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Introduction

The middle meningeal artery (MMA) represents the most common source of acute traumatic epidural hematomas. The identification of the relationship between the MMA and the surface of the skull is paramount for a variety of surgical approaches to anterior and middle cranial fossa pathologies. Additionally, due to its relationship with MMA, we study the pterion, an important surface landmark in neurosurgical approaches.

Figure 1. Left Fronto-Orbito Zygomatic Osteotomy.

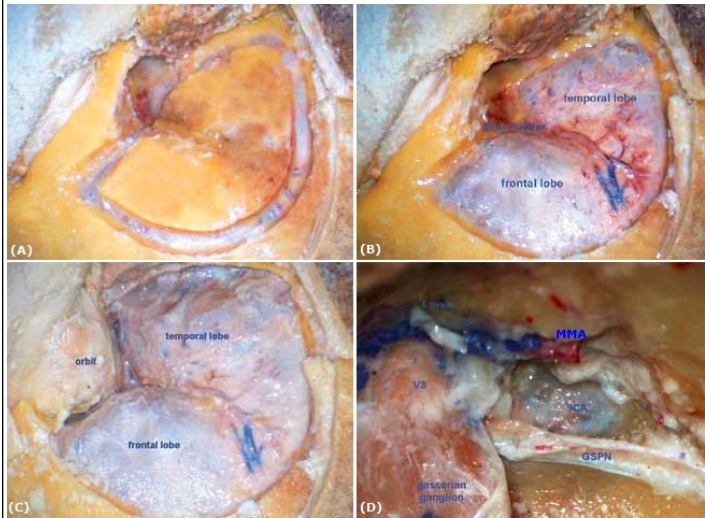


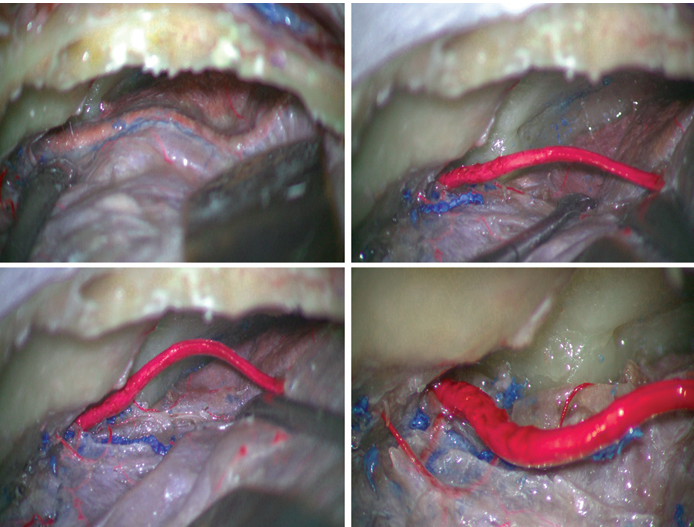
Figure 3: (A,B) the standard pterional bone flap was elevated, (C) removal of additional bone along the cranial base decreased the need for retraction and increased the field of view. (D) The middle meningeal artery is identified. V3 and foramen ovale are revealed after continued dural elevation.

Methods

10 adult cadavers (20 sides) underwent dissection of the MMA through a fronto-orbito zygomatic osteotomy (10 sides) (Figure 1) or a subtemporal osteotomy (10 sides) (Figure 2) to study the relationship between the MMA and surface anatomic

structures. Since the pterion overlies the anterior branch of the MMA, it was identified and the distance from the center of the pterion, and several superficial structures such as the superior border of the zygomatic arch and the posterolateral margin of the frontozygomatic suture, to the MMA was measured. The exposed surgical targets were also evaluated with a BrainLab neuronavigation system.

Figure 2. Left MMA Seen in a Subtemporal Craniotomy.



(A-C) The MMA is seen pre- (associated with the dura) and post-dissection. (D) The MMA is seen entering foramen spinosum.

Results

The location of the anterior branch of the MMA was relatively constant on both sides. The midpoint of the pterion was found to be on average 3 cm superior to the zygomatic arch and 3 cm posterior to the frontozygomatic suture. The anterior branch of the MMA was found to be 3.5 cm superior of the superior border of the zygomatic arch and 3 cm posterior to the frontozygomatic suture, crossing the temporosphenoidal suture.

Figure 3. External Landmarks for the MMA.

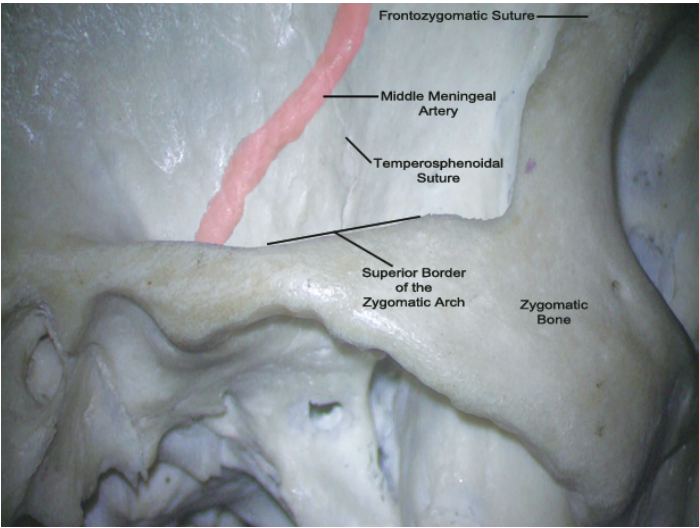


Diagram depicting the average course of the middle meningeal artery and its external bony landmarks.

Conclusions

The MMA runs just underneath the skull and is intimately associated with the dura mater just beneath the pterion. In addition to being the most common source of acute traumatic epidural hematomas, it can also be easily damaged perioperatively. The thorough analysis of the regional anatomy allowed us to identify reliable landmarks to locate the position of the MMA at the level of the foramen spinosum and in its distal course. A thorough knowledge of the course of the artery allows for a safer surgical dissection.

Learning Objectives

By the conclusion of this session, participants should be able to identify external landmarks for the middle meningeal artery.

References

1. Ma S. *Clin Anat.* 2012;25(3):330-339.
2. Carolina M. *Neurosurgery.* 2005;56(4):211-251.