

Up-to date review and case report

Atypical surgical approaches for removal of ectopic third molars: report of three cases

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(Received 1 February 2016, accepted 29 April 2016)

Key words:
ectopic tooth /
migrated tooth / tooth
extraction / Lefort
osteotomy

Abstract – Introduction: Surgical techniques for wisdom tooth extraction are very well described and codified in the literature. As far as standard approaches are concerned, oral surgeons enjoy a wide array of therapeutics and methods to remove impacted third molars. However, conventional intra-oral first path is not suitable when it comes to atypical inclusion and/or limited access. **Observation:** This paper illustrates extreme situations where the intra-oral armamentarium shows its weaknesses: first, two cases where modified submandibular access was successfully used to remove deeply impacted lower third molars; and 1 case where Lefort I osteotomy was achieved to remove a maxillary third molar projected into the pterygo-maxillary fossa. **Discussion:** The extra-oral surgical approach for dental extraction is very rare and in most cases the classical intra-oral approach dominates. However, when intra-oral surgery of the pterygo-maxillary fossa is impossible by the conventional endobuccal method, appropriate extra-oral approaches might be useful. **Conclusion:** Rarely, atypical surgical approaches may be used for removal of ectopic third molars.

Mots clés :
dent ectopique /
migration dentaire /
extraction dentaire /
ostéotomie de Lefort

Résumé – Approches chirurgicales atypiques pour l'avulsion de troisiemes molaires ectopiques : a propos de 3 cas. Introduction : Les techniques d'avulsion de dents de sagesse sont un sujet très bien documenté dans la littérature. Tant que leur position est classique, les chirurgiens ont à disposition un large éventail de thérapeutiques et de méthodes afin d'avulser ces dents. Dès qu'elles ont une position atypique ou un accès chirurgical très limité, il n'y a plus de consensus. **Observation :** Cet article met en avant des situations où l'abord intra-oral classique trouve ses limites : deux cas cliniques illustrent une voie d'abord sub-mandibulaire modifiée pour l'avulsion de dents de sagesse mandibulaires en position très basse, et un troisième cas clinique décrit une voie d'abord de type Lefort I pour l'avulsion d'une dent de sagesse maxillaire ayant migré dans la fosse ptérygo-maxillaire. **Discussion :** L'approche chirurgicale extra-orale pour une avulsion dentaire est exceptionnelle et dans la plupart des cas, une approche conventionnelle intra-orale suffit. Mais, lorsque une approche chirurgicale intra-orale de la fosse ptérygo-maxillaire est impossible, une voie d'abord extra-orale appropriée peut être utile. **Conclusion :** Rarement, une approche chirurgicale atypique pour les avulsions de dents de sagesse ectopiques peut être utile.

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Introduction

Extra-oral access for deeply impacted/projected third molar extraction is very uncommon because of the rarity of real ectopy or an associated complication, the extent of technical difficulties (especially nerve and vascular injuries, joint damage), and the scar from skin surgery.

Concerning the mandibular third molar, an intra-oral approach must be preferred whether through the sublingual fossa, or in the vestibula through the entire mandibular thickness; sagittal split osteotomy may also be indicated.

When dealing with a maxillary third molar projected into the pterygo-maxillary fossa, surgical access becomes rather complicated, and there is no consensus. As a result, there are several instances where the classical intra-oral approach becomes inadequate in cases of a limited surgical field and poor visualisation of an inaccessible region.

Case report 1

A 42-year-old Caucasian male was referred by his general dental practitioner for extraction of his mandibular left third molar. Panoramic X-ray showed a deep dislocated and horizontal third molar (Fig. 1). Computed tomography (CT) scan revealed a lingual position of the molar roots with a straight relationship with the inferior alveolar nerve, and a large radiolucent area associated with the crown (Fig. 2a, 2b and 2c), probably indicative of development of a dentigerous cyst. Molar roots were palpable by neck examination.

To reduce the occurrence of infection or fracture, surgical treatment was proposed and accepted by the patient. The extra-oral approach was chosen instead of intra-oral access through the lingual space due to accessibility. Conventional intra-oral surgery through the entire mandibular body was also ruled out because of the need for extensive osteotomy with the risk of iatrogenic fracture and significant risk of inferior alveolar nerve injury.

The classical surgical approach required a skin incision that was to be made along and about 1 cm beneath the lower border of the mandible. With our technique, the incision was made 4 cm below the lower border of the mandible in order to be sure to avoid the marginal mandibular nerve (Fig. 3a). The platysma muscle had to be incised so that the submandibular gland could be reached. Facial bundle walking on the sidewall of the submandibular gland was located and ligated. The caudal pole of the gland was separated from the basilar edge of the mandible. The impaction site could be reached by a careful elevation of the periosteum on the lingual site of the mandible, upwards from its lower border (Fig. 3b). The tooth was finally released by a gently superficial osteotomy using a round bur on a surgical handpiece. The cystic lesion was removed (Fig. 3c) and was sent for histologic examination. The inferior



Fig. 1. Case 1: pre-operative panoramic X-ray: left mandibular third molar presenting a deep, horizontal position in the mandible. Large radiolucent area associated with the crown of the tooth.

Fig. 1. Cas 1 : orthopantomogramme pré-opératoire : la 3^{ème} molaire mandibulaire gauche est horizontale et avec une position relativement basse. Une radioclarité importante s'observe en regard de la couronne de la dent.

alveolar nerve was not exposed. A drainage tube was placed for 2 days to prevent hematoma development. Finally, the soft tissues were closed in layers.

The following day, normal function of the facial, inferior alveolar and lingual nerves was demonstrated.

Case report 2

A 65-year-old Caucasian woman was referred in emergency conditions for development of left mandibular swelling. Medical history and clinical examination highlighted post-surgical partial facial palsy and permanent limitation in mouth opening of about 15 mm due to an acoustic neuroma operated 10 years earlier. Intra-oral examination showed purulent discharge distal to the mandibular left second molar. Panoramic X-ray showed a radiolucent area next to the second mandibular molar and, on the same side, the presence of an impacted wisdom tooth (Fig. 4a). Surprisingly, CT scan showed a crack across the outer line of the left mandible between the second and the third mandibular molars (Fig. 4b). Multiple tooth extraction including the wisdom tooth and osteosynthesis of the fracture were necessary.

In this case, intra-oral access was not possible due to the severe mouth opening limitation, with the risk of worsening the pre-existing facial palsy.

In order to minimise the risk of lesions of the marginal mandibular nerve, the same procedure was followed to reach the lower border of the mandible as described in case 1 (Fig. 5a). The osteosynthesis plate (Fig. 5b) was prepositioned, removed before wisdom tooth release, and fixed at the end of the procedure (Fig. 5c). The inferior alveolar nerve was not exposed. A drainage tube was placed for 2 days to prevent hematoma development. The soft tissues were closed in layers. Finally,

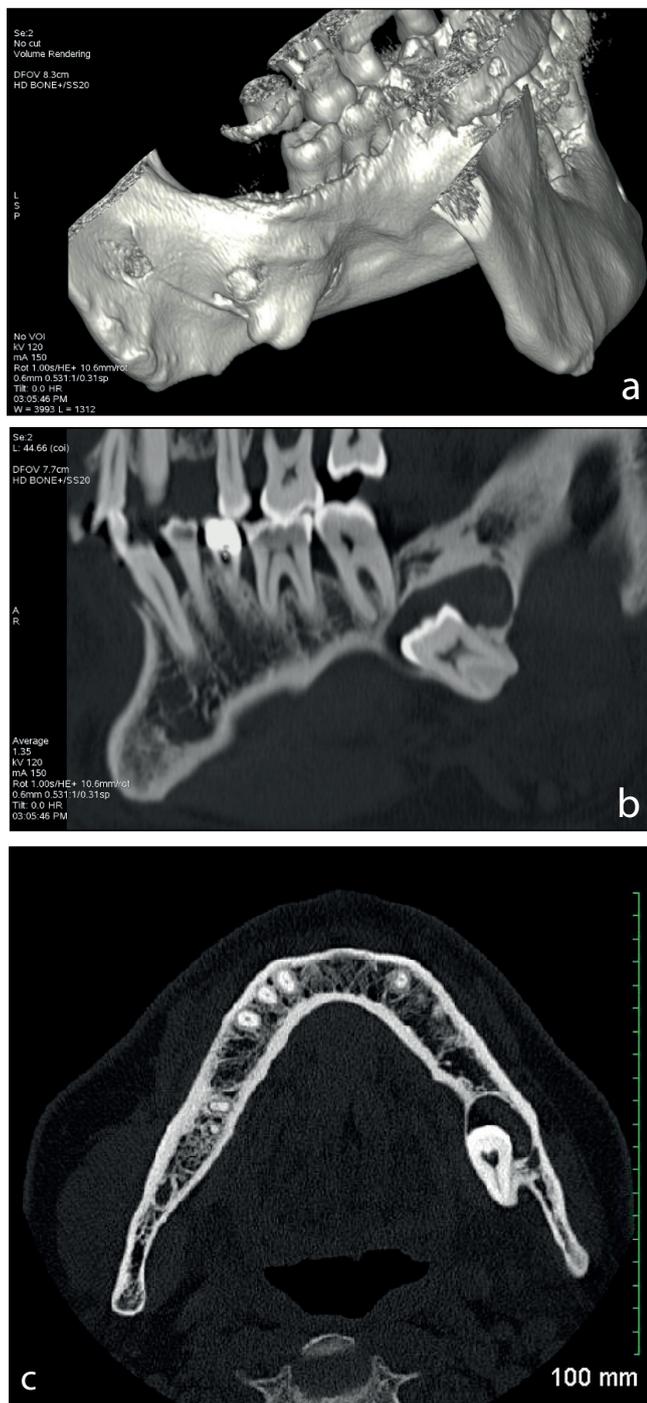


Fig. 2. Case 1: Denta-Scan: **2a**: 3D reconstruction: roots of the mandibular left third molar are in lingual position. **2b**: View on sagittal split. **2c**: View on horizontal split.

Fig. 2. Cas 1 : Denta-Scanner : 2a : reconstruction 3D : les racines de la 3^{ème} molaire mandibulaire gauche sont en position linguale. 2b : Vue en coupe sagittale. 2c : Vue en coupe horizontale.

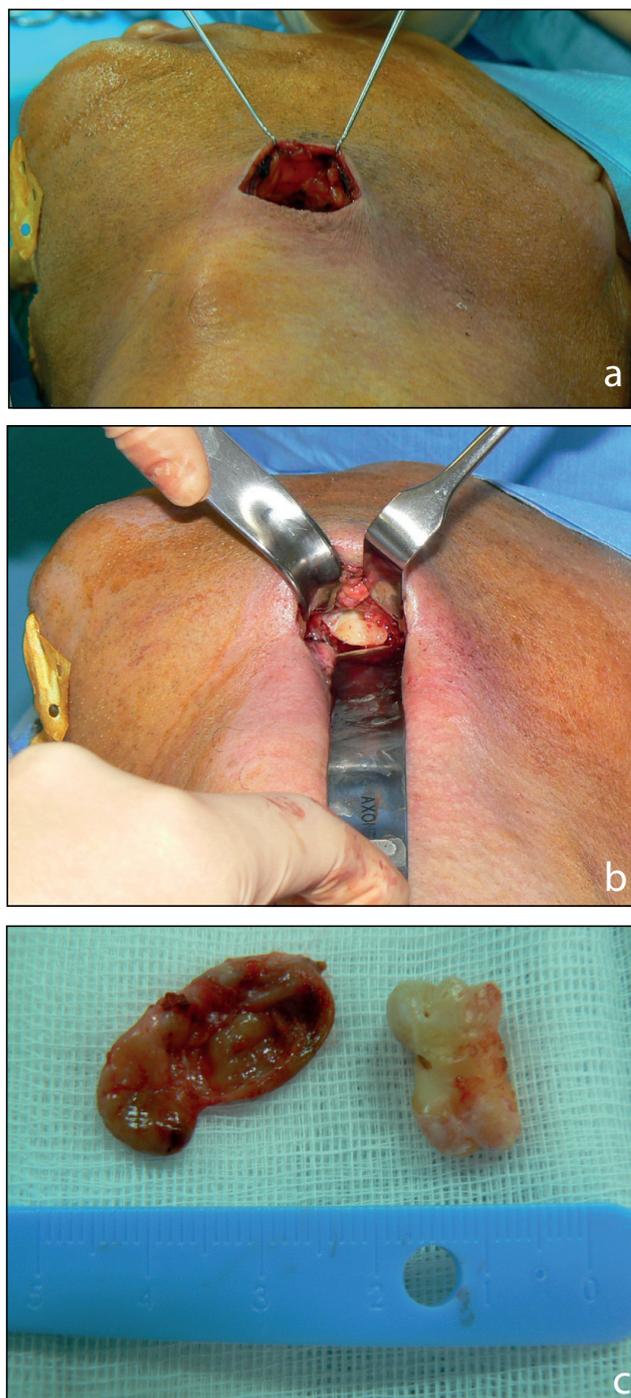


Fig. 3. Case 1: the surgery. **3a**: Incision is made 4 centimeters below the horizontal branch of the mandible, 4 centimeters long. **3b**: Visualisation of the tooth after alveolectomy. **3c**: Diameter of the cyst is approximately 2.5 centimeters.

Fig. 3. Cas 1 : la chirurgie. 3a : Une incision est réalisée 4 centimètres sous le rebord basilaire mandibulaire, sur 4 centimètres de longueur. 3b : Visualisation de la dent après alvéolectomie. 3c : Le kyste fait environ 2,5 centimètres de diamètre.

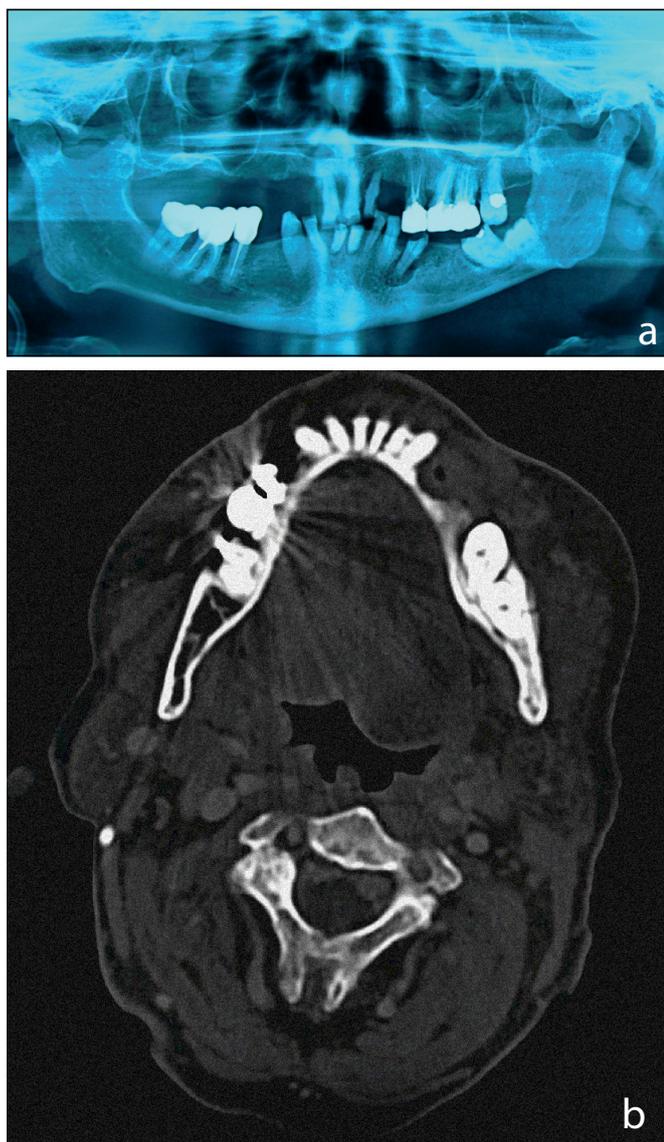


Fig. 4. **4a** Case 2: pre-operative panoramic X-ray shows radiolucent area next to the mandibular second molar and, on the same side, the presence of the wisdom tooth impacted in deep mandibular branch position. It also shows multiple infected teeth. This radiography was taken three weeks before the emergency, the left first premolar was then already lost. **4b** Case 2: horizontal view of CT-scan shows a crack across the outer line of the left mandible between the mandibular second and third molars.

Fig. 4. Cas 2 : 4a : orthopantomogramme pré-opératoire montrant une zone radioclaire dans la région de la seconde molaire mandibulaire gauche, avec la présence simultanée d'une molaire impactée en position très basse. Des foyers infectieux sont mis en évidence sur plusieurs dents. Cette radiographie a été réalisée 3 semaines avant la consultation d'urgence, la seconde prémolaire gauche était alors déjà perdue. 4b : Coupe horizontale de l'examen tomодensitométrique montrant un trait de fracture entre les deuxième et troisième molaires mandibulaires gauches sur la table externe de la mandibule.

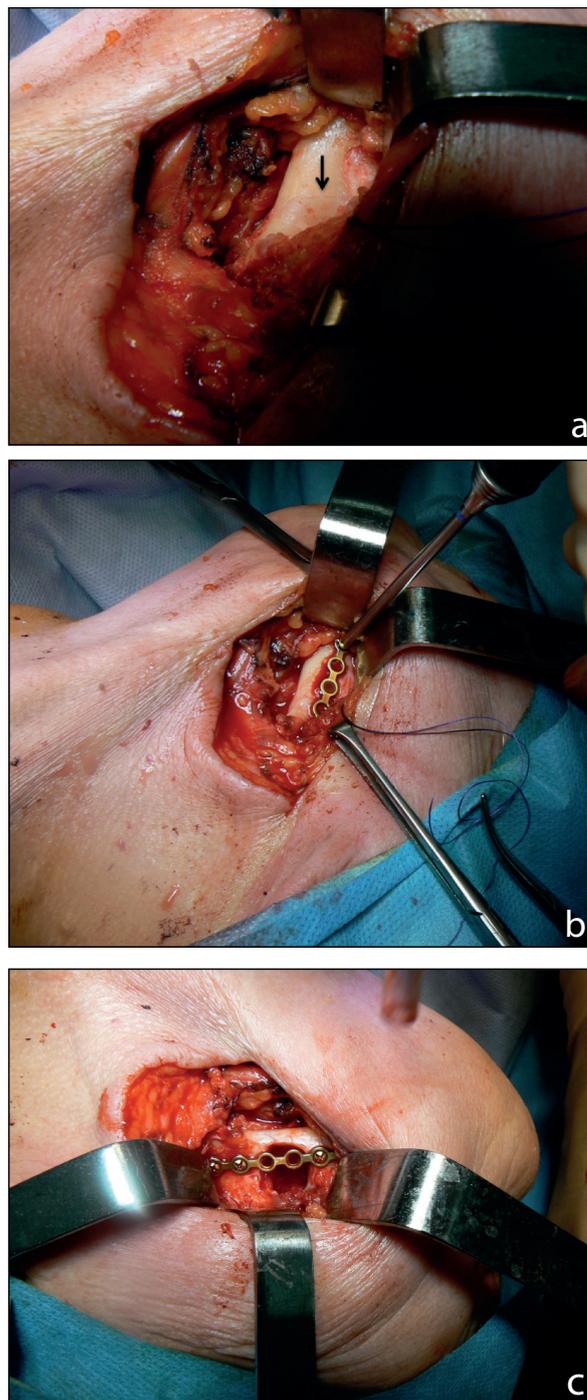


Fig. 5. Case 2: the surgery: **5a**: visualisation of crack on the outer line of the left horizontal branch of the mandible. **5b**: Positioning of screws of osteosynthesis plate before alveolectomy. **5c**: Repositioning of osteosynthesis plate after extraction of mandibular third molar.

Fig. 5. Cas 2 : la chirurgie : 5a : visualisation du trait de fracture sur la face externe de la branche horizontale mandibulaire gauche. 5b : Position des puits d'ostéosynthèse avant alvéolectomie. 5c : Repositionnement de la plaque d'ostéosynthèse après avulsion de la 3^{ème} molaire.

the second premolar and second molar were extracted by conventional intra-oral access because of mobility.

Two weeks after surgery, normal function of the inferior alveolar and lingual nerves was demonstrated. The patient did not experience exacerbation of the preexisting motor dysfunction of the facial nerve.

Case report 3

A 19-year-old Caucasian woman was referred by a maxillo-facial community surgeon for extraction of a projected maxillary left third molar. Panoramic X-rays (Fig. 6a) showed an unusual deep location of the tooth in the soft tissues. CT scan (Fig. 6b) indicated migration behind the lateral pterygo-maxillary left process, associated with an osseous growth reaction.

The extraction of this tooth was first attempted in 2009, following orthodontic treatment. The patient was not informed that this complication occurred, and the tooth was discovered incidentally in 2011 thanks to a panoramic X-ray.

The initial strategy was clinical monitoring. The rich innervation and vascularisation of the fossa justified a cautious attitude. The presence of the maxillary artery and the emergence of the trigeminal nerve represented a very high surgical risk while there was no symptomatology.

It was in 2013 that painful symptoms occur recurrently. The patient described an irradiant pain on palpation of the maxilla tuberosity. No trismus was noted. Antibiotics and analgesics resolved the situation. However, surgical treatment was proposed and accepted by the patient. Lefort I osteotomy access was chosen. Due to the poor visibility and access to the region, the lateral pterygo-maxillary process was resected, and the palatine vascular pedicle cut. The following day, hypoesthesia with paresthesia of the lingual and dental inferior nerves was noted. A post-operative scan was performed at eight months, showing the lack of an inflammatory reaction. At eight months post-operatively, the patient still showed signs of paresthesia in the V3 territory.

Discussion

Extra-oral approach surgery for dental extraction is very limited and in most cases the conventional intra-oral approach dominates.

Through these cases, we highlight two different indications. Certain specific conditions may call for use of this kind of access. First the site of tooth impaction is the main argument [1-3]. Abu El Naaj et al. presented a Third Molar Classification (TMC) according to the position relative to the mandibular canal using a standard panoramic X-ray. According to these authors, patients typed as TMC III (third mandibular molar localised below the mandibular canal) must be treated

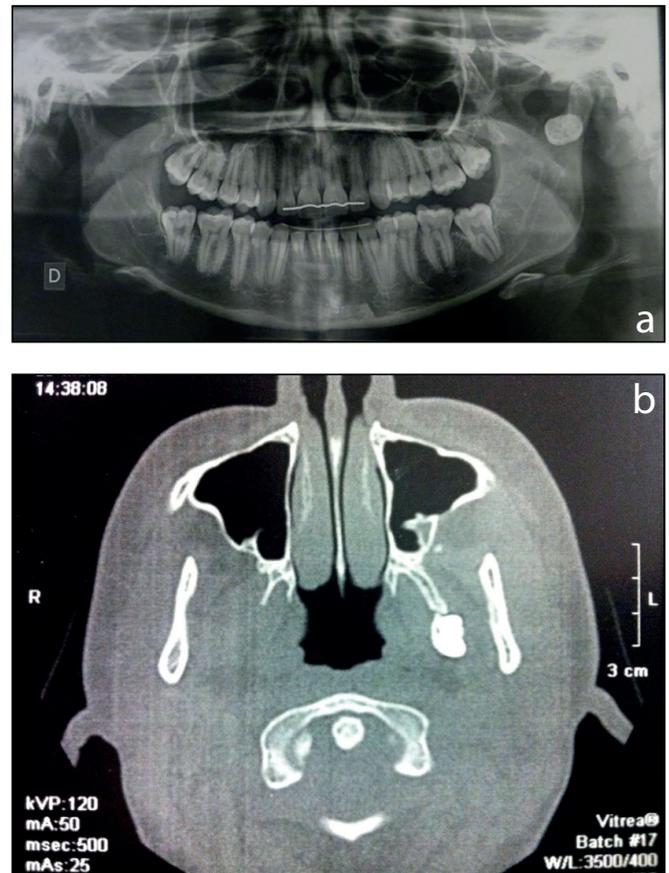


Fig. 6. Case 3: **6a**: pre-operative panoramic X-ray showing an unusual deep location of the tooth in the soft tissues. **6b**: CT scan indicated migration behind the lateral pterygo-maxillary left process, associated with an osseous growth reaction.

Fig. 6. Cas 3 : 6a : orthopantomogramme pré-opératoire montrant une localisation de la dent anormalement enfouie dans les tissus mous. 6b : L'examen tomodensitométrique montre une migration de la dent derrière le processus ptérygo-maxillaire latéral gauche, en rapport avec une croissance osseuse réactionnelle.

with an extra-oral approach [4]. This technique allows a direct view of the relationship between the tooth and the mandibular nerve [5,6].

Second, mouth opening is another argument. In fact, the first description of an extra-oral approach to extract an impacted third molar was reported by Christensen in 1950, for a patient with severe trismus [7].

Facial nerve injury is the most serious complication, due to the mental branch passing along the mandibular edge. One way to avoid this is a sub-maxillectomy surgical approach: a safety distance of 4 cm between the incision and the felled edge has to be respected, in order to protect any nerve branch and avoid an unsightly scar [8].

This present work opens to another surgical approach. The most complicated aspect is to determine the indication for the

surgery. Milner *et al.* recommend careful pre-operative clinical and radiological investigation [9].

Intra-oral approach surgery of the pterygo-maxillary fossa is impossible by the conventional endobuccal method.

The pterygo-maxillary fossa is laterally limited by the lateral plate of the pterygoid process and medially limited by the perpendicular plate of the palatine bone [10]: it is made up of a progressive gap down to the top of the tuberosity of the maxilla and the pterygoid process. It is thus to be differentiated from the infra temporal fossa, more superficial, medially limited by the lateral plate of the pterygoid process.

Surgical access to this region is therefore rather complicated, explaining Lefort I osteotomy [8]. The possibility of another surgical approach was examined. Several cases of trans-sinus methods for ectopic maxillary molars with a Caldwell-Luc approach have been described in the literature [9]. This technique was ruled out because this tooth was far away from the low sinus bottom. Furthermore, osseous resection would have been too damaging, and dangerous with poor eye contact. Endoscopic treatment is also suggested in the literature [10]. This procedure could not be performed in this case because the third molar was projected far away from the meatal complex. To our knowledge, only one case of Lefort I osteotomy for an ectopic intra-sinus wisdom maxillary tooth and cyst is reported in the literature: this was the most appropriate surgical approach allowing resection of the osseous septum, excision of the lesion in one piece, and the curettage of the sinus under visual control without causing significant decay of the anterior wall of the sinus [11]. However, no advice is codified and no similar cases of pterygo-maxillary tooth found. A Lefort I osteotomy is recommended for advised surgeons, and especially on dentate patients for easier repositioning.

Moreover, this region is exposed to a high nerve and vascular risk. The presence of the maxillary artery on the one hand, and the cranial emergence of the trigeminal nerve on the other, make the surgery hazardous.

Therefore, the removal of a pterygo-maxillary migrated third molar is to be carefully evaluated [12]. Three main situations may justify surgical treatment: first, infectious complications with the risk of a basilar region abscess, mechanical complications, when there are signs of blocking and cracking, and finally, nerve complications, with compression signs.

As a result, monitoring is necessary for patient care. Close follow-up will determine when surgery is needed, if the

risk of tooth non-removal is higher than the surgical treatment itself.

Conclusion

Rarely, atypical surgical approaches may be used for removal of ectopic third molars.

Conflicts of interests: none declared

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