Palpable Pulsatile Mass of the Forehead: A Case Series of Superficial Temporal Artery Pseudoaneurysms

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Abstract

Background: Pseudoaneurysms of the Superficial Temporal Artery (STA) are rare and originate in most cases posttraumatically, often in young to middle-aged men. A palpable pulsatile mass at the temporal region is present, and pulsations can be eliminated or reduced by proximal compression of the STA. Diagnosis is often confirmed by duplex-sonography.

Methods: Between 2006 and 2016, five patients with a palpable pulsatile mass of the forehead presented at our institution. Case history, clinical, technical and histopathological patient data and corresponding treatment is presented and compared with current literature on pseudoaneurysms of the STA.

Results: In four cases the pulsatile mass was caused by a trauma, while in one case the mass arised spontaneously. Clinical examination revealed a palpable pulsatile mass on the forehead. The pulsatile quality of all tumors disappeared by unilateral compression of the STA. Duplex-sonography revealed a traumatic pseudoaneurysm in four cases and an arteriovenous (AV) malformation in one case. A resection of the pseudoaneurysms and AV malformation was performed. Histopathological examination confirmed the clinical diagnosis.

Conclusion: Despite recent advances in endovascular approaches, surgical resection remains the treatment of choice. Our results are concordant with current literature regarding pseudoaneurysms of the STA.

Keywords: Pseudoaneurysm; Superficial temporal artery; Treatment

Figure 1: Anatomy of the ATS in relation to occipitofrontalis and temporalis muscle. Between the occipitofrontalis muscle and temporalis muscle the anterior branch of the STA is most vulnerable to compression against the rigid scull [1,4].

Most aneurysms of the STA are pseudoaneurysms: a trauma to the STA leads to partial transection and/or contusion of a segment of the artery and causes the lumen of the artery no longer being surrounded by the three layers of the arterial wall [2,4] (Figure 2). This is in contrast to a “real” aneurysm, where the three layers of the arterial wall remain present. Often young patients have a compressible pulsatile mass of 1-1.5 cm approximately two to six weeks after traumatic injury of the temporal region. Additional symptoms can be throbbing headache, auditorial and visual disturbances, vertigo and rarely facial
nerve paresis. The pulsations of the mass can be eliminated or reduced by proximal compression of the STA. A systolic murmur and a palpable ‘thrill’ can be present [2,4].

In the differential diagnosis a lipoma, hemangiomia, AV malformation, meningocele, angiofibroma, and supra-orbital neurinoma should be kept in mind. Nevertheless, the correct diagnosis can often be made by detailed history and accurate clinical examination [4]. Diagnosis is frequently confirmed by duplex-sonography and sometimes by classical or CT-angiography [2,7].

Material and Methods

We retrospectively created a database of patients on whom an operation of the STA was performed, excluding STA biopsies. Between 2006 and 2016, five patients at our institution have undergone surgery of the STA for a palpable pulsatile mass of the forehead. We provided demographic, histologic, clinical and therapeutic data of these five patients. Finally, we compared our results with current literature and made a review on pseudoaneurysms of the STA and its treatment.

Results

History, clinical examination and duplex-sonography revealed a traumatic pseudoaneurysm of the STA in four cases, and a subcutaneous AV malformation of the STA in one case. In all 5 cases surgical resection with ligation of the proximal and the distal vessels of the AV malformation was performed (Table 1).

Case 1

A 45-year-old male patient presented with pain at the left temporal region. The patient had no pertinent medical history. Four weeks before he was involved in a road accident. He suffered a fracture of the left orbita and a fracture of the right fifth rib. The fracture of the left orbita was treated conservatively. Clinical examination showed a sensitive temporal region and a small painful pulsatile tumor was observed (Figure 3A). Duplex-sonography of the pulsatile tumor was performed, which confirmed the diagnosis of a pseudoaneurysm of the STA (Figure 3B). The pseudoaneurysm had an average diameter of 0.43 cm, compared to the expected diameter of the STA of approximately 0.10 cm.

The left temporal region was anesthetized with lidocaine (Xylocaine) 2%. Through a pre-auricular longitudinal incision the pseudoaneurysm was subsequently dissected and visualized. Next, the proximal and distal temporal artery was ligated after which the pseudoaneurysm was subsequently dissected and visualized. The diagnosis of a postraumatically pseudoaneurysm was histopathologically confirmed. An arterial vessel with an aneurysmatic dilatation and a prominent intima was seen microscopically. In addition, regional fibrosis was observed already showing signs of organization. Within this fibrous plaque inflammatory cells, including mononuclear and eosinophilic cells, were found. Both the tunica elastica and media were fragmented. No smooth muscle fibers were found in the pseudoaneurysm. Histopathologically there were no arguments for arthritis. The patient recovered uneventfully [8].

Case 2

An 18-year-old male patient presented with a painful progressive swelling at the right temporal region after a motorcycle accident 6 weeks before. During the accident, he fell on the right temporal region while wearing a helmet which initially only caused a small hematoma and headache. As the hematoma resolved, the headache and swelling at the right temporal region progressively increased. Clinical examination showed a sensitive and painful pulsatile swelling at the right temporal region with a maximal diameter of about 1 cm.

The diagnosis of a traumatic pseudoaneurysm was histopathologically confirmed. Hematoma of the STA pseudoaneurysm with a diameter of 0.43 cm. The left temporal region was anesthetized with lidocaine (Xylocaine) 2%. Through a pre-auricular longitudinal incision the pseudoaneurysm was subsequently dissected and visualized. Next, the proximal and distal temporal artery was ligated after which the pseudoaneurysm was completely resected.

Table 1: Case report summary.

<table>
<thead>
<tr>
<th>Case</th>
<th>Sex</th>
<th>Age (years)</th>
<th>Origin</th>
<th>Treatment</th>
<th>APE</th>
<th>Time to pseudoaneurysm after trauma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case 1</td>
<td>Male</td>
<td>45</td>
<td>Traumatic</td>
<td>Surgical resection</td>
<td>Pseudoaneurysm (Ø: 0.43 cm)</td>
<td>4 weeks</td>
</tr>
<tr>
<td>Case 2</td>
<td>Male</td>
<td>18</td>
<td>Traumatic</td>
<td>Surgical resection</td>
<td>Pseudoaneurysm (Ø: 1.10 cm)</td>
<td>6 weeks</td>
</tr>
<tr>
<td>Case 3</td>
<td>Male</td>
<td>48</td>
<td>Atraumatic</td>
<td>Surgical resection</td>
<td>AV malformation (Ø: 2.26 cm)</td>
<td>-</td>
</tr>
<tr>
<td>Case 4</td>
<td>Female</td>
<td>64</td>
<td>Traumatic</td>
<td>Surgical resection</td>
<td>Pseudoaneurysm (Ø: 0.92 cm)</td>
<td>1 year</td>
</tr>
<tr>
<td>Case 5</td>
<td>Male</td>
<td>24</td>
<td>Traumatic</td>
<td>Surgical resection</td>
<td>Pseudoaneurysm (Ø: 0.80 cm)</td>
<td>2 weeks</td>
</tr>
</tbody>
</table>

APE: Anatomo Pathological Examination, Ø: diameter
Complete resection of the pulsatile protuberance with ligation of the proximal and distal STA was performed under local anesthesia.

The diagnosis of a posttraumatically pseudoaneurysm of 1.10 cm was histopathologically confirmed.

Case 3

A 48-year-old male patient presented with a pulsatile tumor at the left frontoparietal region which caused headache, especially during warm weather. The patient had no pertinent medical history. Clinical examination showed a pulsatile tumor at the left frontoparietal region. By compression of the left STA the pulsatile quality of the tumor disappeared. By compression of the right STA the pulsations remained present.

Duplex-sonography showed a very high systolic and diastolic flow of the left STA compared to the right STA. Angio-MRI confirmed a subcutaneous arteriovenous (AV) malformation at the left frontoparietal region with a maximal diameter of 2.26 cm. The AV malformation showed a slightly hypertrophic and tortuous parietal branch of the left STA (Figure 4). There was no connection with the intracranial circulation.

The afferent left STA proximal to the AV malformation was ligated under general anesthesia. Subsequently the AV malformation was completely resected. The diagnosis of an AV malformation was confirmed histopathologically. Recovery was uneventful.

Case 4

A 64-year-old female patient presented with a painful progressive swelling at the left temporal region. One year before the patient had fallen on her head and the head wound was sutured by the general practitioner. Clinical examination showed a painful pulsatile swelling at the left temporal region under the year-old scar of the head wound. The scar was re-incised under general anesthesia. The pseudoaneurysm was visualised and the proximal and distal STA ligated. Finally, the pseudoaneurysm was completely resected.

Discussion

STA-pseudoaneurysms require adequate treatment due to the risk of spontaneous rupture, pain and potential esthetic reasons [4, 8]. However, only three case reports with spontaneous rupture of the STA-pseudoaneurysm have been described in literature. Surgical resection under general or local anesthesia is considered the standard therapy [1,2,4,9]. The pseudoaneurysm is localized with subsequently ligation of the proximal and distal STA; next, the pseudoaneurysm is completely resected [10].

Nonsurgical methods include observation and application of continuous pressure over the aneurysm with eventual thrombosis. These methods can be effective in cases of small STA-pseudoaneurysms sometimes associated with arteriovenous fistulas [1,5]. Others
suggest that conservative treatment is not appropriate due to the risk of rupture, bleeding and thromboembolism [5,11].

Nowadays endovascular approaches for treatment of vascular malformations gain popularity. Endovascular treatment using a microcoil or vascular plug may be used as a therapeutic tool when the STA-pseudoaneurysm has a relatively inaccessible localization, such as the proximal STA [1]. In these cases, adequate dissection of the parotid gland and the facial nerve before ligation and resection of the aneurysm may pose a greater threat than the aneurysm itself, justifying endovascular embolization as the first choice of treatment [1]. Compared to surgical resection, coil embolization requires a longer peroperative time but has a shorter recovery time and avoids/minimizes the surgical scar [1,9]. Nikolakopoulos et al., suggest that an endovascular approach should only be performed when angiography is mandatory for diagnosis [5].

Furthermore, percutaneous ultrasound-guided injection of thrombin can be used on chronic or subacute pseudoaneurysms with a diameter of 4 cm or less [5]. In contrast to coil-embolisation, local injection of thrombin has a higher incidence of complications such as allergic reactions, risk for recanalisation and distal ischemia [5,9]. Other disadvantages are the lag time for resolution of the thrombosed pseudoaneurysm and the need for reexamination with duplex ultrasound to ensure no recanalization of the pseudoaneurysm has occurred [5].

The diagnosis is confirmed histopathologically with loss of normal arterial architecture and an arterial wall that mainly consists of fibrous tissue and organized thrombus.

Conclusion

Our results are concordant with the current literature regarding pseudoaneurysms of the STA. 75% of our patients with a STA-pseudoaneurysm are male with a median age of 35 years at diagnosis. For patients with a traumatic event preceding the development of a pseudoaneurysm the median delay was 3 weeks, in contrast to the AV malformation which arised spontaneously. All our patients presented with a pulsatile swelling at clinical examination. Correct diagnosis could be made by detailed history and clinical examination, and confirmed by duplex sonography in four cases and angio-MRI in one case. In all five cases, surgical resection with ligation of the proximal and the distal vessels of the pseudoaneurysm and the AV malformation was performed. Histopathologically, the diagnosis of a traumatic pseudoaneurysm of the STA was confirmed in four cases, with a median diameter of 0.86 cm, and an AV malformation of the STA in the remaining case.

STA-pseudoaneurysms are rare and develop in most cases post-traumatically. Despite recent advances in endovascular approaches, surgical resection remains the treatment of choice.

Funding

This research received no grant from any funding agency in the public, commercial or not-for-profit sectors.

References