

Pseudoaneurysm of the internal maxillary artery following mandibular condylar fracture

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ABSTRACT

Pseudoaneurysm of the internal maxillary artery is a rare occurrence. A well-organized pulsatile mass that develops after a traumatic event indicates a pseudoaneurysm. Such lesions are commonly misdiagnosed for an abscess or a hematoma. Pulsations and audible bruit are diagnostic features of an aneurysm. Rupture of such false aneurysms cause significant morbidity. Management is either surgical resection or embolization. Endovascular embolization is indicated in deep seated lesions or lesions with high morbidity. Though surgical resection is an invasive procedure, it is considered to be an alternative to embolization.

Keywords: Angiogram, embolization, internal maxillary artery, pseudoaneurysm, surgical resection

INTRODUCTION

Vascular complications early or late, following jaw fractures are rare.^[1] Immediate danger is life-threatening hemorrhage following severe maxillofacial injuries such as gunshot wounds, blast injuries, etc., Late vascular complications include infected hematoma, a false aneurysm or an arteriovenous malformation. A false aneurysm (pseudoaneurysm) of head and neck region though rare can cause significant morbidity.

“An aneurysm is a focal, irreversible dilatation of an arterial wall.” A “true” aneurysm will have all three components of the arterial wall (i.e., tunica externa, media, and intima), while a pseudoaneurysm may have one or two components.^[2,3] The etiology may be (1) a blunt trauma to vessel, (2) iatrogenic transection of the vessel wall, (3) radiation injury and/or infection causing erosion of the vessel wall. Common vessels involved are: (1) Facial artery, (2) superficial temporal artery, (3) descending palatine artery, (4) internal maxillary artery (first and last parts), and (5) internal carotid artery (ICA). Possible complication is rupture of aneurysm resulting in massive hemorrhage, which poses a threat to life and warrants urgent intervention.

Vessel anatomy around temporomandibular joint

The vessel immediately medial to condyle is middle meningeal artery with a mean distance of 31 mm from the zygomatic arch. Internal maxillary artery and its major branches also lie immediately medial to condylar head. More distant from head of condyle are, carotid artery, internal jugular vein, and retromandibular vein.^[4]

Pathogenesis

The sudden medial displacement of the fractured bone fragments can injure the internal maxillary artery or its major branches. Bleeding from the fractured bone ends and injured/ruptured vessel collects around the mandibular condylar region till the pressures inside and outside the vessel become equal, or tissue tamponade results. Hematoma forms rapidly due to arterial bleed. The clot forms and starts organizing. During the reparative process of a ruptured vessel, the cellular components get employed in the formation of aneurysmal sac and the inflammation around the hematoma forms a fibrous capsule. The center of the clot liquefies. The arterial pressure or “jetting” of blood through the sac makes the lesion pulsatile, and a bruit is heard on auscultation. The formation of well-formed sac or pseudoaneurysm usually takes a long period, may be months or years after the trauma.^[1,5]

CASE REPORT

The present case is about a 22-year-old male who reported with a complaint of increasing swelling in front of the right ear since 2 months. Patient had a history of road traffic accident 2 months back, sustained injuries to lower jaw, and right upper limb. The patient was treated elsewhere for fracture right parasymphysis of the mandible by open reduction and internal fixation [Figure 1]. Patient was placed on intermaxillary fixation (IMF) for condyle fractures. Patient had persistent swelling in front of the right ear since then. The patient reported to us for treatment of swelling on the right side of the face and also for the removal of IMF.

On examination, the swelling was well-defined and was confined to parotid region [Figure 2]. The skin over swelling was

normal and pulsations seen over the swelling. On palpation, the swelling was soft, fluctuant and mimicked an abscess, except for the pulsation and an audible bruit. A provisional diagnosis of pseudoaneurysm was made and the patient was advised for an orthopantomogram and angio-CT [Figure 3], which confirmed a pseudoaneurysm. Carotid angiogram and possible embolization was planned [Figure 4]. Due to financial constraints of the patient only angiogram was done. A final diagnosis of pseudoaneurysm of the internal



Figure 1: Orthopantomogram showing treated fractures of parasymphysis and untreated bilateral condylar fractures



Figure 2: (a) Preoperative photographs. Front profile. (b) Right lateral profile. (c) Lateral profile. (d) Basal profile



Figure 3: (a) Computed tomogram. Coronal section. (b) CT coronal section showing thrombus and displaced condylar segment. (c) CT sagittal section. (d) CT axial section showing laterally displaced ramus. (e) Angio-CT showing the pseudoaneurysm

maxillary artery was made, with the identification of feeder vessel. Surgical resection of the aneurysm was planned. Under general anesthesia, an extended submandibular incision was given. Superior and inferior flaps were raised, the common carotid artery was exposed and a vascular clamp was applied to external carotid artery (ECA). The sac reduced in size considerably. The sac was attached to the posterior border of ramus, extended superiorly and medially until the infra-temporal fossa [Figure 5]. The sac was carefully dissected. At the superior end, the sac ruptured and profuse bleeding was encountered. A curved artery was used to control hemorrhage and remaining sac was dissected. Finally, feeder vessel (internal maxillary artery) and ECA were ligated. The displaced condylar stump was seen deep in infra-temporal fossa, and it was retrieved [Figure 5]. Wound was closed in layers after thorough hemostasis. A drain placed was removed after 36 h when the collection was negligible. Patient recovered well and was discharged on the 9th postoperative day. Patient was followed-up regularly and symptoms resolved completely. The jaw deviation and scar along incision line persisted. Patient did not opt for any further treatment [Figure 6].

DISCUSSION

It is a well-known fact that the face has abundant blood supply- both direct and collateral. These vessels are protected by the soft and hard tissues. Injury to these vessels can result in a rapidly developing hematoma. Usually, these hematomas resolve and do not leave a pathology behind. Rarely, the hematoma organizes into a pseudoaneurysm.

Trauma is the common cause of pseudoaneurysm, whether accidental or iatrogenic.^[6,7] Involvement of a vessel depends on the region of trauma sustained or area of operation. The internal maxillary artery crosses just medial to the condyle. The first part of this vessel gives two major branches, the meningeal and inferior alveolar. Sudden retraction of head of condyle following the fracture can injure any of these vessels resulting in extravasation of blood. Since the arterial bleed is brisk, a hematoma forms in no time. This may eventually turn into a pseudoaneurysm.

Clinically, the swelling enlarges gradually. Symptoms become apparent once the swelling attains a considerable size, and usually mimic an abscess or a cyst. A palpable pulsation or an audible bruit suggests an aneurysm. More specific investigation methods are angio-CT and angiogram.^[1,6,8]

Endovascular treatment has been advised for the lesions that are surgically not accessible or with high morbidity. Superficial lesions, lesions with large feeder vessels, severe anastomosis with neighboring large vessels are better treated by surgical resection.

Endovascular management is a non-invasive, safer procedure to treat pseudoaneurysms. The purpose of embolization is not to occlude the vessel because it can stimulate the growth of collateral blood supply. The objective of treatment is to diminish the blood flow at both mesial and distal ends. It is aimed at depositing the substance in the blood vessel network. This is accomplished

through a catheter introduced through the femoral artery. The catheter is advanced until common carotid artery and a contrast medium is used to identify the feeder vessel. A microcatheter and a microwire are used to convey the coils. An embolus

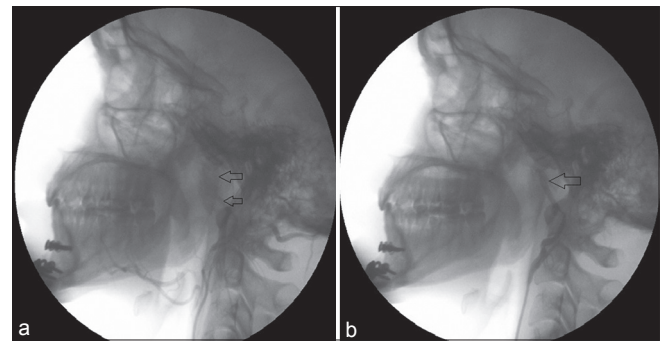


Figure 4: (a) Carotid angiogram. Upper arrow shows the aneurysm. Lower arrow shows feeder vessel. (b) Carotid angiogram. Showing internal maxillary artery

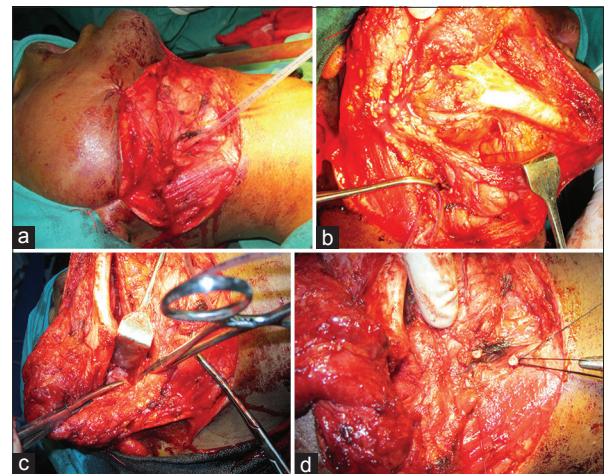


Figure 5: (a) Intraoperative photograph. Carotid artery exposed and dissected. (b) Carotid artery clamped at origin. Aneurysmal sac attached to the posterior border. (c) Condylar stump visible after dissection of sac. Note that a large artery is used to clamp distal feeder vessel. (d) Division of carotid artery after transfixation and ligation



Figure 6: (a) One month postoperative photographs front profile. (b) Right lateral profile. (c) Basal view. An unaesthetic scar at incision lines

forms (hence called embolization) around the coil and ceases the blood flow to the pseudoaneurysm. Embolization materials can be categorized as fluids that completely fill the lesion, particulate agents and mechanical devices. Few examples are gelfoam, gelatin, Dacron fibers, N-butyl cyanoacrylate, autologous clot, polyvinyl alcohol, platinum complex coils, Guglielmi detachable coils, and more recently electronically detachable platinum microcoils.

In trained hands, morbidity associated with such treatment is almost negligible (0.03% mortality and 1.73% morbidity) and results are promising.^[2] Common complications include injury to vessels, inadvertent embolization of ECA or ICA, dislodgement of coils or embolus, infarction, etc., Embolization is usually contraindicated in patients with significant anastomosis with neighboring major vessels, severe atheromatous disease and allergy to any of the contrast or embolizing agents.

CONCLUSION

Pseudoaneurysm of the internal maxillary artery is suspected when a pulsatile swelling persists following condylar injury. Though clinical diagnosis is not difficult, angio-CT or angiography accurately describes the lesion with feeder vessel identification. Endovascular management is relatively safe procedure. Surgery can be considered when the lesions are superficial and easy to resect or when super selective embolization fails. Factors influencing the treatment methods are multifold and best suited modality may be adopted on an individual basis.

REFERENCES

1. Ribeiro-Ribeiro AL, de Melo Alves Junior S, de Jesus Viana Pinheiro J. Traumatic pseudoaneurysm of the facial artery: Late complication and effects on local blood flow. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2011;112:e4-9.
2. Zachariades N, Rallis G, Papademetriou G, Papakosta V, Spanomichos G, Soulelem M. Embolization for the treatment of pseudoaneurysm and transection of facial vessels. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2001;92:491-4.
3. Madani M, Veznedaroglu E, Pazoki A, Danesh J, Matson SL. Pseudoaneurysm of the facial artery as a late complication of bilateral sagittal split osteotomy and facial trauma. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2010;110:579-84.
4. Talebzadeh N, Rosenstein TP, Pogrel MA. Anatomy of the structures medial to the temporomandibular joint. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1999;88:674-8.
5. Zachariades N, Skoura C, Mezitis M, Marouan S. Pseudoaneurysm after a routine transbuccal approach for bone screw placement. *J Oral Maxillofac Surg* 2000;58:671-3.
6. Fan X, Mao Q. Life-threatening oral haemorrhage of a pseudoaneurysm after raising of a fractured zygoma. *Br J Oral Maxillofac Surg* 2002;40:508-9.
7. Karanth SK, Jagannathan M, Mahesh SG, Devale M. Internal maxillary artery pseudoaneurysm in a case of mandibular fracture. *Indian J Plast Surg* 2007;40:51-3.
8. Rogers SN, Patel M, Beirne JC, Nixon TE. Traumatic aneurysm of the maxillary artery: The role of interventional radiology. A report of two cases. *Int J Oral Maxillofac Surg* 1995;24:336-9.

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