

Case Report

Contribution of endoscopy in high sinus inclusions, a case report

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Abstract – Introduction: This paper will discuss the management of iatrogenic displacement of the third molar (3M) into the maxillary sinus through a specific case that we have encountered. **Observation:** This case reports the atypical clinical history of an ectopic intra sinus 3M of iatrogenic origin, associated with an inflammatory cyst. A 52-year-old man presented with chronic sinusitis and an oral-sinus communication 30 yr after the displacement of his 3M into the maxillary sinus. A minimally invasive multidisciplinary management using endoscopy was proposed to the patient as well as an 18-month follow-up reporting a normalization of his initial sinus symptoms. **Discussion:** An analysis of the literature concerning intra sinus teeth was carried out, whatever their etiology, in order to situate our case and to be able to propose the least invasive procedure for these patients. The different surgical approaches are analyzed as well as the effectiveness of a multidisciplinary management. **Conclusion:** In this case, the simultaneous oral and nasal approach enabled a minimally invasive procedure. The endoscope is now part of the surgeon's therapeutic arsenal, and the training of practitioners in its use could greatly facilitate procedures.

Introduction

Wisdom teeth avulsion is the most common procedure in maxillofacial surgery, stomatology and oral surgery (Haute Autorité de Santé, 2019) [1]. Intraoperative and postoperative complications associated with wisdom teeth avulsion are found in approximately 3% of cases [2]. The most common complications are bleeding, infection, alveolitis, and nerve damage may also occur.

In rare cases, the third molar (3M) or one of its roots may be accidentally displaced into different anatomical spaces: the pharyngeal lateral space [3], the buccal space [4], the infra-temporal fossa [5], and also into the maxillary sinus [6]. The latter, although rare, seems to be the most frequent case of displacement given the proximity of the maxillary 3M to the maxillary sinus, especially in young subjects.

We present here the management of a patient with maxillary sinusitis [7] following the iatrogenic displacement of his 3M into his maxillary sinus. We will then discuss the

multidisciplinary double approach chosen for the surgical procedure and the contribution of endoscopy, taking into account the literature published on this topic.

Observation

A 52 year old man was referred by his dentist for the management of a chronic right maxillary sinusitis associated with the presence of an intrasinus tooth. He was admitted to the hospital in an Otorhinolaryngology (ENT) – Stomatology department. He had no previous history apart from smoking 30 pack-years and the avulsion of the 3Ms during his military service. The patient's history showed symptoms of right maxillary sinusitis for 6 months until his visit, such as posterior discharge, nasal congestion, facial pain and halitosis without improvement despite various courses of antibiotics.

The clinical examination revealed a vestibular oral-sinus communication (OSC) visible at the site of 3M, associated with the presence of a purulent fluid whose discharge increased during the Valsalva maneuver. The dental panoramic examination revealed a tooth in the right sinus under the floor of the orbit (Fig. 1). The nasofibroscopy showed oedema and

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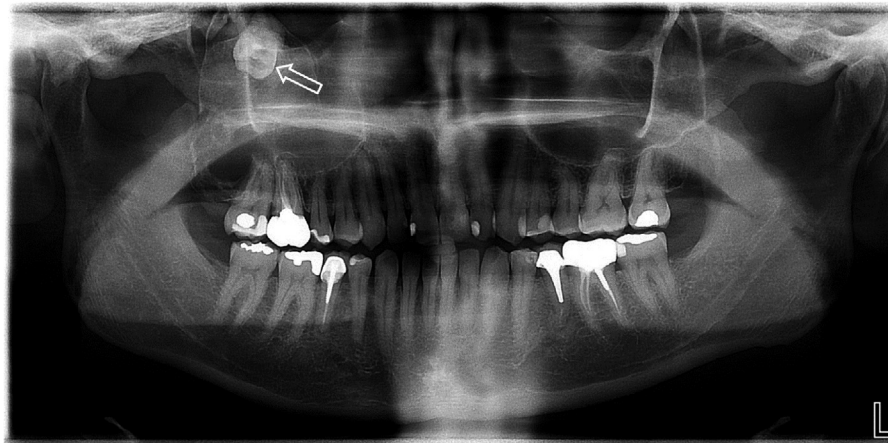


Fig. 1. Orthopantomogram before surgery, March 23rd 2021. A radiopaque image is visualised in the right sinus, below the orbital floor (arrow).

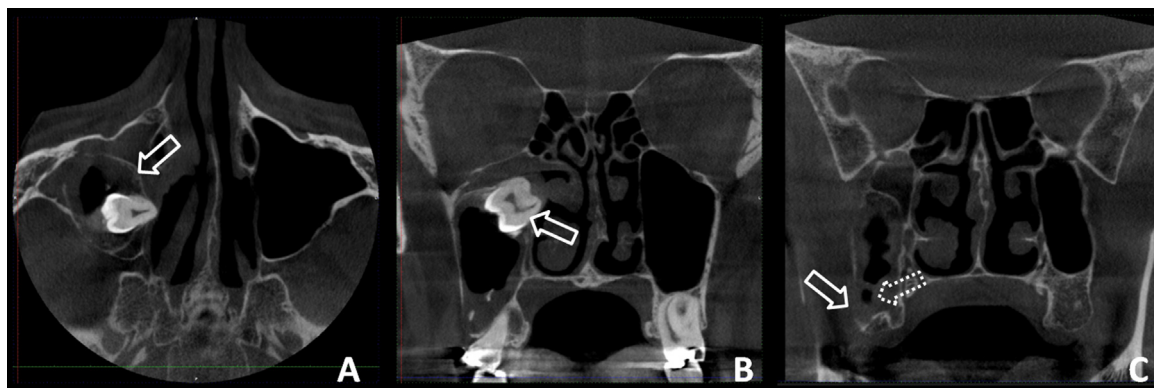


Fig. 2. Multiplanar cone beam computed tomography (CBCT) sections, January 2022. (A) Axial section showing the tooth and an image of a calcium-toned shell with displacement of this tooth towards the lateral aspect of the nasal cavity (arrow). (B) Coronal section regarding second molars (2Ms) showing the tooth and the shell protruding into the middle meatus (arrow). (C) Coronal section regarding third molars (3Ms) showing the resorption of the alveolar bone (dotted arrow) and responsible for a communication with the oral cavity (arrow).

inflammation localized to the middle turbinate with no visible tooth or purulent discharge. Given the absence of any traumatic antecedents, we retained as an etiological hypothesis the iatrogenic displacement of the 3M during the avulsion of his 4 wisdom teeth thirty years earlier, without the patient having been informed of this at the time.

A Cone Beam Computed Tomography (CBCT) was then performed, showing a filled right maxillary sinus containing a cystic lesion ($30 \times 15 \times 15$ mm) with an eggshell calcified wall centered on a tooth and located under the right orbital floor in relation to the middle meatus, associated with thickening of the sinus mucosa in a frame shape. An OSC was present in the site of the right 3M (Fig. 2).

A multidisciplinary surgery with an ENT specialist and an oral surgeon was scheduled.

The operation was performed under general anesthesia in an outpatient unit after meshing the nasal cavity with 5% naphazoline xylocaine. An intraoral approach through his OSC was attempted. Due to the proximity of the tooth to the middle meatus, it was not visible without the use of an endoscope. To allow its access into the sinus, a small widening of the OSC was

performed in order to visualize his tooth (Fig. 3B). Because of the limited access of surgical instruments *via* this exclusive approach, a middle antrostomy was carried out. A partial anterior midline turbinectomy was performed because the middle meatus was not reachable by luxation of the middle turbinate, followed by a meatotomy including the natural ostium of the sinus by performing unciformectomy. The attempt to avulse the tooth through the middle meatus failed due to a lack of mobility (Fig. 3A). We used the Chompret syndesmotome *via* the endobuccal route and the Blakesley forceps *via* the meatotomy to mobilize the tooth. We then luxated and extracted the tooth *via* the oral route using the elevator and the gouge forceps (Fig. 3C). We enucleated the cyst with the Lucas curet. We checked with the endoscope for residual tissue. The aim was to enucleate the cyst with its tooth as extensively as possible, as it was considered to be responsible for the patient's current symptoms. Intraoperatively, as the upper wall of the cyst was in continuity with the floor of the orbit, completely fixed and integrated with it, it was decided not to remove it, in order to limit the risk of complications. We washed and cleaned the sinus with saline and povidone-iodine. The anatomical

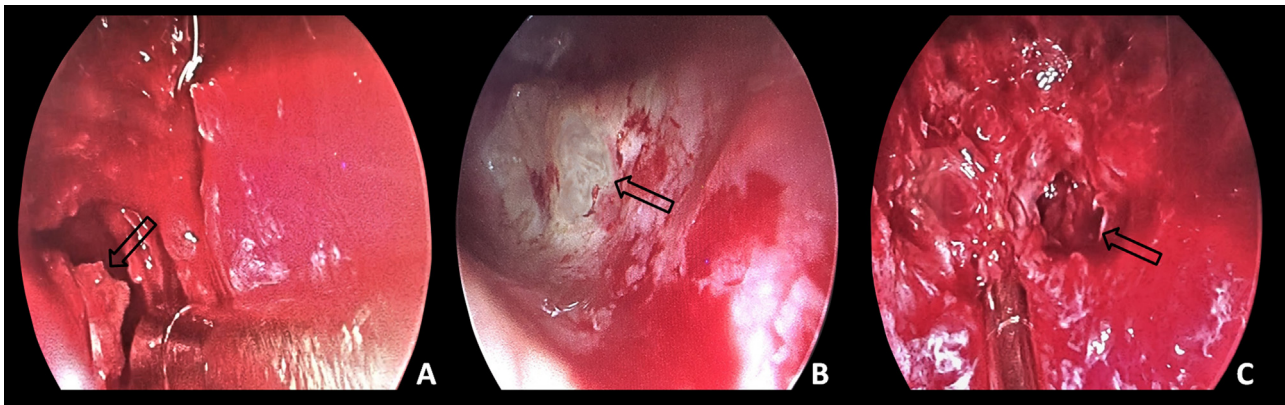


Fig. 3. Intraoperative endoscopic images. (A) Nasal endoscopy with the roots of the 3M (arrow). (B) Oral-antral endoscopy with the crown of the 3M embedded in the sinus mucosa (arrow). (C) Oral-antral endoscopy after the tooth was luxated and removed (arrow).

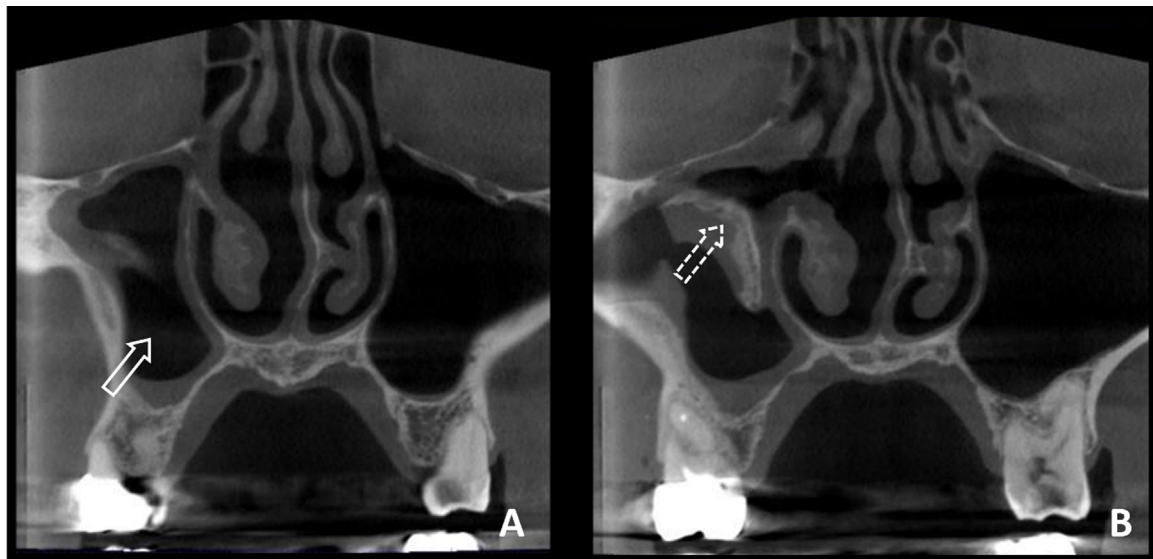


Fig. 4. Multiplanar Cone Beam Computed Tomography (CBCT) sections, June 2022. (A) and (B): Coronal sections in site of 2Ms showing the empty sinus (arrow) and the upper residual cyst wall (dotted arrow).

specimen was sent for anatomopathological analysis. We closed the OSC by tracting the buccal fat pad, which we covered with a displaced gingival flap and sutured with 3.0 absorbable braided suture.

Postoperative treatment included antibiotic therapy with amoxicillin, anti-inflammatory treatment with prednisolone 20 mg 4*/d for 4 days, alcohol-free mouthwash, and nasal cavity washing with saline.

The postoperative course was uncomplicated. The check-up at third week showed complete mucosal healing with no signs suggestive of persistent OSC. The radiological check up at 6-months showed on the CT scan that his right sinus was mostly empty with good communication to the nasal cavity and the upper residual cyst wall (Fig. 4). At the 18-month clinical follow-up, the patient's quality of life had improved, with the complete resolution of his initial symptoms. The patient will be monitored regularly in the department and imaging will be carried out according to the patient's symptoms.

The pathological analysis of the specimen measuring $31 \times 15 \times 12$ mm showed an odontogenic cyst of inflammatory nature with a "foreign body reaction" type (Fig. 5).

Discussion

Knowing that the avulsion of maxillary 3Ms is a common procedure, their expulsion into the sinus should, in theory, be less frequent when attempted by an experienced practitioner assessing the benefit-risk balance for the patient, based on factors that predict the difficulty of the procedure such as the position of the maxillary 3M, its relationship to the maxillary sinus and also its relationship to the distal root of the maxillary 2M [8].

It is interesting to recall that to date there is no scientific evidence to recommend or contraindicate wisdom teeth avulsion in an asymptomatic patient [9]. In our case, in the

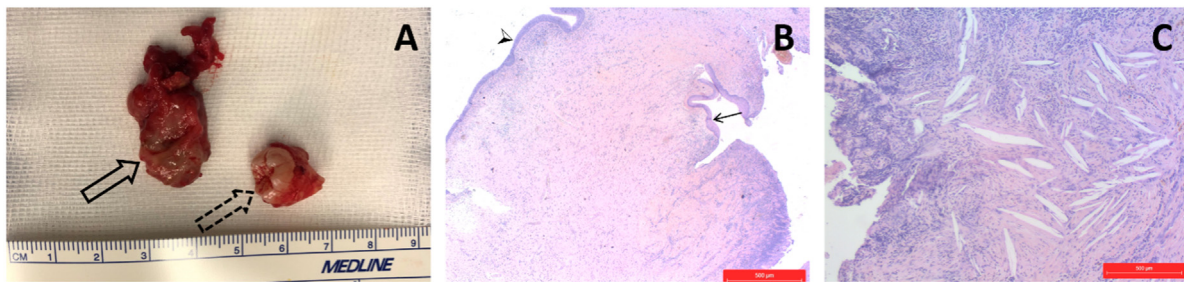


Fig. 5. Macroscopic and histological analysis of the surgical material. (A) Macroscopic picture of the enucleated cyst (arrow) with 3M (dotted arrow). (B) Microscopic image (HES X 25): the non-keratinizing squamous cyst lining (arrow) and the respiratory sinus lining (arrowhead). (C) Microscopic image (HES X 100): resorptive granuloma-like inflammation with macrophages and cholesterol crystals.

absence of clinical and radiological medical data, it is impossible to know the initial symptomatology that motivated the operation 30 yr ago. It is therefore important in symptomatic patients to look for predictive factors of intraoperative difficulty in order to limit certain rare complications such as projection of the maxillary 3M, implying a more complex management.

We remind all practitioners that there is a minimally invasive procedure that is technically accessible in case of projection of a 3M into the sinus. This is the "irrigation/suction technique", which consists in irrigating the sinus through its iatrogenic communication with saline water and then aspirating the tooth with the aspiration cannula. If this is not sufficient, a second procedure should be considered. If the tooth is asymptomatic and there is no cystic lesion on imaging, regular follow-up appointments may be an alternative to surgery.

There are two main surgical approaches to access the maxillary sinus. The endoscopic endonasal approach, with different sinus access methods including: prelacrimal, inferior meatotomy, medial meatotomy, medial maxillectomy or a combination of these approaches. The other main approach consists in a sublabial anterior approach, also known as the conventional Caldwell-Luc procedure (CLP), which in its original description is an anterior antral window opening for direct surgical access. This procedure has evolved since the arrival of functional endoscopic sinus surgery (FESS) in the 1980s [10], and is described as a modified endoscopic maxillary sinus surgery (MESS); modified in terms of access and also through the use of endoscopy.

Few studies compare the CLP and the endonasal approach. A meta-analysis by Courtot *et al.* [11] lists 39 cases reported up to 2020, and compares the two aforementioned techniques. The comparison of these two techniques is difficult because of the inter-surgeon variability of the procedures, as well as those related to the intra-sinus location. Of the 39 cases, only 3 cases underwent a MESS, and none were performed using a pre-existent OSC similar to that of the patient in our case. Their conclusion is that the location of the tooth does not play a role in the choice of the technique used. Another recent retrospective study by El-Fattah *et al.* [12], describes the approach used depending on the location of the tooth within the sinus and shows the usefulness of endoscopy in all cases for

minimally invasive purposes. In this study, with the exception of the sinus floor, the endonasal approach was used for the management of all intra-sinus locations. Nevertheless, the use of the nasal endoscopic approach for a tooth located on the sinus floor is also possible, as described in a case study by Micozkadioglu *et al.* [13].

In our case, the joint opinion of an ENT specialist and an oral surgeon in view of the potential risks and expected complications of each approach led to the following conclusions. Given the small size of the pre-existing OSC and the objective of a minimally invasive surgical procedure for the patient, it was decided to initially use his pre-existent OSC, enlarging it if needed by a maximum of a few millimeters for the passage of instruments. Per-operatively, if access proved insufficient given the posterior position of the OSC, a 2nd endonasal approach would be chosen to facilitate access to the tooth rather than widely opening the anterior wall of the sinus. One of the reasons for this choice was to preserve the alveolar ridge adjacent to already damaged teeth (first and second molar), and thus, to allow a future hypothetical sinus bone graft if needed, for prosthetic rehabilitation or for implants [14]. In addition to this, we wanted to improve the chances of healing his pre-existent OSC, which is a known complication of the sublabial approach [15]. Among the various possible endonasal approaches, we opted for a medium meatal approach because of the functional aspect of the procedure which takes into account the ostium of the sinus in order to re-establish a natural mucociliary drainage. Furthermore, this approach was preferred for better access to the tooth and its cyst, which were positioned close to the middle meatus. Other approaches such as a median maxillectomy seemed too invasive, and a prelacrimal approach would not be in line with normal sinus physiology and an optimal drainage.

Endonasal and intraoral approaches have also been compared and widely used for all causes of odontogenic maxillary sinusitis (OMS). Conclusions are that CLP is no longer recommended in the era of FESS [15] and that endoscopy should be considered when the technical platform is available. The endoscopic endonasal approach has been widely indicated to reduce notably postoperative maxillary cyst formation, to ensure the preservation of the posterior maxillary alveolar ridge and preserving sinus physiology. The innovative and efficient MESS approach shares the same strengths and can be used in many sinus pathologies such as removal of migrated implants [16].

In addition, it is interesting to evaluate the value of a multidisciplinary approach, both for the patient and the practitioners. In our case, for example, it was possible to combine the expertise of an ENT and an oral surgeon. This allowed discussing the pros and cons of each scenario before surgery and also sharing expertise during surgery.

Conclusion

In conclusion, a trained multidisciplinary team combining oral and ENT surgeons allowed in one step, thanks to a middle meatotomy and a small widening of a pre-existing OSC, the avulsion of an ectopic 3M, the enucleation of its cyst of inflammatory origin, as well as the closure by a local fat flap. Although the displacement of a 3M in the maxillary sinus remains a rare situation, it is desirable for the patient to be managed by an experienced practitioner with a minimally invasive objective. The use of the endoscope seems to be an innovative and promising method that is not yet widespread. In view of the recent literature, for a minimally invasive procedure and a better management of this pathology, the endoscope should be part of the surgeon's therapeutic arsenal, and the training of practitioners in its use could greatly facilitate procedures.

Availability of data and materials

The data used for this case can be accessed by contacting the author in charge of communications, G.MS.

Conflict of interest

The authors declare that they have no affiliation with the subject matter of this article.

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Ethical approval

Ethical approval was not required.

Informed consent

Written informed consent was obtained from the patient.

Authors contributions

MS was in charge of conception, design, data collection, writing, analysis, interpretation and literature analysis. T. P, E.

M, E.B, A.C, A.S et N.D were implicated in critical review and supervision and approval of the final manuscript.

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