



Case Report:

Atypical Course of Maxillary Artery Piercing the Temporalis Muscle in the Infratemporal Fossa

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Abstract: Maxillary artery is one of the important contents of the infratemporal fossa. Reports on branching variations of the maxillary artery in the infratemporal region have been documented in the literature. We report in here a rare case of very superficial course of maxillary artery in the infratemporal fossa. The artery pierced the temporalis muscle from superficial to deep and divided the muscle fibers into superficial anterior and deep posterior parts. Entrapment of the maxillary artery within the muscle fibers may cause numbness or headache and may interfere with the injection of local anesthetics into the infratemporal fossa. Detailed knowledge of variations of maxillary artery in the fossa is of particular relevance in oral maxillofacial surgeries, management of epistaxis, intractable neuralgias or headaches.

Key Words: Maxillary artery, Temporalis, Piercing, Superficial

Introduction:

Maxillary artery is a branch of the external carotid artery supplying a vast region including the auditory tube, dura mater, the outer and middle ear, the upper and lower jaws, the muscles of the temporal and infratemporal regions, the nose and paranasal air sinuses, the palate and the root of the pharynx. It is a larger terminal branch of external carotid artery given off behind the neck of the mandible. In the infratemporal fossa, its course is divisible into three parts with relation to lateral pterygoid muscle.(1) While its first or mandibular part lies below the lateral pterygoid muscle, the second or pterygoid part usually lies superficial or lateral to lateral pterygoid and medial to the temporalis muscle. The third or pterygopalatine part enters the pterygopalatine fossa by passing between the two heads of the lateral pterygoid muscle and through the pterygomaxillary fissure. The usual relation of the second part of the maxillary artery with the lateral pterygoid muscle is variable as in about 29% of cases; the artery lies deep to the muscle.(2) Many authors have studied the variant pattern of the maxillary artery, but no consistencies among the reported observations are so far achieved. The peculiar course of maxillary artery piercing the temporalis

muscle that we are publishing herewith is a rare and unique variation. In the present case, an atypical superficial course of the maxillary artery, piercing the temporalis muscle was noticed. Such an anomalous course might lead to entrapment of the artery when the muscle contracts and may cause numbness or headache and may interfere with the injection of local anesthetics into the infratemporal fossa. This unusual morphology of the maxillary artery should be kept in mind by surgeons performing radical maxillectomy and endoscopic endonasal surgery for tumors of infratemporal fossa.

Case Report

During routine cadaveric dissection of the infratemporal region for the MBBS students, we observed a peculiar course of second or pterygoid part of the maxillary artery. The proximal half of the artery was superficial to the temporalis muscle. It then pierced the temporalis muscle and coursed deep to it lying lateral to lateral pterygoid muscle (Figure 1). Because of the arterial piercing, the fibers of temporalis muscle was divided into two parts; superficial anterior and deep posterior parts (Figure 2). The further course of the maxillary artery towards the pterygopalatine fossa through the pterygomaxillary fissure was unremarkable. No variations in the branching pattern and other relations of the artery were found. This variation was observed on the left infratemporal fossa of a male cadaver aged about 60 years.

Discussion

The infratemporal fossa is a complex anatomical area on the face that is affected by benign and malignant tumors. Comprehensive anatomical knowledge of the variant course of the maxillary artery is essential in choosing the best approach for treating lesions in this area.(3) Conventionally, the maxillary artery is classified into three types concerning its relation to lateral pterygoid muscle. The lateral type of the maxillary artery runs laterally to the lateral pterygoid muscle, the intermediate type of the artery runs through the lateral pterygoid and in medial type, it courses medially to the muscle. Following the presence of multiple patterns of variant

course of maxillary artery Maeda et al., proposed an extended categorization to this primary type of classification.(4) According to them, the lateral type of maxillary artery can be further divided into group A and group B categories based on its relation to temporalis muscle. In group A, maxillary artery pierces the temporalis muscle, whereas in group B it does not pierce the temporalis muscle (Figure 3). Among 104 cadavers (208 sides) examined in their study, no single case of group A maxillary artery was identified in contrast to 90.4% of group B cases. Though the present case is of group A category, the pattern of piercing the muscle is different. (Figure 2B).

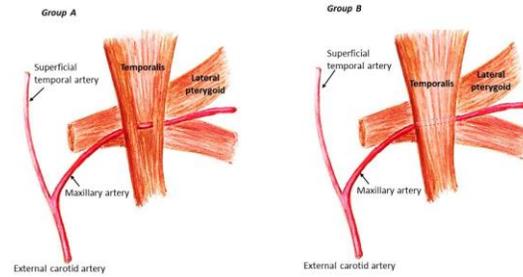


Figure 3: Schematic representation of Group A and Group B category of lateral type of maxillary artery according to Maeda et al (4) description.

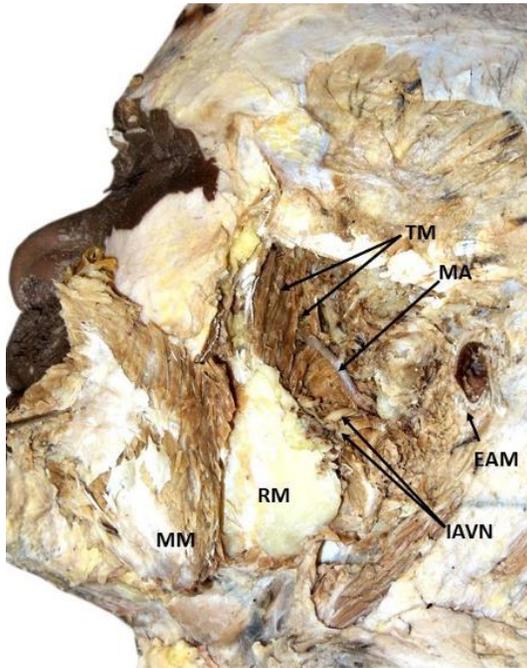


Figure 1: Dissection of the left infratemporal region showing maxillary artery (MA) piercing the temporalis muscle (TM). MM- Masseter (reflected anteriorly), RM-ramus of the mandible, EAM- external acoustic meatus, IAVN- inferior alveolar vessels and nerve

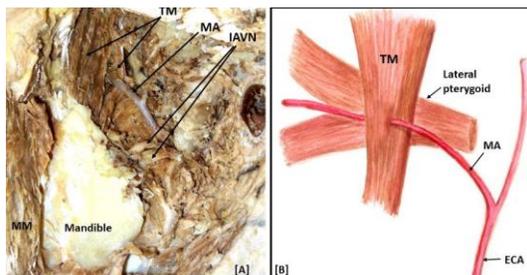


Figure 2: The closer view [A] showing the division of temporalis muscle (TM) being pierced by the maxillary artery (MA) superficial to deep. The schematic representation of the present case is shown in [B]. MM- Masseter (reflected anteriorly), IAVN- inferior alveolar vessels and nerve, ECA- external carotid artery.

Reports on the rare course of maxillary artery coursing through the nearby nerves of the infratemporal region, such as through the two roots of auriculotemporal nerve (5) and through the inferior alveolar nerve (6) are available in scientific literature. Abnormal passage of the artery through the nerve loop formed between auriculotemporal nerve and posterior division of mandibular nerve (7) and between the lingual nerve and trunk of mandibular nerve (8) are also reported.

A limited number of cases of maxillary artery piercing through the temporalis muscle at its superficial course is reported. (9,10) Patil et al. reported the complete intramuscular course of the maxillary artery through the substance of temporalis muscle and stated that the second part of the maxillary artery is liable to the variant course than its other parts.(11) Claire et al. has reported maxillary artery bifurcating into superficial and deep branches with the eventual reunion to form a complete loop in the infratemporal region.(12)

In the present case, very superficially coursed maxillary artery piercing the temporalis muscle and separating its muscle fibers into superficial anterior and deep posterior parts is a unique representation. The embryological basis for such variant course of the maxillary artery can be accredited to its initial vascular network ring formation adjoining the soft tissue structures in the developing infratemporal fossa. The eventual persistence of some of its parts may be responsible for the resultant atypical course of the artery.(12) Abnormal course of the maxillary artery within the infratemporal region is vulnerable to iatrogenic injury as the fossa is a clinically important anatomical area for local anesthetic procedures in dentistry and maxillofacial surgery.(6) Vascular variations in the region of infratemporal fossa can also result in failure of inferior alveolar nerve block and intravascular injection procedures. From the reported literature, it has been estimated that 20% is the prevalence rate of arterial penetration during mandibular block.(13)

Conclusion

The very superficial course of maxillary artery in the infratemporal fossa, piercing the temporalis muscle is a rare variation. Due to this anomalous course, the artery might get compressed by the contraction of the muscle during mastication and affect the blood flow through it. Such variations should be kept in mind by surgeons performing radical maxillectomy and endoscopic endonasal surgery for tumors of infratemporal fossa.

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