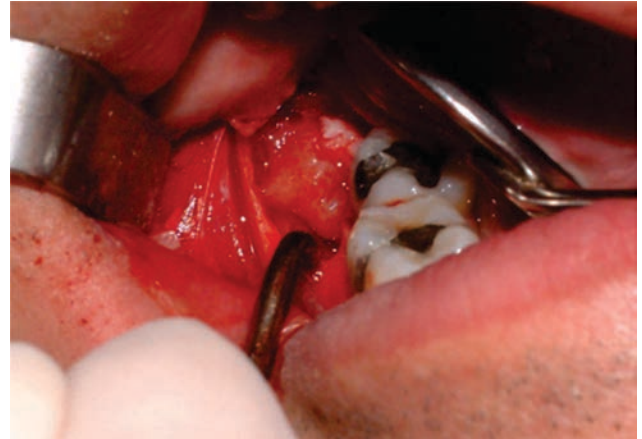


Figure 3. After elevation of the mucoperiosteal flap, the tooth is visible behind the cystic sac



Figure 4. The crown of the tooth is clearly visible

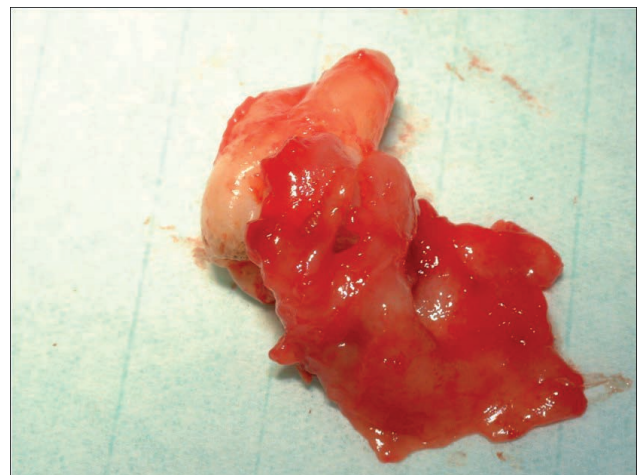


Figure 5. The removed wisdom tooth along with the cyst

Discussion

A dentigerous or follicular cyst is the most common type of developmental cyst of the jaws. It develops by accumulation of fluid between the reduced enamel epithelium and the crown of the tooth, or between the layers of the reduced enamel epithelium⁴. The formed cyst grows in size as a result of increased osmotic pressure within the cyst lumen, which causes expansion and bone resorption. The cyst is most commonly associated with impacted third molars and maxillary canines and is frequently attached to the tooth at the cement-enamel junction. It is usually asymptomatic and often discovered when assessing delayed eruption of a tooth, but can sometimes become very large and cause cortical bone expansion and perforation. Radiographically, a dentigerous cyst is a well-defined, unilocular or occasionally multilocular radiolucency associated with the crown of an unerupted tooth.

Treatment consists of removal of the associated tooth and enucleation of the cyst. However, if the lesion is associated with an unerupted permanent tooth or it affects a large portion of the jaw, decompression and irrigation allow the cyst to shrink and the tooth to erupt.

In order to perform a radical operation - enucleation of the cyst along with the impacted tooth removal - there must be a planning that ensures adequate access to the operative field and preservation of the inferior alveolar nerve. As this operation is not a simple case of impaction, but a complicated surgical procedure due to the large cystic lesion that envelopes the impacted tooth, like in the case presented at figure 1, a special planning is necessary. According to this plan, a longer incision and a broader flap were performed in order to fulfill the following criteria:

- A. Adequate bone support following surgery for correct suturing;
- B. Protection of all gentle anatomical structures (IAN, adjacent teeth etc.);
- C. Radical removal of dentigerous cyst.

In order to accomplish adequate bone support following surgical excision of a dentigerous cyst, the flap must be broader and more extended than the flap used in the routine removal of an impacted third molar. The incision must be at least 1 cm away from the calculated line limit of the cystic cavity. In this case, the incision line was performed in the respected tissues just under the mesial part of the crown of the first mandibular molar (Fig. 2). This approach enhanced the operative manipulations during the cyst enucleation and the third molar removal, and provided enough bone support for a correct suturing.

A very crucial part of intraoral removal of impacted third mandibular molars is the protection of the noble structures of the mandible as are the inferior alveolar nerve and the lingual nerve. The inferior alveolar nerve is

at risk of damage during removal of lower third molars, apicectomy of lower premolars and molars, placement of intraoral implants and soft- tissue surgery around the mental foramen, especially in the elderly where the mental nerve may lie at or close to the alveolar crest. The lingual nerve is at risk during surgical removal of lower third molars, the placement of intraoral implants and incisions in the floor of the mouth for the removal of submandibular duct calculi, biopsies etc⁵.

The incidence of transient inferior alveolar nerve damage following lower third molar removal varies between 1.3% and 7.8%. Between 0.5% and 1% of all lower third molar extractions result in permanent damage to the inferior alveolar nerve. Following lower third molar extraction, the incidence of permanent lingual nerve sensory disturbance necessitating nerve repair lies between 0.3% and 0.8%. According to our protocol, the patient was informed before the operation and he signed a document of consent.

To protect the inferior alveolar nerve, a clear view of the operative field is mandatory. The performed flap in this case acquired this necessity. The existence of a large dentigerous cyst in the area displaced the nerve bundle to the lower part of the mandible. The first part of the operation, the removal of the impacted third mandibular molar, was easy since the nerve was far away at the bottom of the lesion. After the removal of the tooth, the cystic membrane was detached gently and patiently until the whole cyst was enucleated. Immediately after the cyst removal, the inferior mandibular nerve was liberated and returned to its natural position, which was in the bottom of the created surgical cavity (Fig. 6). The patient was free of symptoms and only an expected swelling in the area was noted in the early postoperative period.



Figure 6. The inferior alveolar nerve lying at the bottom of the cavity, liberated immediately after the removal of the cystic lesion

Dentigerous cysts maybe managed generally by two methods:

1. Enucleation with removal of the tooth in the same procedure;
2. Marsupialization as an initial procedure with possible removal of the tooth at a later date.

Marsupialization can be chosen when cysts are associated with the crowns of teeth that the surgeon wishes to preserve and when teeth are near the surface and have a possibility to erupt. Another reason for marsupialization is the possible risk to damage the inferior alveolar nerve or a jaw fracture, especially in very large cysts with a large absorption of the jaw bone^{6,7}. In this case reported the size of the cyst that was approximately 4 cm in diameter and the fact that the third molar had to be extracted along with the cyst removal, made the choice of enucleation the most appropriate.

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Received on August 7, 2016.

Revised on September 10, 2016.

Accepted on September 15, 2016.

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