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Endoscopy-assisted removal through combined lower and middle meatotomies of an ectopic upper third molar in the sinus associated with a dentigerous cyst



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ABSTRACT

The aim of this case report is to present an original conservative technique for the transnasal endoscopy-assisted extraction of an ectopic upper third molar associated with a dentigerous cyst occupying the whole maxillary sinus by means of combined lower and middle meatotomies. The proposed technique is a viable, minimally-invasive alternative to the Caldwell–Luc operation (with or without the repositioning of a bone lid), and also to endoscopic middle meatal antrostomy in cases where this would be unable to ensure adequate access because of the position and size of the ectopic tooth and associated cyst.

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1. Introduction

There have been reports of symptomatic ectopic maxillary third molars in the sinus associated with dentigerous cysts [1–5]. The aim of treatment should be to enucleate the cyst and extract the associated ectopic tooth using the most conservative and functional surgical technique. Several surgical procedures have been proposed, depending on the site of the tooth, including: cyst marsupialization [6]; simple enucleation [7]; the Caldwell–Luc operation [5,8]; and endoscopic sinus surgery [2–4,9–15].

The purpose of the present case report is to describe an original minimally-invasive surgical technique based on transnasal endoscopy with simultaneous middle and lower antrostomies to extract an ectopic maxillary third molar and associated dentigerous cyst that occupied the whole sinus, without necessitating any oral surgery.

2. Case report

A 40-year-old man with no systemic disease was referred to us by his dentist with a swelling of the left cheek, and evidence of an ectopic maxillary third molar associated with a radiopaque lesion occupying the whole sinus on panoramic dental

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X-ray (Fig. 1). A computed tomography (CT) scan of the paranasal sinuses (Fig. 2) confirmed the presence of a well-defined radiopaque neoformation associated with the ectopic tooth in the left maxillary antrum, compatible with a dentigerous cyst. The tooth was located in the palatal bone, in the floor and medial wall of the left maxillary sinus, proximal to the apexes of tooth 26.

The patient reported symptoms of recurrent maxillary sinusitis. He showed no signs of oro-antral fistula. Transnasal endoscopic surgery was performed under general anesthesia. The nasal cavity was prepared with pads soaked in a solution comprising 30 ml of 0.1% oxymetazoline hydrochloride, 20 ml of 2% lidocaine, and 4 ml of epinephrine 1:1000. The whole procedure was completed using a 4 mm, 0°, 45° and 70° Storz–Hopkins telescope (KARL STORZ GmbH & Co., Tuttlingen, Germany).

Left complete uncinectomy was performed and the natural ostium was enlarged. The wall of the cyst was immediately visible, emerging from the maxillary sinus. The cyst was gently detached from the medial wall of the maxillary sinus up to the infero-medial angle and the superior wall. The left antrostomy was enlarged in a dorsal-to-ventral direction using a backward antrum punch, and then slightly extended inferiorly with a downward antrum punch. The whole cyst was removed with angled forceps. No microdebrider was used for this maneuver. The position of the tooth was visualized using a 70° angled endoscope and its mobility was tested with angled Heuwieser forceps. A lower meatotomy was performed under a 4 mm, 0° Storz–Hopkins telescope. The left inferior turbinate was gently raised with a Freer elevator to reveal the lower meatus, and the Hasner valve was identified (Fig. 3a). Using a 3 mm diamond bur, an opening approximately 1 cm long was made 2–3 mm posteriorly to the Hasner valve, directing the instruments horizontally and downwards to avoid orbital injury. The inferior meatotomy was enlarged first in a ventral-to-dorsal direction using a straight cutting bone punch, then inferiorly with a downward antrum punch. The profile of the ostium was better defined with a microdebrider using a 2.9 mm straight shaver blade. A 4 mm, 45° or 70° Storz–Hopkins telescope was inserted through the opening to examine the maxillary cavity directly (Fig. 3b), and the tooth in particular (Fig. 3c). The tooth was extracted from the maxillary bone using a gouge. Under 45° and 70° Storz–Hopkins telescopes, the tooth was grasped via the middle meatotomy with Heuwieser forceps with extra-long curved tips (Fig. 3d–e).

After surgery, the patient was prescribed antibiotics (second-generation cephalosporin for 6 days) and painkillers (paracetamol 1000 mg every 8 hours for three days). His recovery was uneventful. The histological findings were consistent with a dentigerous cyst (Fig. 4). Six months after surgery, healing of the hard and soft tissues was confirmed on postoperative CT (Fig. 5), and endoscopic examination. There was no evidence of cyst recurrence.

3. Discussion

The transnasal endoscopic approach to the treatment of sinus pathologies meets the need for a minimally-invasive surgery capable of preserving physiological function while minimizing morbidity and preventing complications.

The Caldwell-Luc operation was avoided because a large opening in the anterior maxillary sinus wall would have been needed to extract the tooth. This would have carried a risk of complications, including damage to the sinus mucosa, retraction

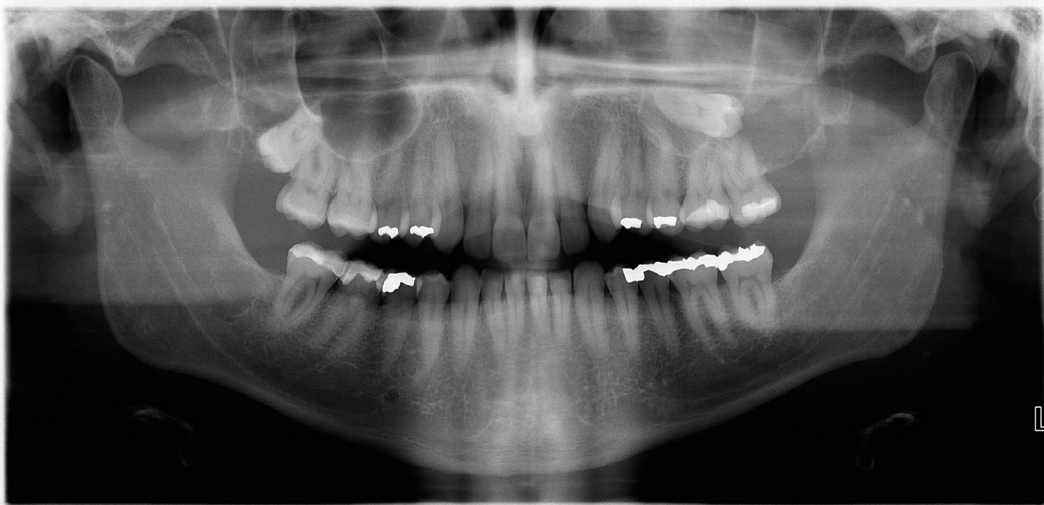


Fig. 1. Preoperative panoramic dental X-ray showing the ectopic position of the upper left third molar. A widespread opacity is visible in the left maxillary sinus.

of the soft tissues of the cheek, oro-antral fistula, infra-orbital nerve injury, and damage to the nasolacrimal duct and adjacent teeth [2,4,16]. The technique involving repositioning a bone lid [17] was also considered unsuitable because of the above-mentioned risks in this particular case, given the site and size of the tooth to be extracted.

Various applications of the endoscopic technique for removing ectopic maxillary third molars, with or without associated dentigerous cysts, have been described [2–4,9–15].

Viterbo et al. [10], and Cedin et al. [15] chose the canine fossa as the access route for endoscopy, which they combined with a repositioned bone lid in the former report, and a lower meatotomy in the latter. Other authors reported using a middle antrostomy alone for cyst and tooth removal [2,3,12]. A mucoperiosteal flap associated with an inferior meatus opening was described by Seno et al. [14], while Wardani et al. [13] adopted a modified endoscopic transnasal medial maxillectomy.

As mentioned by other authors [2,3], two main factors influence the choice of surgical technique in this setting: the surgeon's ability; and the anatomical position of the ectopic tooth and the associated dentigerous cyst. An exclusively

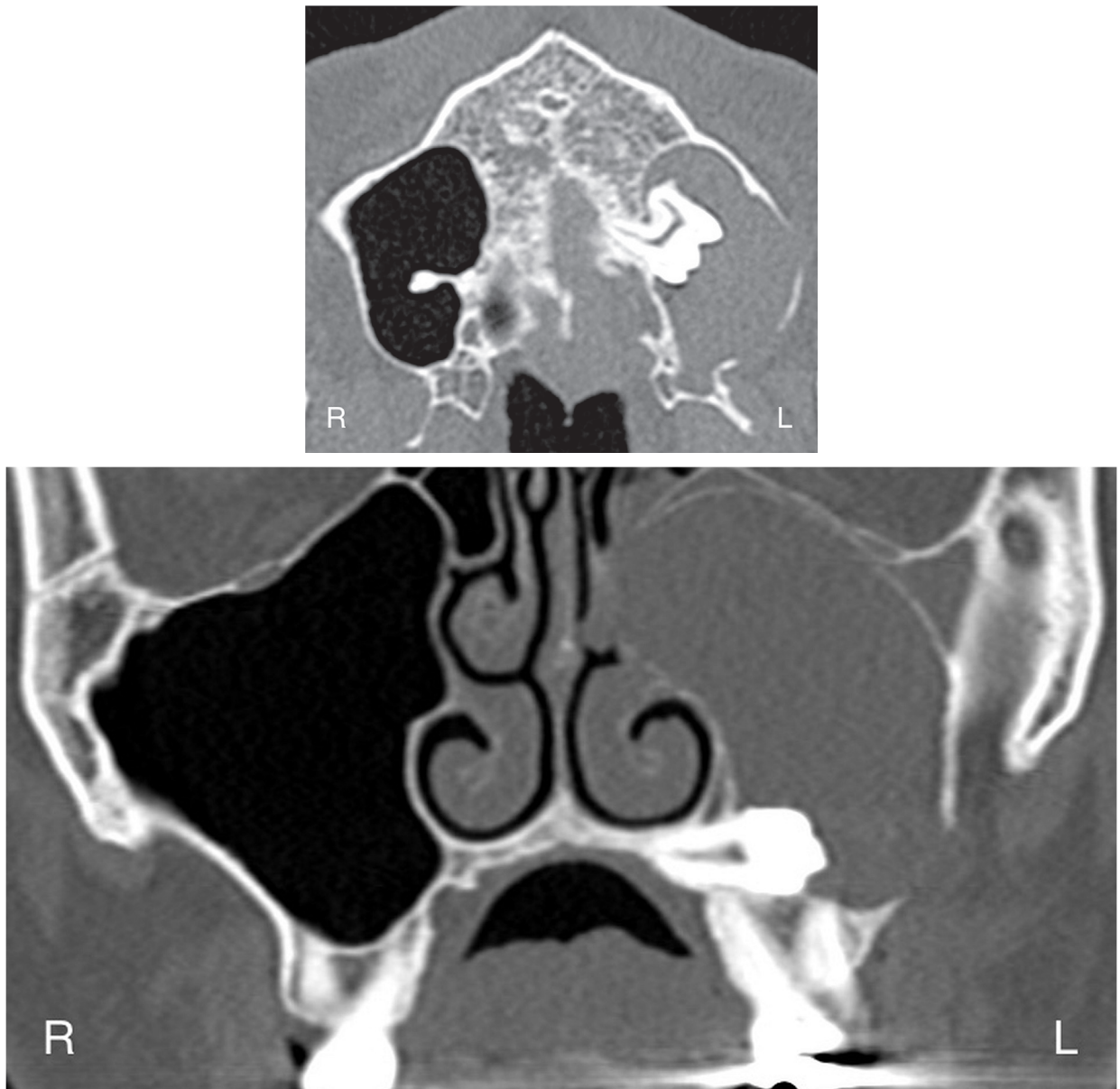


Fig. 2. Preoperative CT scan. One of the roots of the third molar is inserted in the palatal bone, and the crown is in the sinus cavity, surrounded by a radiopaque neof ormation, which seems to entirely fill the antrum. On the most cranial area of the sinus, a separate bony wall is visible in the coronal view. **2.a** Axial view. **2.b** Coronal view.

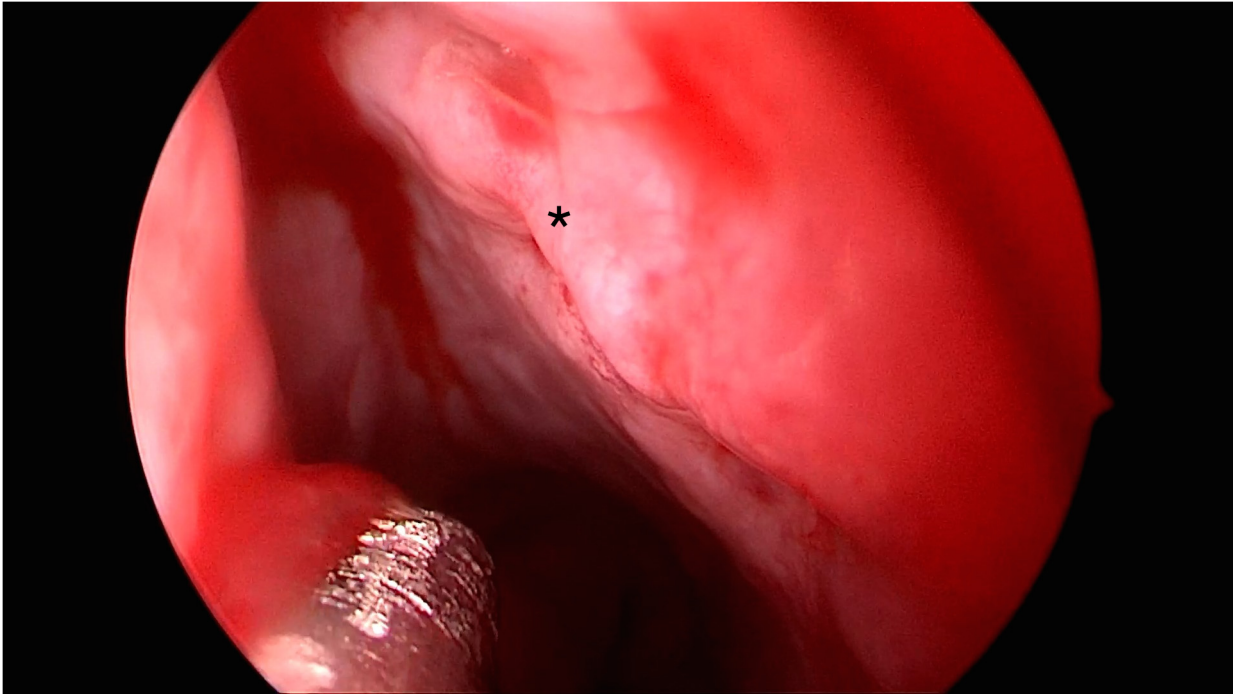


Fig. 3. Surgical procedure. **3.a** Endoscopic endonasal view of the inferior meatus, focusing on the Hasner valve (*). **3.b** View of the left maxillary sinus through the inferior meotomy. **3.c** View of the impacted tooth from the inferior meotomy (before its removal); C, crown; R, root. **3.d** View of the crown of the ectopic upper molar dislocated into the maxillary sinus using a 45° endoscope through the middle antrotomy. The sucker is inserted from the inferior meotomy. **3.e** Removal of the ectopic tooth using Heuwieser forceps. **3.f** Extraction of the tooth through the left nasal fossa.

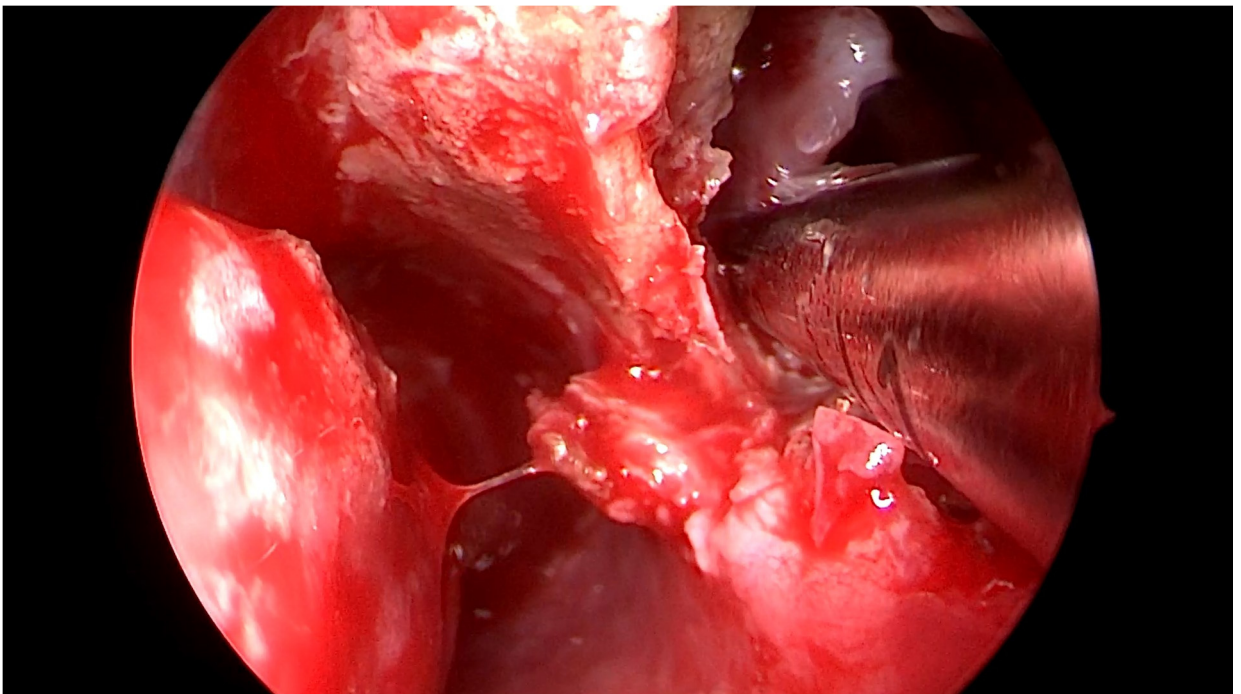


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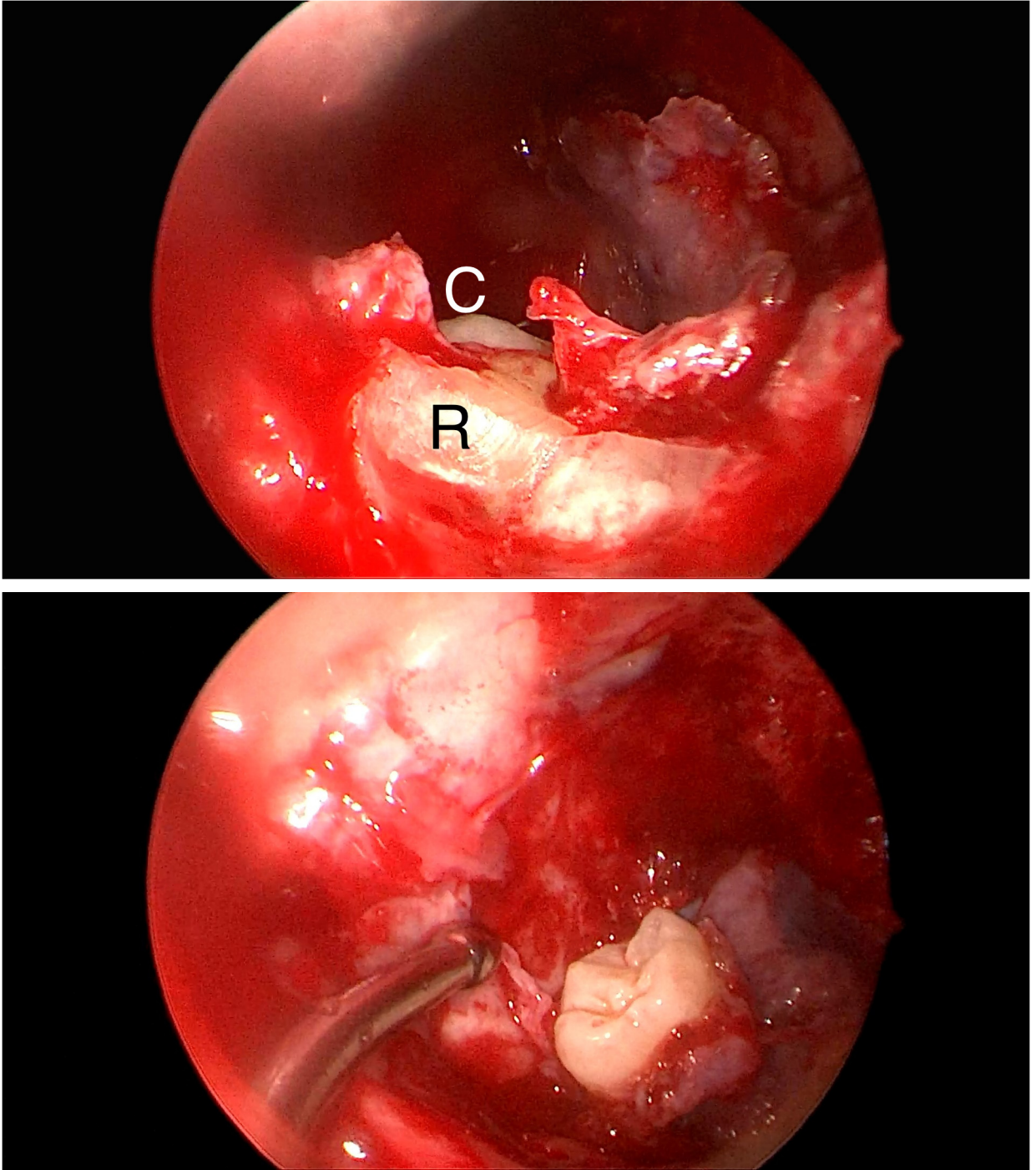


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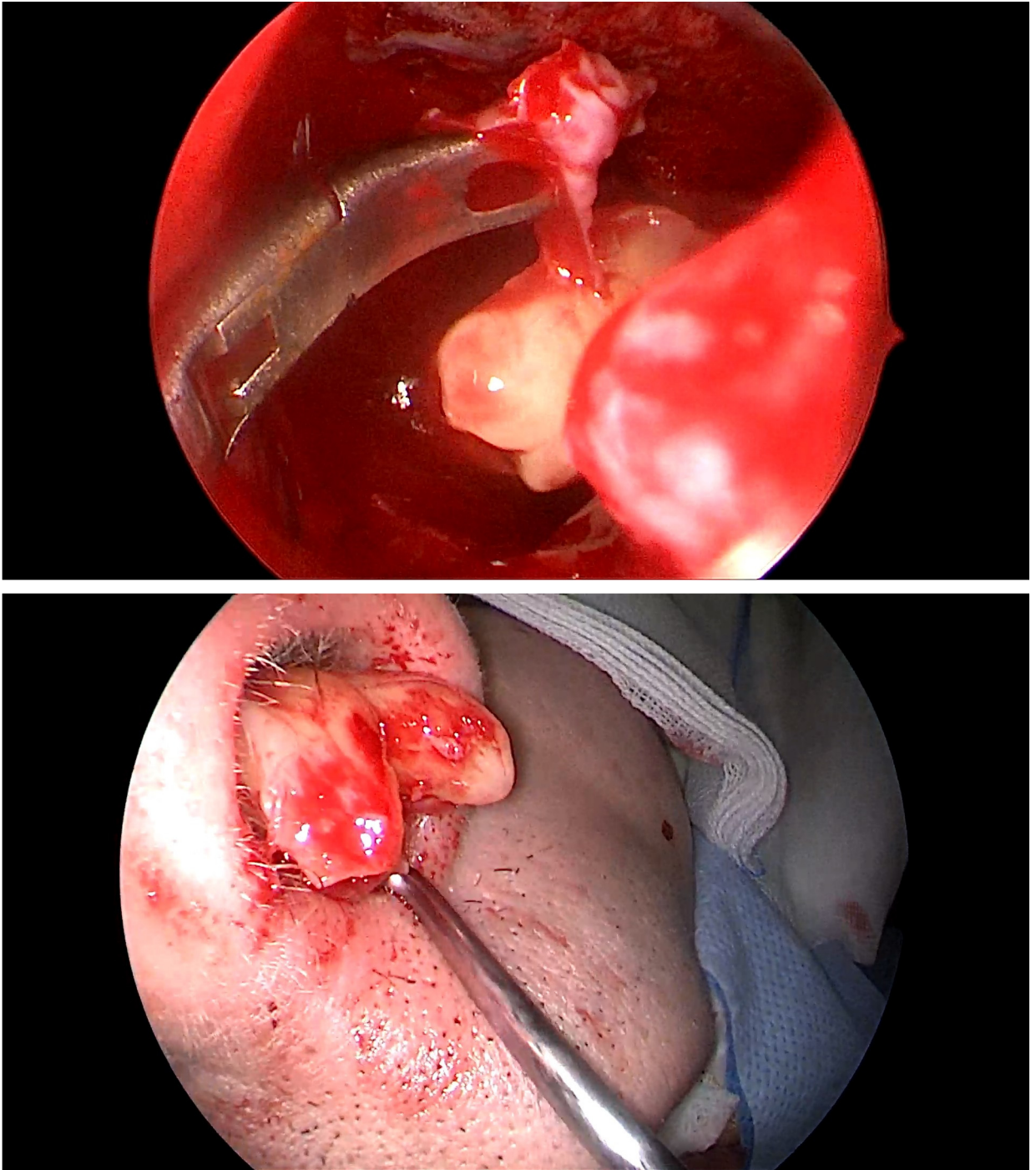


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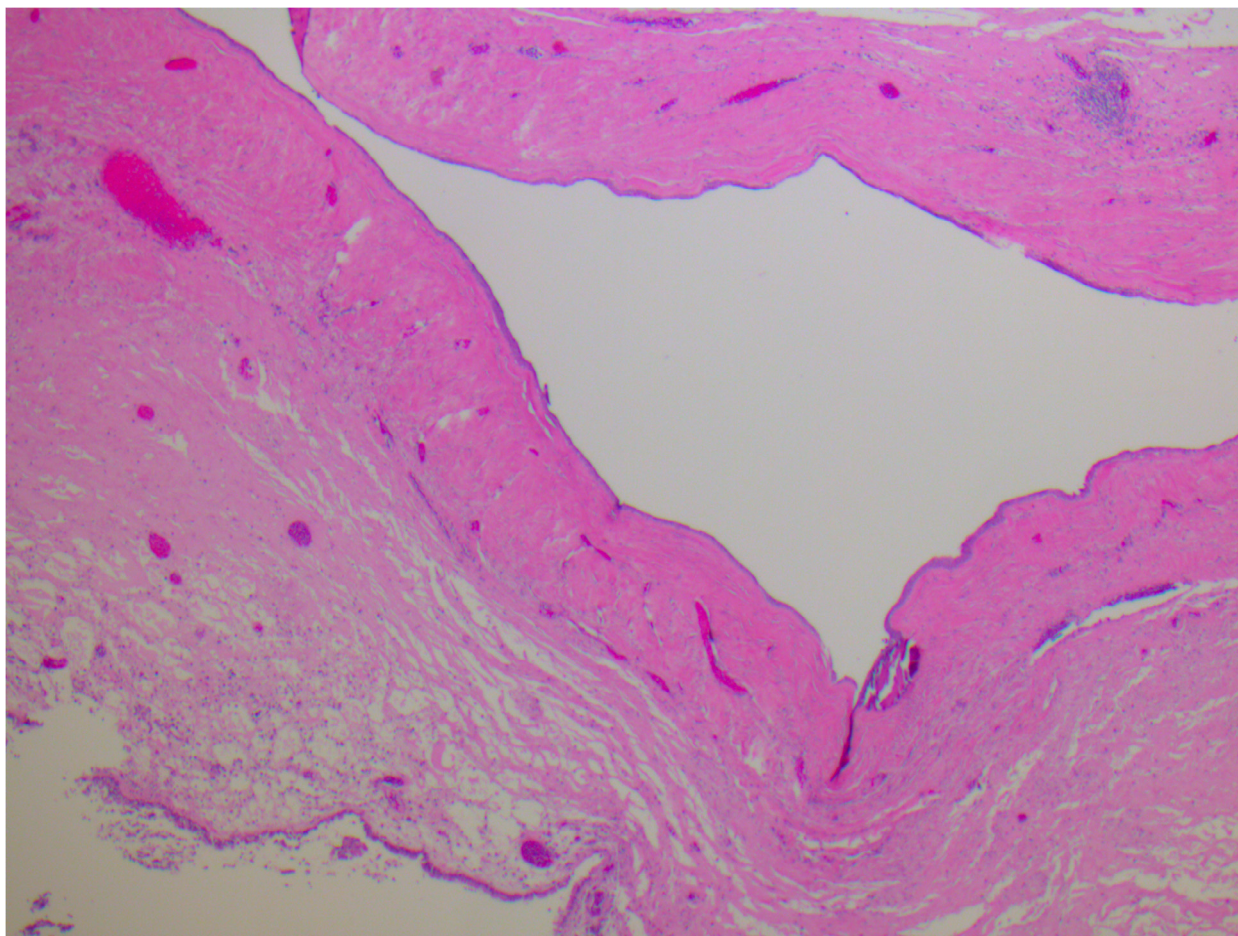


Fig. 4. Histology: H&E section (50× x) showing dentigerous cyst: fibrous cyst wall, with ectatic blood vessels, lined with epithelium.

transnasal endoscopic approach, preferably through a middle meatal antrostomy, can be used when the tooth and cyst are proximal to the osteomeatal complex. A combined endoscopic and Caldwell-Luc approach should be considered if the tooth is too far from the lateral nasal wall, or too close to the orbital floor or nasolacrimal duct, or if the cyst and tooth are too large to be removed through an appropriately-sized middle meatotomy. For example, it was reported a case of an ectopic third molar located in the roof of the maxillary sinus treated using endoscopic sinus surgery with the aid of a bony lid created in the canine fossa [10]. Buchanan et al. [18] described a case involving an ectopic tooth in the right sinus causing a frontal mucocele: a Caldwell-Luc operation was performed because the tooth was embedded too laterally to be amenable to endoscopic removal. Alexandrakis et al. [12] reported on two patients with ectopic teeth obstructing the nasolacrimal duct: one patient underwent endoscopic tooth extraction and nasolacrimal duct probing; the other surgical removal of the tooth (Caldwell-Luc).

The originality of the present case lies in that lower and middle meatotomies were performed simultaneously to enable the extraction of an ectopic third molar. A similar technique was used by Brescia et al. [19] to retrieve a dental implant displaced into the maxillary sinus. In the present case, once the Hasner valve had been visualized (to avoid damage to the nasolacrimal duct), osteotomy adjacent to the third molar apexes was needed to luxate the tooth. This made it necessary to create a second, lower access to mobilize the tooth after performing a limited osteotomy with rotatory instruments. An endoscopic approach via an intra-oral access through the canine fossa [20] would have been unable to guarantee an adequate supplementary access.

At follow-up, there was evidence of lower meatotomy patency in the absence of any complaints of symptoms from the patient, or any pathological signs. This condition was therefore not considered as a complication or limitation of the technique [19,20].



Fig. 5. CT coronal view 6 months after surgery, showing inferior and middle meatotomies, normal sinus mucosa thickness, no sinus radiopacity, integrity of tooth 26, and remains of the bony walls that surrounded the follicular cyst.

In conclusion, ectopic teeth located in the sinus and associated with large dentigerous cysts can be managed surgically with the minimally-invasive endoscopic approach described herein, which affords optimal visibility, and allows for a more precise and wider dissection, with less morbidity and an optimal functional recovery, by comparison with intra-oral approaches or more extensive endoscopic maxillectomy.

Conflicts of interest

None of the authors have any financial or personal relationships with people or organizations that might inappropriately bias their work.

Ethical statement/confirmation of patient's permission

The authors confirm that the patient was fully informed about his condition and consented to the clinical and surgical procedures, which included taking photographs of the lesions and procedural steps. The authors confirm that any personal details of the patient, contained in any part of the paper or supplementary materials, were removed prior to submission. The authors declare that the procedures described herein comply with the World Medical Association's Declaration of Helsinki on medical research protocols and ethics.

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