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# Endoscopically assisted enucleation of a large mandibular periapical cyst

*Heleia Nestal Zibo, Ene Miller*


## SUMMARY

*Abstract.* Enucleation of large cysts in the jaws is an invasive method that might be associated with complications. Marsupialization is a less invasive alternative method but it involves a prolonged and uncomfortable healing period.

This study addresses a contemporaneous and less invasive surgical technique for treating larger mandibular cysts.

*Materials and methods*. A 48-year-old woman presented with a large mandibular apical cyst involving the left parasymphysis, body, ramus and condylar neck, with involvement of the alveolar inferior nerve. The cystic lesion was enucleated using a 30° 4.0 mm endoscopic scope and endoscopic instruments through two small accesses: the ostectomy site of previously performed marsupialization and the alveolus of the involved third molar extracted of the time of the enucleation of the cyst.

*Results.* The endoscopic scope provided good visualization of the whole cystic cavity allowing the removal of any residual pathologic tissue and preservation of the integrity of the involved inferior alveolar nerve. The morbidity of the surgical procedure was extremely reduced. At a 6-month follow-up the patient did not present any symptom of inflammation and a panoramic X-ray showed good bone repair and remodelation.

*Conclusions*. Endoscopically assisted enucleation proved to be effective method of treating a large mandibular cyst, providing total enucleation with a minimal invasive technique.


**Key words:** radicular cyst, periapical cyst, endoscopy, odontogenic cysts.

## INTRODUCTION

Odontogenic cysts are one of the most common osseous-destructive lesions affecting the jaws [1]. The most frequent odontogenic cysts are radicular cysts (61.4%) followed by dentigerous cysts (20.1%) and odontogenic keratocysts (6.4%), representing together 87.9% of all odontogenic cysts. Radicular cysts are more commonly diagnosed in females, with a male to female ratio of 0.61:1. Most cases are located in the maxilla (63.05%) and in the mandible, 81.04% of the lesions are located in the posterior region. The incidence peak of the radicular cyst is between the second and the fourth decades of life [2].

The epithelium at the apex of a nonvital tooth can be stimulated by inflammation forming a true epithelium-lined cyst, i.e. the periapical cyst. Inflammatory response appears to increase the production of keratinocyte growth factor by periodontal stroma cells, leading to increased proliferation of the epithelium in the area. The source of the epithelium is usually a rest of Malassez but it can also be the crevicular epithelium, the sinus lining or the epithelial lining of fistulous tracts [3]. Periapical cysts are usually asymptomatic and can acquire great dimensions if the source of the inflammatory stimulus is not eliminated. Small cystic lesions without epithelial sheets often resolve after appropriate endodontic treatment, larger lesions require a combination of endodontic therapy and surgical intervention. Enucleation of large cysts, especially in the mandible, is an invasive method that might be associated with complications such as nerve bundle

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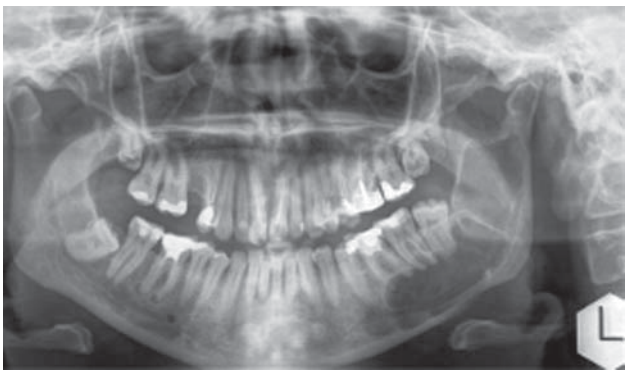

**Fig. 1.** Panoramic radiography of the mandible showing a cystic lesion in the area of the left parasymphysis, body and ramus, reaching to the condylar neck, with involvement of the alveolar inferior nerve canal and root apex of the 36, 37 and 38 teeth

**Fig. 2.** Intra-oral photography demonstrating the marsupialization of the cystic cavity on the vestibular area of the alveolar bone. Maintenance of the aperture using a silicone tube (adapted from a suction catheter) with the internal diameter of 9 mm and 9 mm depth, fixed by 4.0 nylon stitches to the oral mucosa

injuries and pathologic fractures. Marsupialization is a less invasive alternative method of treating large cysts but it involves a prolonged and uncomfortable healing period.

This study addresses a contemporaneous and less invasive surgical technique for treating larger mandibular cysts by endoscopically assisted enucleation.

## CASE REPORT

A 48-year-old woman was referred to the Maxillofacial Department of the North Estonia Medical Centre for treatment of a large mandibular cyst. The cyst was diagnosed after a routine panoramic radiography in a dental office. According to the anamnesis, the patient had been diagnosed with sclerosis multiplex five years earlier, but no pharmacological treatment had been necessary.

Clinically, the patient did not have any complaints. On an intra-oral examination the 36 and 37 teeth showed crown restoration and absence of vitality.

Radiographically, a large mandibular cyst was visualized in the area of the left parasymphysis, body, ramus and condylar neck, with involvement of the alveolar inferior nerve canal and the root apex of the 36, 37 and 38 teeth (Fig. 1).

The first treatment option consisted in an incisional cyst biopsy and marsupialization and endodontic treatment of the 36 and 37 teeth and extraction of the 38 tooth, to achieve reduced cyst dimensions and to perform latter enucleation with less morbidity (Fig. 2). After forming the cystic access and aperture, the patient complained about persistent neuropathic pain on the left side of the mandible and the inferior lip with irradiation to the left ear, which did not cease with analgesics. Clinical and blood tests did not exhibit any sign of infection. The histology confirmed the diagnosis of an inflammatory periapical cyst. Empiric therapy with clindamycin and nonsteroidal anti-inflammatory drugs and later with carbamazepine did not contribute to clinical improvement. The patient appeared depressed and stressed during the whole treatment period. This treatment option was not well tolerated by the patient, culminating in systemic neurological collapse 2 months later. The patient was then referred to the Emergency Department of our hospital. Clinically, on admission, she presented agitation, mental confusion, total sensomotor aphasia, eyesight paresis and paresis of the right arm. The patient was hospitalized in the neurology department. A lumbar punction was performed but the results did not show any liquor alteration. Blood tests results were normal. A MRI exam of the head revealed cerebral lesions characteristic of multiple sclerosis without any activity (Fig. 3). Additionally, on the left side of the mandible, there was observed a cystic lesion with approximate dimensions of 82×25×18 mm, involving the condylar neck, ramus and body, and a partial bone septum dividing the cavity into two chambers. The cortical bone around the cystic cavity was very narrow and absent from the medial side. The marsupialization aperture, as well as the air and liquid flow into the cavity were visualized. In the area close to this aperture the cystic content was less dense (liquid) than in the rest of the cavity, presenting signs of moderate intensity in T1 and in T2 (denser than liquid). The inferior alveolar nerve was not visualized (Fig. 4).

Four days later all neuropathic signs and symptoms disappeared and the patient was discharged without any neurologic deficit.

The treatment strategy of the mandibular cyst was then changed and the lesion was enucleated

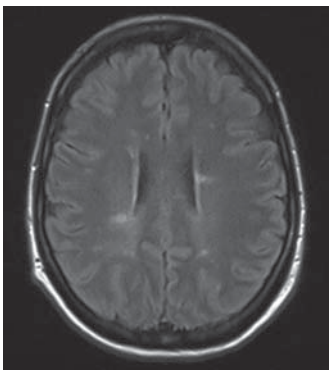

**Fig. 3.** Magnetic resonance image of the brain showing non-contrasting characteristic lesions of multiple sclerosis in T2

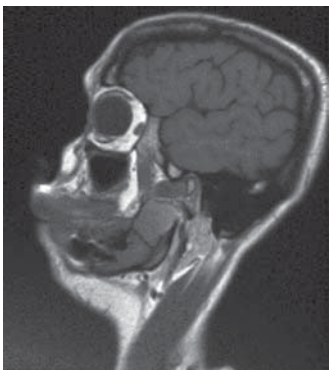

**Fig. 4.** Magnetic resonance of the mandible. In T1, a sagittal view of the left side of the mandible showing a cystic lesion with the approximate dimensions of 82×25×18 mm, involving the neck of condyle, ramus and body and the presence of a partial bone septum dividing the cavity in 2 chambers

using a 30º 4.0 mm endoscopic scope and endoscopic forceps and curettes. The capsule was totally removed through two small accesses: the previously formed marsupialization ostectomy site and the alveolus of the involved third molar extracted at the time of cyst enucleation (Fig. 5). The left inferior first molar had previously suffered a deep crown fracture during endodontic treatment and had also to be extracted. The postoperative period was uneventful, surgical morbidity was minimal and the patient was discharged on the first postoperative day.

## RESULTS

The endoscopic scope ensured a good visualization of the whole cystic cavity allowing the removal of any residual pathologic tissue and preservation of the integrity of the involved inferior alveolar nerve. The morbidity of the surgical procedure was extremely reduced. At a 6-month follow-up the patient did not present any symptom of inflammation, trigeminal neuralgia or sensorial deficit and a panoramic X-ray showed good bone repair and remodelling (Fig. 6).

## DISCUSSION

Traditionally larger cystic lesions of the jaws can be treated more conservatively by a decompress technique, aiming to reduce the size of the lesion for further performing of total enucleation in a less invasive manner. With marsupialization, the cystic lesion is decompressed allowing new bone to fill the defect, leading to substantial reduction in the size of the cystic cavity. It shows lower morbidity compared to enucleation in terms of preservation of important anatomical structures as the maxillary sinus, the adjacent teeth and the inferior alveolar nerve [4, 5].

However, marsupialization is a time-consuming treatment that can only be performed in a compliant patient [6]. The period of marsupialization can range from 6 to 80 months, with a median time of 23.5 months and only 18.5% of the lesions resolve completely after marsupialization [5]. In most cases later surgical enucleation will be necessary.

In this reported case, the communication of the cystic cavity to the external environment exposed the inferior alveolar nerve to a greater variation of external factors, especially temperature, probably predisposing trigeminal neuralgia. Constant pain contributed to stress and accentuated the patient's depression. Somatization of local symptoms culminated in a neurological collapse through the activation of multiple sclerosis. It is known that negative emotions are closely associated with onset of multiple sclerosis and may play important roles in development of the disease [7].

Endoscopically assisted enucleation is an innovative alternative method that can be as conservative as marsupialization, allowing preservation of important surrounding structures, with the greater advantage of one-step treatment, reduced healing period and very low morbidity.

By using the scope it is possible to check all remote aspects of the cavity, to remove any pathologic tissue around the root of the involved teeth and to ensure the complete curettage of the cyst as well as the adherences of the cystic lining to the adjacent bone or soft tissues in the areas of cortical bone perforation. Endoscopy allows a safer separation of the cyst capsule from the alveolar inferior nerve, especially in the areas of difficult access, like the ascending ramus. A large access can be avoided preserving thus bone and reducing the risk of jaw fracture [8].

Endoscopy can be helpful also for treatment of maxillary odontogenic cysts. In 2005 a video assisted endoscopic technique was described in treatment of four cases of periapical cysts with

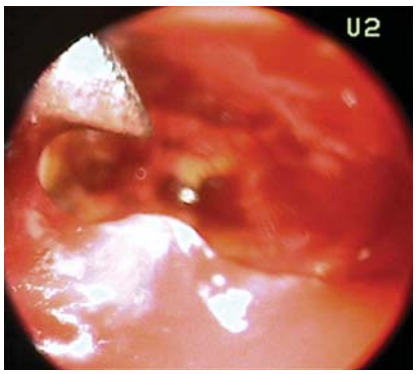


**Fig. 5.** Intraoperative endoscopic photograph demonstrating the cystic cavity and internal surface of the capsule

**Fig. 6.** Panoramic view of the mandible 6 months after cystic enucleation: good bone repair and remodeling

intrasinusal extension, presenting an oroantral fistula and chronic maxillary sinus suppuration. A lower antrotomy was performed in the area of the canine fossa to allow access for endoscopic optic and instruments. The authors concluded that video assisted endoscopic surgery is a feasible technique to enucleate odontogenic cysts with maxillary sinusal extension and to simultaneously eliminate sinusal suppuration [9].

In this reported case there was not used any material to fill the cystic cavity and good bone repair was observed already in the 6-month postoperative period. In the mandible, spontaneous bone regeneration occurs without inflammatory or other complications even in large bone defects. After one year, larger defects will be healed by new bone with an average density of 84% of the normal surrounding bone [10].

## CONCLUSIONS

Endoscopically assisted enucleation proved to be an effective method for treating a large mandibular cyst, providing total enucleation with a minimal invasive technique.

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