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Anatomical risks of the extraction of the mandibular wisdom tooth in a transverse position: A case report

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Abstract
An impacted tooth is a tooth whose eruption is partially or completely prevented and which remains under the gum tissue or is completely embedded in the alveolar bone. The majority of dental impaction cases are mandibular third molar impactions.
The difficulty of their avulsion depends on their position, their depth and their proximity to the inferior alveolar nerve and many other anatomical structures such as lingual nerve. The dentist must be able to predict the difficulty of surgical extraction of the third molar and take that into account in the making of the avulsion decision.
in this work we describe a clinical case of a transverse impacted wisdom tooth (winter class 5) that we surgically extracted preserving the noble anatomical structures all around and we detail the technical procedure that allowed us to avoid them.

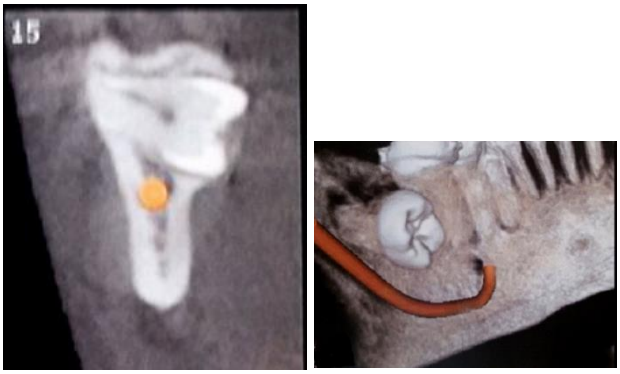
Keywords: wisdom tooth, transverse, lingual nerve, inferior alveolar nerve, oral floor

Introduction
One of the most common procedures performed by dentists and maxillofacial surgeons is the surgical removal of a mandibular third molar which is positioned in the retromolar trigone limited medially by the lateral lip of the temporal crest and laterally by the buccinators crest.
If the mandibular ramus-body junction is near the distal side of the 2nd mandibular molar, the retro molar trigone space is reduced and the mandibular third molar will be impacted in the bone wall of the mandibular ramus.
Most of the mandibular third molars are impacted in the area of the mandibular ramus near the second molar, and the level of difficulty of the extraction depends on the degree of Impaction, the angle of the tooth and it position in the mandibular branch.
In this work, we report a case of a physiologically impacted transversal mandibular third molar located in the mandibular ramus-body junction area. The study is focused on the anatomical risks caused by the extraction of this wisdom tooth and how to avoid them.

Case report
A 27-year-old female patient referred by the Dentofacial Orthopedics department for the extraction of the left mandibular wisdom tooth (38) in the oral surgery department, in Faculty of Dental Medicine of Monastir, Tunisia
Her medical history was unremarkable; she had no psychological nor significant hereditary medical conditions. The extra-oral examination showed no signs of swelling and the intra-oral exam did not show anything special, the mucosa covering the impacted tooth was normal with the presence of the biting tick line on the inner face of the jaw (Fig.1).
A panoramic radiograph showed that the crown of the left mandibular wisdom tooth is located high in the mandibular angle and Outcropping the inferior alveolar nerve and impacted against the distal root of the mandibular 2nd molar (Fig.2). In order to identify the exact location of the root computed tomography (CT) was performed. it revealed a transversal position of the third mandibular molar, the lingual situation of the crown caused the Thinning of the lingual plate with the presence of fenestration in relationship with cusps (Fig.3), the vestibular situation of roots caused the embrittlement of the vestibular bone wall. The mandibular canal is less than 1.5 mm from the tooth's crown with the total presence of its cortical lining.
The surgery was performed under local anesthesia (local anesthesia infiltration for the buccal nerve, and locoregional anesthesia block for the inferior alveolar nerve). An incision was done over the right external oblique ridge and extended from the second molar to the posterosuperior mandibular ascending ramus. osteotomy was performed with a bone bur at a speed of 800 rpm.
The root was exposed and carefully separated from the crown with a zekria bur to avoid the lesion of inferior alveolar nerve. The tooth was easily removed and the crown has been sectioned in the buccal-lingual direction to avoid its expulsion in the sublingual region due to the fragility of the lingual plate (Fig. 4, Fig. 5)
Sharp areas were smoothened, the site was curetted and cleaned with sterile saline solution and betadine, hermetic sutures were put in place using 4/0 vicryl braided absorbable suture. A prescription was given to the patient containing antibiotic (combination of amoxicillin and clavulanic acid) with posology of 1g * 3 / day for 7 days corticosteroid (unidex 8mg) for one day and paracetamol 1000 mg with the posology of 1g*3 / day during 5 days.
The patient was recalled after 10 days for sutures removal and postoperative evaluation. No nerve damage symptoms were detected (Fig.6)

Fig 1: intra oral view

Fig 2: Panoramic view of impacted crown of the left mandibular wisdom teeth



(a) (b)

Fig 3: Coronal section (A) and 3D reconstruction (B) of computed tomography (CT). CT scans shows a transversal position of the third mandibular molar with Thinning of the lingual plate

Fig 4: intraoperative view of the osteotomy and the separation of roots from crown

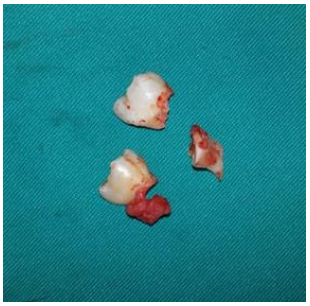


Fig 5: the fragmented third mandibular teeth was extracted

Fig 6: intra oral view on a day 10 before suture ablation

Discussion

Impacted tooth is a tooth which is completely or partially unerupted and is positioned against another tooth, bone or soft tissue so that its further eruption is unlikely, described according to its anatomic position [1].

Dental inclusions can be explained by 3 phenomena

- Physiological: the place of inclusion is close to the normal situation of the tooth as described in our case
- Ectopic: the tooth is included in the jaws, but far from its natural site
- Heterotypic: the tooth is impacted outside the maxillae which is exceptional [2]

Different factors such as morphology, mesiodistal width, unfavorable eruption and its path, were associated with third molar impaction [3]. However, the main reason for third molar impaction is assumed to be a lack of retromolar space [3, 4], which was reported by Björk *et al*. as in 90% of third molar impaction cases [4].

As for the mandible, the retromolar space is limited by the lateral lip of the temporal crest on the inside, and by the buccinator crest on the outside. When the junction between the ramus and mandibular body is close to distal side of the second molar, the area of the retromolar trigone is reduced, and the mandibular third molar is impacted in the ramus bone wall [5].

Impacted Third molars are classified according to winters classification based on their inclination compared to the second molar's axis:

Class 1: vertical angulation
class 2 horizontal angulation,
Class 3: disto-angular angulation
class4: mesio-angular angulation
class 5: transversal angulation
class 6: inverse angulation [6]

In this case we are faced to class, the surgical extraction of this type of third mandibular molar should be carefully performed. In fact the wisdom tooth area is surrounded by many noble anatomical structures that we must protect and preserve and dealing with a transversal angulation makes removing it even more risky [7, 8].

These anatomical structures are mainly:

-the mandibular canal that contains the inferior alveolar nerve and artery (IAN/IAA). The IAN is the largest branch of the mandibular nerve. It descends with the IAA, at first beneath the Pterygoideus externus, and then between the spheno-mandibular ligament and the ramus of the mandible to the mandibular foramen. It then passes forward in the mandibular canal, beneath the teeth, as far as the mental foramen, where it divides into two terminal branches, incisive and mental [9]. At the third molar area the IAN is on top of the IAA which makes its injury risk quite high.

- The lingual nerve: Within the infra-temporal fossa, the lingual nerve divides from the posterior division of the mandibular nerve (V3) as a terminal branch. As the lingual nerve proceeds anteriorly, it lies against the medial pterygoid muscle and medial to the mandibular ramus. It then passes inferiorly to the superior constrictor attachment and courses antero-inferiorly to the lateral surface of the tongue. As it runs forward deep to the submandibular gland, it terminates as the sublingual nerve. Nerve injuries in this region can predominately be attributed to dental interventions and the close spatial relationship of the nerve to the wisdom tooth area [10].

-The oral floor and the submandibular gland: which is one of the major salivary glands lies in the submandibular triangle medially to the mandibular molar region. The gland has a superficial and deep lobe separated by the mylohyoid muscle. It presents several important relationships with anatomical structures most at risk of injury during submandibular gland excision which are the intracapsular facial artery and vein, overlying marginal mandibular branch of the facial nerve, and the hypoglossal and lingual nerves medially [11]

As previously mentioned, the main anatomical structure at risk is the inferior alveolar nerve and it depends on the third molar impaction type and the depth of the tooth. According to several study the class five of winter, fortunately is the most infrequent type, presents the second highest risk of the IAN injury. Thus a preoperative radiological l examination is mandatory by using a panoramic and CBCT radiographs to analyze the anatomical factors in order to highlight the difficulty and the risk of this procedure and prevent its occurrence [12]. The most important features to note are the impaction level of the tooth, the roots anatomy and its relationship with the mandibular canal since it might be the principal cause and the elementary predictable factor for IAN impairment after teeth extraction [13, 14].

Many anatomical studies confirmed that the lingual cortical wall near the third mandibular molar is thinner than the vestibular, this thickness is more fragile by considering the lingual position of the crown for the class five of winter, so we are usually faced in this case not only a thin lingual bony table but also a presence of several dehiscence due to the cusps [15]. This situation could be dangerous when the lingual nerve is in contact with the lingual alveolar table and travels under the lateral sublingual mucosa.

These anatomical factors could lead to two complications: first of all, the injury of a noble anatomical structures should be taken into consideration while performing the surgery which is the lingual nerve and the IAN secondly, the ejection risk of the tooth, crown or fragments to the oral floor.

In order to avoid the LN injury, the incision, especially the distal relieving incision for wisdom tooth, should not be made medial to the ascending branch because the variability of the nerve and its possible surface positions that may cause a lesion. The tangent to the distal surface of the third molar is also suited as a guideline for orientation. The incision should be made at a 45° angle to this tangent in the buccal direction. Moreover, during free raising of the lower wisdom tooth, attention should be paid to the fact that a full thickness flap should be raised and a raspatory should be pushed distolingually between the periosteum and bone in order to protect the periosteum and lingual nerve [9].

In addition to that, the second complication previously cited is the expulsion of the third molar into the oral floor that can affect the overriding anatomical elements at this region which is the submandibular gland, the close relationship with the facial artery and vein and the mylohyoideus nerve and artery. In fact, even that it is a rare complication, the tooth orientation makes the risk higher in this case. Also, since it is a rare orientation too, a particular attention should be paid to the point of application of the elevator and the extraction movements necessary to deliver a tooth during surgery, that are determined by the type of impaction, to avoid an eventual expulsion and mandibular fracture [16].

Conclusion

In conclusion, besides the usual precautions taken while performing a surgical extraction of mandibular wisdom tooth, a particular consideration should be given to the transversal cases since it is an infrequent type and surgeons are not used to it which makes the complication risk higher. In order to perform a successful surgery with the minimum of per and post-operative complications, a pre-surgical analyze of all the risk factors especially the anatomical ones is a must underlying a case by case basis.

Conflicts of interest

There are no conflicts of interest

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