ABSTRACT

Aneurysms of the facial vasculature due to various accidental, violent, and surgical injuries have been reported since mid-17th century. Approximately 386 pseudoaneurysms of the superficial temporal artery (STA) have been reported in the literature since 1644. Traumatic pseudoaneurysm of the STA is a rare lesion. It manifests as a painless pulsatile mass in the temporal region following trauma. The unusual incidence and confusing presentation require the clinicians to have a thorough knowledge of its presentation and diagnosis. We present a case of traumatic pseudoaneurysm of the STA, which developed a few weeks later, after sustaining blunt trauma to the head. We have also reviewed the anatomical challenges and pathophysiology that promotes the formation of pseudoaneurysm and the optimal approach to diagnose and manage the lesion. Pulsatile lesions or lesions that are continuous with the STA should be regarded with extreme caution. The sole treatment modality is surgical resection of the pseudoaneurysm. This will avoid any future complications such as hemorrhage or compression of adjacent nerves and vessels.

Keywords: Painless, pseudoaneurysm, pulsatile, superficial temporal artery, trauma

INTRODUCTION

Traumatic pseudoaneurysm of the superficial temporal artery (STA) is a rare lesion. The lesion can present as an innocuous subcutaneous lump or a large, grotesque, pulsatile mass with a tendency toward massive hemorrhage. Due to its long unprotected course over face, the STA is most frequently involved in traumatic pseudoaneurysm. Since 1644, approximately 386 cases of pseudoaneurysm of the STA have been documented. Most pseudoaneurysms form as a result of blunt trauma and present as painless, pulsatile mass that may be associated with increased size or sometimes neuropathic changes.[1,2]

CASE REPORT

A 35-year-old male reported to our department with a chief complaint of swelling over the left side of face and in front of ear since 3 weeks. Under the influence of alcohol, patient had a history of fall from slow-moving train 1 month back. Patient had a history of blunt chest trauma and was admitted under the department of general surgery for observation. The same patient presented to us 4 weeks later with a painless pulsatile mass in the left temporal region. Initially, patient noticed a very small pea-sized swelling in front of left ear, around 1 week after trauma. There was a history of the gradual increase in the size of swelling to present size since then, and patient was feeling pressure over the involved region. There were no changes over skin surface. Patient did not complain of headache, ear discomfort, visual disturbance, dizziness, hemorrhage, or any neurologic defect. He was concerned about the increasing size of the swelling.

On local physical examination, a well-defined roughly spherical-shaped globular, nontender, pulsatile mass of about...
30 mm × 30 mm was seen over left preauricular region anterosuperior to the left tragus [Figure 1], it was easily compressible on digital pressure. Swelling did not disappear on the compression of the ipsilateral STA, but aneurysmal pulsations were eliminated. Transmitted pulsations could be felt over posterosuperior region of the swelling. Computed tomography (CT) of brain was normal. On auscultation, bruit could be appreciated. Another pulsatile mass was present above the swelling mentioned, measuring approximately 10 mm × 10 mm in maximum dimensions.

CT angiography revealed well defined, round to oval, hyperdense lesion measuring approximately 2.7 cm × 2 cm in left temporal space in the suprazygomatic region with nonenhancing hypodense area within the lesion suggesting partially thrombosed pseudoaneurysm from the superficial temporal branch [Figure 2a]. Doppler ultrasound of left preauricular region revealed relatively well-defined lesion in the preauricular region on the left side measuring 3.0 cm × 2.6 cm × 3.0 cm in size. Lesion was seen in close relation to the STA. The artery showed normal triphasic waveform. Color Doppler showed “yin-yang” sign and “swirling pattern” waveform. These imaging features were suggestive of pseudoaneurysm. Part of the lumen of the pseudoaneurysm appeared heterogeneous, suggestive of partial thrombosis of the lumen. Another small pseudoaneurysm was seen adjacent to above-described pseudoaneurysm and appeared thrombosed [Figure 2b and c].

Under general anesthesia, surgical exploration by Alkayat-Brahmley incision and temporal flap elevation was done [Figure 3a]. The mass was excised and proximal and distal cut ends of the artery were ligated [Figure 3b]. A 3.0 cm × 3.0 cm mass was resected [Figure 3c]. A standard pressure dressing was applied for next 48 h. No bleeding or any other complication occurred. Biopsy specimen sent for histopathological examination confirmed pseudoaneurysm. The report stated hematoma in arterial wall beneath thinned out adventitia and fibrovascular stroma with extravasated red blood cells [Figure 4a and b]. The patient recovered uneventfully after surgery and there is no recurrence after 1 year of surgery [Figure 5].

DISCUSSION

Aneurysms are classified as true, false, or dissecting. A true aneurysm involves all three layers of arterial wall while a false aneurysm (pseudoaneurysm) is a collection of blood which oozes out of any blood vessel but is confined next to the vessel by the adjacent tissue. Most aneurysms are designated as true ones while pseudoaneurysms account only for <1% of total lesions. Pseudoaneurysms of the STA are rare and were first described in 1740 by Bartholin.[1] Most cases (about 75%) are the result of blunt trauma to head. However, there are also cases documented wherein penetrating scalp lesions, previous craniotomy, use of Gardner traction devices and hair implants are considered as etiological factors.[3] Very rarely, spontaneous pseudoaneurysm formation can occur due to any congenital defect or atherosclerotic disease.[4]

Yang et al. described three cases of STA pseudoaneurysm caused by blunt, compressive trauma.[5] Goto et al. also described two similar cases in 2015.[6] Skaf et al. and Prado et al., independently, reported a case of pseudoaneurysm arising from the frontal branch of the STA, after the injection of botox. Ellis et al. reported pseudoaneurysm of STA following trigeminal nerve stimulator placement. Takemoto et al. were first to report possible association between atherosclerosis and a spontaneous STA pseudoaneurysm formation.[7]

Among facial vasculature, the STA is especially likely to form a pseudoaneurysm after trauma. This is due to its superficial
position over the frontal bone and only the thin temporalis and frontalis muscles provide cushion and protection in some areas. However, in the region between the frontalis and temporalis muscles, the artery lies directly against the skull.\textsuperscript{[5,6]}

Most STA aneurysms are false aneurysms (pseudoaneurysms) which are defined by the lack of all three layers of the arterial wall. Usually, there is complete or partial transection or traumatic necrosis of part of the vessel wall (arterial intima), with the resultant hemorrhage into the vessel wall contained by the skin. A hematoma then forms and organizes with a pseudocapsule, which slowly expands from the pressure exerted by local blood flow. This slow expansion of hematoma explains the frequently reported gap of 1 to 6 weeks, between the traumatic event and the onset of the mass. Continual lysis of luminal thrombus signifies that the artery may recanalize, permitting substantial reflow through the vessel. This continued flow through the artery and into the pseudoaneurysm sac causes progressive dilation of the weak hematoma capsule.\textsuperscript{[7,8]}

Patient typically presents with a compressible, pulsatile, nontender mass subsequent to trauma to temporal region which occurred 2–6 weeks ago although the prodromal period may range from just a few hours to as long as 10 years.\textsuperscript{[9]} Patients may complain of visual disturbance, dizziness, hemorrhage, throbbing headache, ear pain, uncommonly facial nerve deficits, or cosmetic and other neurologic deficits, depending on the location. Examination will reveal a pulsatile mass in synchrony with the heartbeat. Proximal compression of the artery should diminish or reduce the pulsations.\textsuperscript{[10]} A systolic murmur can be heard on auscultation and palpable thrill may also be present. Cranial nerve palsies, paraesthesia, and vascular compromise have also been reported and may be present if there is any rupture of pseudoaneurysm.\textsuperscript{[4]}

A number of differential diagnosis warrant consideration which include lipoma, cyst, simple hematoma, abscess, inflamed lymph node, neuroma of the supraorbital nerve, arteriovenous fistula, meningocele, encephalocoele, angiofibroma, and chronic middle meningeal artery aneurysms with overlying temporal bone erosion.\textsuperscript{[10]} X-rays can be done to evaluate any fracture leading to pseudoaneurysm, but they are not much sensitive.\textsuperscript{[4]} Noninvasive techniques include Doppler ultrasonography, which can show turbulent flow and vessel dilation within
Contrast CT or magnetic resonance imaging may diagnose any extracranial mass or intracranial pathology. Arteriography is the diagnostic tool of choice, CT angiography can be used to confirm the diagnosis and exclude other lesions such as arteriovenous malformation and fistula. The patency and position of the main trunk as well as distal branches of the STA and the accurate dimensions of the lesion, including the degree of thrombosis and the amount of luminal opacification can be accurately assessed by three-dimensional CT angiography. It can reveal extracranial masses and intracranial pathology simultaneously. Needle aspiration of such suspicious lesions should always be avoided because of the significant risk of uncontrolled bleeding.

STA pseudoaneurysms should be treated to reduce the risk of hemorrhage from trauma, to relieve any type of headache or orofacial pain and for the cosmetic defect. Conservative management is not recommended, surgical ligation and resection of the lesion are considered the treatment of choice. General anesthesia is required for safe access during surgical excision of this lesion. Due to the rich facial vasculature, reconstruction of vessels is usually not required, but sometimes end-to-end anastomosis or arterial grafting may become necessary to restore blood supply to critical structures. Embolization has become alternative mode of treating these vascular anomalies. Obliteration of STA aneurysms using thrombin has also been reported and may prove to be a promising modality to treat vascular abnormalities.

CONCLUSION

Pulsatile lesions or lesions that are continuous with the STA should be managed and treated with extreme caution. Surgeons should consider the occurrence of traumatic pseudoaneurysm in case of a palpable pulsatile mass around periauricular region. CT angiography should be done to confirm the diagnosis because this diagnostic tool can accurately describe the morphology of the pseudoaneurysm. Surgical resection of the mass and ligation of proximal and distal ends of the artery is the treatment of choice.

Declaration of patient consent
The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest
There are no conflicts of interest.

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