Partially Thrombosed Internal Maxillary Pseudoaneurysm after Gunshot Wound

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Abstract

A 29-year-old man arrived in our emergency department after being shot on the face. Computed tomography (CT) revealed multiple facial bone fractures along the bullet trajectory. On day 10 of admission, CT angiogram of the neck revealed a partially thrombosed pseudoaneurysm in the parapharyngeal fat pad. The pseudoaneurysm was successfully treated with coil embolization. This report discusses diagnosis and treatment of a partially thrombosed internal maxillary artery pseudoaneurysm. Although digital subtraction angiography is the gold standard for pseudoaneurysm diagnosis, CT angiography may provide complimentary information, as seen in this case.

Keywords

- internal maxillary artery
- pseudoaneurysm
- gunshot

Traumatic vascular lesions of the head and neck are relatively common in urban trauma centers, arising from either blunt or penetrating forces. Potential complications of vascular injury range from simple intimal tear to complete rupture of the vessel. If the three layers of the vessel wall are compromised, active arterial extravasation or pseudoaneurysm may result. A pseudoaneurysm is an extravascular hematoma that communicates with the intravascular space. Pressure in the hematoma builds up until equilibrium is reached with the surrounding soft tissues, limiting further extravasation. Over several weeks, the hematoma liquefies centrally and produces a fibrous pseudocapsule.^{1–3} Rupture of the pseudocapsule due to pulsation of the liquefied hematoma can trigger severe hemorrhage or thromboembolism.^{1–3}

Vessels that are most susceptible to trauma in facial gunshot injury include the vertebral, internal carotid, facial, superficial temporal, and middle meningeal branches of the external carotid artery. The anatomic location of the internal maxillary artery (IMAX), deep to the parotid gland, mandibular ramus, and in the pterygopalatine fossa, usually protects the vessel from injury. Pseudoaneurysms of the IMAX are usually secondary to blunt or penetrating trauma, temporomandibular joint surgery, or orthognathic surgery.^{4–6} This report discusses diagnosis and treatment of a partially thrombosed IMAX pseudoaneurysm. Although digital subtraction angiography (DSA) is the gold standard for pseudoaneurysm

diagnosis, computed tomography angiography (CTA) may provide complimentary information, as seen in this case.

Case Report

A 29-year-old man presented to our emergency department with gunshot wounds on the face. An entrance wound was noted in the right mastoid region with exit wound at the left zygoma. The patient had massive bleeding from the oropharynx and blood was draining from both nares. Bleeding was controlled with placement of transnasal Foley catheters. Facial bone CT (►Fig. 1) demonstrated fractures of the left maxillary sinus, left pterygoid plates, left zygomatic arch, and right mandibular ramus, all along the bullet track. On day 10 of admission, the patient underwent a CTA of the neck due to persistent neck swelling. A 4-cm lobular high attenuation mass was noted in the right parapharyngeal space and extending laterally through the stylomastoid foramen to abut the parotid tail (►Fig. 2). The lateral portion of the mass demonstrated attenuation similar to that of intravascular contrast, consistent with a pseudoaneurysm of the IMAX. The remainder of the pseudoaneurysm was filled with high attenuation clot. The patient subsequently had a digital subtraction angiogram, which demonstrated a 2.5-cm pseudoaneurysm arising from the right IMAX (►Fig. 3). Embolization of the pseudoaneurysm was achieved with platinum coils and confirmed on postembolization angiogram (►Fig. 4).

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Fig. 1 Axial CT of the facial bones demonstrates numerous fractures along the bullet trajectory. Note the transnasal Foley catheters in the nasopharynx for control of bleeding.

Discussion

Clinical signs of IMAX pseudoaneurysm often arise several weeks to months after trauma and include facial swelling, pain, pulsatile mass, neurological deficits, and thromboembolism.⁷ The options available to identify arterial injuries in the neck after penetrating trauma include DSA and CTA. Although DSA is considered the gold standard for detection of maxillofacial vascular injury, it is expensive,

Fig. 2 CT angiogram of the neck demonstrates a lobular mass extending from the right parotid gland through the stylomastoid foramen into the parapharyngeal fat pad. A portion of the mass (black arrow) is isoattenuating to intravascular contrast, consistent with a pseudoaneurysm. The remainder of the mass (double white arrows) is the thrombosed portion of the pseudoaneurysm.

Fig. 3 Lateral view of an external carotid angiogram demonstrates a giant pseudoaneurysm of the internal maxillary artery. Note that only the patent lumen is opacified, thus the apparent contradiction in pseudoaneurysm size when compared with the CT angiogram.

labor intensive, and has a small but definite risk of stroke.⁸ It is therefore not an optimal choice as a screening modality.⁹ Additionally, DSA will characterize only the patent component of a pseudoaneurysm, which can lead to an underestimation of lumen size depending on the degree of thrombus within the aneurysm. Partial thrombosis is often seen in giant pseudoaneurysms (>2.4 cm).¹⁰ When a pseudoaneurysm is completely thrombosed, DSA can fail to make the diagnosis.¹¹

Fig. 4 Post-coil embolization frontal view demonstrates successful occlusion of the pseudoaneurysm.

Helical CTA is a minimally invasive technique which depicts the neck vessels in relation to adjacent soft tissues and bone. Owing to its wide availability, it has essentially replaced DSA for the initial evaluation of patients with penetrating neck injury. Because it demonstrates all the soft tissues, the true size of a pseudoaneurysm is accurately depicted with CTA, including the degree of thrombosis versus the amount of patent lumen. The discrepancy in pseudoaneurysm size between DSA (2.5 cm) and CTA (4 cm) in our case was due to the thrombosed portion of the pseudoaneurysm, which was occult on DSA.

A recent review of the diagnostic performance of multi-detector CTA for vascular injuries of the neck demonstrated sensitivities ranging from 92.8 to 100% for internal carotid injuries but only 63.4 to 70.0% for external carotid injuries when compared with DSA.¹² This lower sensitivity is likely due to the fact that the external carotid artery (ECA) branches are considerably smaller in caliber, which may decrease the rate of detection of injuries owing to the lower spatial resolution of CTA compared with DSA. Therefore, negative findings on CTA should not preclude evaluation with DSA in cases where there is high suspicion for arterial injury based on the bullet trajectory.

Management of facial pseudoaneurysms with either close clinical follow-up or definitive treatment is considered mandatory, as these lesions may progress and result in exsanguination or airway compromise. Catheter embolization is the preferred treatment of facial pseudoaneurysms.³ This technique is minimally invasive, selective, and can reach damaged vessels that may be difficult to approach surgically. Immediate verification of the effectiveness of treatment may be obtained with a postembolization angiogram, as in this case. Materials that may be used for embolization include gelatin sponge, polyvinyl alcohol particles, acrylic glues, or detachable coils. In our case, clinical and imaging studies confirmed total regression of the lesion at follow-up.

Conclusion

Pseudoaneurysms of the IMAX, though rare, may develop after penetrating facial trauma. CTA is the screening exam of choice when vascular injury is suspected. Although DSA is the gold standard for detection of vascular injury, CTA may offer

complimentary information, as in this case of partial pseudoaneurysm thrombosis.

Conflict of Interest

The authors declare that they have no conflict of interest.

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