Introduction

Pseudoaneurysms of the superficial temporal artery (STA) are a relatively rare disease entity. Only less than 200 cases of STA pseudoaneurysm have been documented in the literature since Bartholin reported the first case of the STA pseudoaneurysm in 1740. However, the authors encountered three cases during a 3-year span, which suggests that STA pseudoaneurysms may be more common than the previous literature shows. And the most frequent causes of peripheral traumatic pseudoaneurysm are closed head trauma (62%), penetrating wounds (27%), and iatrogenic trauma (11%).

Here, we report three cases of the STA pseudoaneurysm, which are caused by the head trauma.

Case Report

The details of the presentation, diagnosis, and treatment of STA pseudoaneurysm of three male patients are summarized in Table 1.

Case 1

The typical patient was a 22-year-old man who sustained blunt trauma by the baseball to the side of his forehead. There was a large contusion area on the right temple, which subsided within 2 weeks after trauma, leaving a small, pulsatile nodule. Six weeks later, the patient noticed that he had a painful mass on the right side of his forehead. He felt pain on this area since the mass had expanded. Physical examination revealed that a 15 x 15 x 10 mm sized pulsatile and spherical mass on the right side of his forehead, which was located in the course of the anterior branch of the STA.

The pulsation of the mass disappeared with pressure on the proximal portion of the superficial temporal artery. A Doppler ultrasound scan and computed tomography of the lesion showed a round dilatation of the STA measuring 15 mm in maximum diameter with turbulent and arterial flow. The presumptive diagnosis of STA pseudoaneurysm was made and confirmed by catheter angiogram (Fig. 1). Under local anesthesia, the aneurysm was excised en bloc following ligations and division of the STA both proximally and distally.
Traumatic Pseudoaneurysm

Histology confirmed a pseudoaneurysm of the STA. The patient recovered uneventfully.

### Case 2 & 3

The other two cases demonstrated similar features. In case 2 we diagnosed it by physical examination only and it was confirmed by histology after surgical excision (Fig. 2). The unusual location of pulsating scalp swelling and headache prompted angiography in case 3, which showed a pseudoaneurysm in the anterior branch of the right STA (Fig. 3).

Table 1. Clinical characteristics of three patients with superficial temporal artery pseudoaneurysm

<table>
<thead>
<tr>
<th>Case</th>
<th>No</th>
<th>Sex/Age</th>
<th>Presentation</th>
<th>Trauma</th>
<th>Time interval (Week)</th>
<th>Size (cm)</th>
<th>Ancillary test</th>
<th>Treatment</th>
<th>Involved segment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M</td>
<td>22</td>
<td>Pulsatile mass</td>
<td>Blunt (lsl)</td>
<td>8</td>
<td>1.5x1.5x1</td>
<td>Angiography</td>
<td>Excision</td>
<td>Anterior branch</td>
</tr>
<tr>
<td>2</td>
<td>M</td>
<td>21</td>
<td>Growing mass</td>
<td>TA</td>
<td>5</td>
<td>2x2x1</td>
<td>P/Ex only</td>
<td>Excision</td>
<td>Anterior branch</td>
</tr>
<tr>
<td>3</td>
<td>M</td>
<td>30</td>
<td>Swelling, H/A</td>
<td>Blunt (bar)</td>
<td>12</td>
<td>2x1.5x1.5</td>
<td>Angiography</td>
<td>Excision</td>
<td>Anterior branch</td>
</tr>
</tbody>
</table>

*CT=Computed tomography. TA=Traffic accident. P/Ex=Physical examination. H/A=Headache

Fig. 2. Photomicrograph demonstrates normal arterial wall in left and myxomalous changes of the pseudoaneurysm in right. A hematoxylin and eosin-stained section demonstrates that the aneurysmal wall, which lacks the media and the internal elastic lamina (black arrow), is torn at the ruptured site (starburst) on high power magnification (100X).

Fig. 3. Case 3. Aneurysm at the anterior branch of the superficial temporal artery is noted on the lateral view of the selective angiogram of the right external carotid artery. Neck of the aneurysm is broad.

### Discussion

Pseudoaneurysms of the STA are rare and account for less than 1% of all aneurysms presenting as a result of trauma. Any blunt or penetrating trauma on the side of the head may result in a STA pseudoaneurysm. The injury may lead to either partial transection or contusion of a segment of the arterial wall, leading to vessel wall necrosis. The resulting hematoma becomes progressively organized, forming a fibrous pseudocapsule. Progressive dilatation of the weak hematoma capsule explains the delayed appearance of a pulsating mass.

There have been several reports regarding the traumatic STA aneurysms in the literature, which are mainly associated with sporting injuries such as baseball, squash, rugby and a popular new survival game known as "paintball". Iatrogenic causes of STA aneurysms have been reported after temporomandibular arthroplasty, hair transplantation, and cyst removal. Spontaneous development of this type of aneurysm is rare, with only 12 cases reported. These aneurysms were reported to be congenital or degenerative.

Most STA aneurysms involve the anterior branch of the STA rather than the proximal STA or its posterior branch. The segment of the anterior branch traverses the attachment of the temporalis fascia to the superior temporal line, which is prominent anteriorly but, fade posteriorly. In general, muscle tissue can cushion vessels against traumatic pressure. However, there is a gap between the flat muscle bellies at the superior temporal line when the anterior branch of the STA traverses superiorly from the temporalis territory to the lateral border of the frontalis muscle, and it is in this area that the artery is susceptible to injury. In addition, the fascial investment of the artery at the junction of the temporalis and frontalis muscles has a tethering effect, preventing the artery from displacing in response to rapid compressive forces.

The reported time between trauma and diagnosis of aneurysm is ranged from just a few hours to as long as 10 years with a usual onset time of approximately 2 to 6 weeks after head injury.

Most complain of a single or multiple painless swellings occurring in the distribution of the STA with or without associated pulsations, headache and ear discomfort, or buzzing. STA pseudoaneurysm sizes have varied from 0.5cm to 5.7cm, with the most common size being 1 to 1.5cm. Although there are several reports of multiple lesions, most
History and physical examination are the most important tools to diagnosis the STA aneurysms. A diminution or disappearance of pulsation with compression of the proximal STA is meaningful finding. However, this might be possible in a case of arteriovenous malformation too. Doppler examination, skull x-ray evaluation, Computed Tomography scanning and MRI may be adjunctive diagnostic tests and demonstrate pathologic conditions associated. Selective angiography may be diagnostic and therapeutic. Differential diagnosis includes simple hematoma, lipoma, cyst, abscess, and arteriovenous(AV) fistula, encephalocele and meningocele.

Conservative treatment has not been recommended because the aneurysm may cause discomforting headaches and cosmetic disfigurement to the patient. It has the risk of rupture and hemorrhage, and may cause bony erosions in the long term. The treatment of choice is ligation and resection of the aneurysm, which can be performed under local or general anesthesia. General anesthesia may be necessary for the surgical excision of the STA pseudoaneurysm if the aneurysm is located in proximity to the facial nerve or parotid gland for safe access. Also, it is essential for more proximal vessel control. Roll of the surgery, as for treatment of STA pseudoaneurysm is to reduce the risk of hemorrhage from subsequent head trauma, to relieve headache, and to resolve the cosmetic defect of the lesion. Embolization has become a popular mode of treatment of vascular abnormalities, and successful occlusion of the STA pseudoaneurysm was reported in the literature.

However, possible complications such as occlusion of the underlying artery and ischemic stroke following nontarget embolization should be considered.

Other limitation of embolization is the elapsed time, which takes longer than surgical repair to resolve the mass effect created by thrombosed aneurysm.

Conclusion

Pseudoaneurysm of the STA is more common than the literature shows. Thus, it should be considered for the evaluation of temporal head mass especially after the facial trauma.

References