

Superficial temporal artery pseudoaneurysm after blunt trauma: A case series

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Abstract:

Purpose: To describe our experience with the presentation and management of traumatic superficial temporal artery pseudoaneurysms in our institution.

Small case series description: Reviewing all patient's records during the last 20 years we identified 3 cases with a superficial temporal artery pseudoaneurysm. Two patients had suffered a motorcycle accident and presented with blunt and/or penetrating skin injuries on the head remote of the site of the aneurysm. No helmet was used. The remaining patient presented with skin necrosis on the aneurysm indicating a direct blunt arterial injury after a minor fall. No other severe injuries were apparent. After a diagnostic colour duplex they underwent aneurysm excision and ligation of the superficial temporal artery under local anesthesia.

Conclusion: In our patients temporal artery pseudoaneurysms were developed after direct arterial transection or traction due to a nearby head injury. Diagnosis was based on clinical examination and confirmed by ultrasound. Treatment consisted of aneurysm excision.

Key words: arterial injury, arterial trauma, pseudoaneurysm, false aneurysm, superficial temporal artery

INTRODUCTION

Superficial temporal artery pseudoaneurysms (STAPs) are rare. The first case was described from Bartholin in 1740 on a young patient after blunt head trauma¹. Four hundred cases have since been described, accounting for only 1% of all traumatic aneurysms². We reviewed the current literature regarding the causative process, the diagnosis and the treatment of these aneurysms. Additionally, we describe our experience with three patients managed at our institution.

REPORT OF CASES

The first patient was a 16-year-old male who presented with a bump on his left temple. It was formed after a motorcycle accident a week earlier and was progressively enlarging. He was not wearing a helmet. He complained of a headache. The mass was pulsatile and a colour duplex confirmed the diagnosis of a superficial temporal artery pseudoaneurysm (STAP), 2.0 cm in diameter, at the bifurcation of the superficial temporal artery (STA). The patient was treated by excision of the mass with proximal and distal STA branch ligations (Table).

The second patient was an 80-year-old male on anticoagulation who presented with a lump on his left frontal bone after a minor fall. A necrotic skin area sized 1.5x1.0 cm was apparent over the lump indicating direct injury. The mass was painful and pulsatile. A colour duplex confirmed the diagnosis of a STAP. The patient underwent aneurysmectomy with necrotic skin removal and frontal STA ligation, under local anesthesia¹.

The third patient was an 18-year-old male who presented with a visible mass on his left temple (Figure 1). He had a motorcycle accident and received medical care for penetrating skin injuries on his forehead 20 days before. Five days later a visible bulge appeared on his left temple, progressively enlarging. Physical examination revealed a painless, pulsatile temporal mass. Pulsation disappeared after proximal compression of the STA. A colour duplex confirmed the diagnosis of a STAP, measuring 1.4x1.1cm in diameter, while it also depicted the "to and fro" pattern and the "Yin-Yang sign" (Figure 2). The STA was ligated and the aneurysm was excised (Figure 3).

DISCUSSION

Arterial pseudoaneurysms (PSAs) may arise in trauma patients, mostly after focal transection of the vessel wall. The frontal branch of the STA is extremely vulnerable after traumatic head injury as it runs over the bone and a thin layer of pericranium. The risk is aggravated at the region where STA crosses the superior temporal line. Consequently, STAP may arise after direct injury to the vessel at the site of the aneurysm (patient 2) or due to shear damage after vessel overstretching from a remote blunt head injury (patients 1 and 3)^{1,2}.

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Table: Patient’s characteristics and management

No.	Sex	Age	Type of trauma	Time to presentation	Time to operation	Clinical signs	Imaging Technique, Diagnosis	Location	Treatment
Case 1	Male	16	Blunt	7 days	10 days	Pulsatile enlarging mass	U/S exam	Bifurcation of the STA	Aneurysm excision with proximal and distal ligation of the vessel
Case 2	Male	80	Blunt	10 days	10 days	Pulsatile enlarging mass, Necrotic skin, Anticoagulation	U/S exam	Frontal branch of the STA	Aneurysm excision with proximal and distal ligation of the vessel
Case 3	Male	18	Blunt	5 days	20 days	Pulsatile enlarging mass	U/S exam	Frontal branch of the STA	Aneurysm excision with proximal and distal ligation of the vessel

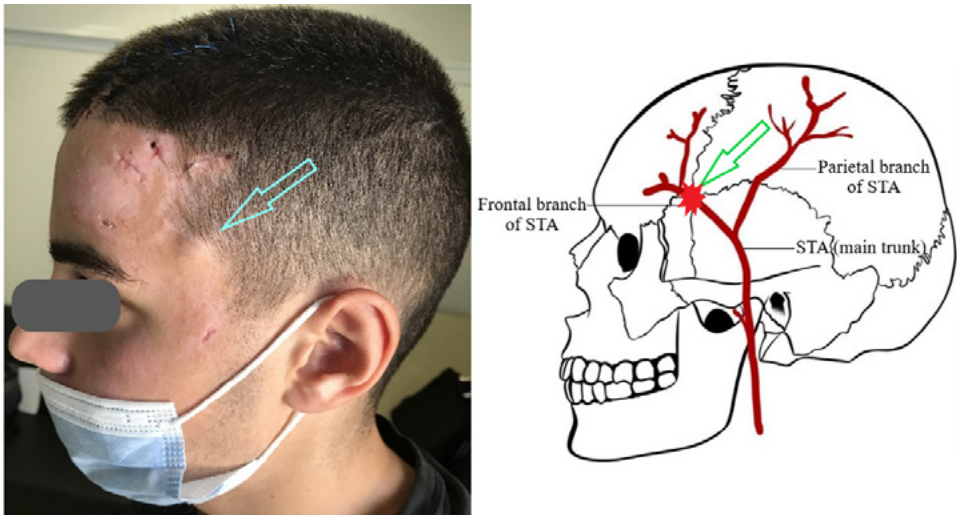


Figure 1: The superficial temporal pseudoaneurysm (turquoise arrow) and a schematic representation (green arrow).

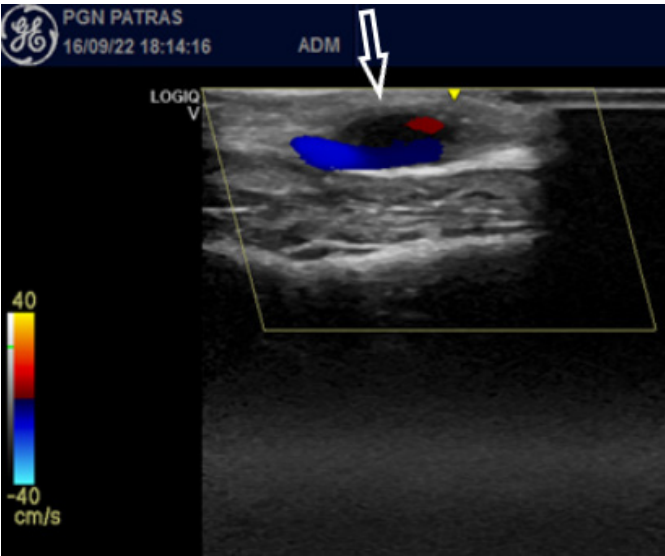


Figure 2: Colour duplex imaging: The aneurysmal sac (white arrow) and the Yin-Yang sign.

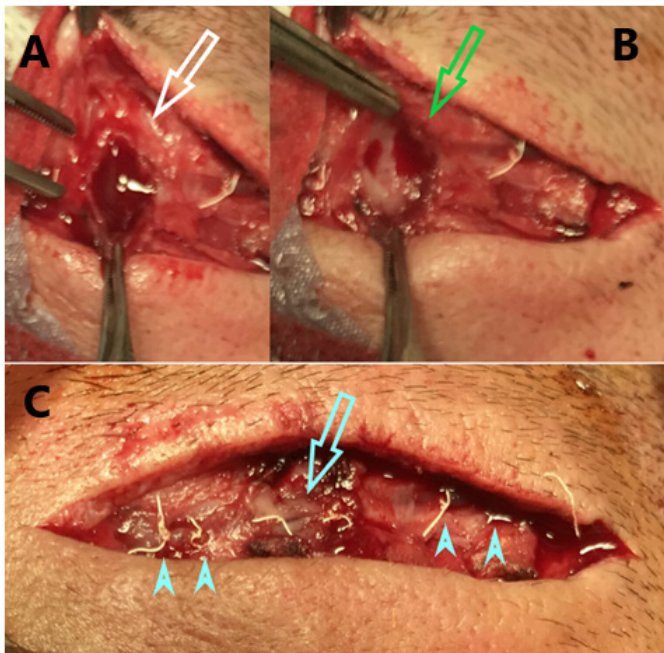


Figure 3: (A) Intrasac thrombus is visible after opening of the pseudosac (white arrow), (B) the sac after evacuation of the thrombus (green arrow), (C) proximal and distal ligation (turquoise arrowheads). Vessel lumen is visible after removal of the sac (turquoise arrow).

Generally, more than 95% of PSAs are traumatic in origin complicating iatrogenic procedures or caused by brawl, fall or sport activities. The remaining 5% are classified as spontaneous aneurysms of congenital or atherosclerotic etiology². They manifest as pulsatile, painless masses when they affect superficial arteries. As they grow in size, they may present with neuropathic alterations. Differential diagnosis of a STAP includes a true aneurysm, an abscess, a cyst, a lipoma, a hematoma, an angiofibroma, a parotid tumor, a vascular tumor, an arteriovenous fistula and an aneurysm of the middle meningeal artery that eroded the temporal bone^{1,3}.

STAP is usually asymptomatic, but it may present with local pain. In case of a STA arteriovenous fistula (STA-AVF) isolated or combined with a STAP, a continuous ringing in the ear may arise^{3,4}. Clinical examination shows a palpable pulsatile mass at a point along the course of the STA. Pulses are diminished after proximal compression. In case of an STA-AVF, a palpable thrill and an audible continuous murmur are usually diagnostic^{3,4}. A history of head injury should raise the suspicion for a STAP if a mass appears at the temporal region. Although a detailed history and thorough physical examination are essential, confirmation of diagnosis is accomplished with imaging studies. Ultrasound (U/S) is the initial preferable technique due to its wide availability, noninvasiveness, cost-effectiveness, and its bedside applicability. Additionally, the superficial location of the STA enhances U/S resolution and moreover it may be easily used for follow-up⁵. U/S gray scale imaging is used to assess the pseudoaneurysm size and the intra-sac thrombus, while colour duplex is used to evaluate the neck and to locate the feeding artery. It displays the “to and fro” waveform in the neck and the colour flow inside the sac, known as the “Yin-Yang” sign (Figure 2). Computer Tomography Angiography (CTA) is usually the first imaging study in multi-trauma patients which may depict a coexistent STAP. Magnetic Resonance Angiography (MRA) and Digital Subtraction Angiography (DSA) have also been used^{4,6}.

According to recent literature, the proximal and distal artery ligation with excision of the pseudoaneurysm is the preferred surgical method. Surgical excision is indicated because of the risk of rupture, the necessity for pain management, and aesthetic concerns. This method is simple and safe, due to the superficial location of the STA and it may be carried out under local anesthesia, with the potential exception of large STAPs^{1,6}. Due to the abundant collateral supply of the face and skull, the effects of STA ligation are insignificant. Therefore, surgical treatment remains the gold standard. STAPs located on the scalp are addressed with a direct linear incision, while preauricular incisions have been used for STAPs located at the zygoma⁷.

Although conservative compression therapy has been proposed, it is often unfavorable because of the extended period of headaches, the possibility of rupture and aesthetic worries⁸. Endovascular coiling embolization is a possible therapeutic option, but it has an inherent risk of stroke, poor cosmetics and the mixed evidence does not justify this procedure as first-line therapy⁹. U/S guided thrombin injection is another alternative solution. Although it is the gold standard in common femoral PSAs management, it seems to have no

role in STAPs treatment. It carries a high rate of recanalization, thrombosis of the underlying artery and embolization with ischemic stroke and seizures^{8,9}. There is a risk of scalp ischemia and skin necrosis^{9,10}. Patients may be disappointed due to poor cosmetic outcomes, since the thrombosed pseudoaneurysm needs up to 3 months to resolve. Numerous other surgical techniques have been used to address STAPs, albeit many of them are just of historical importance, such as external and common carotid artery ligation¹.

CONCLUSION

Traumatic STAP is a rare clinical condition which may be associated with local skin necrosis or traumatic injuries at other sites. The diagnosis is based on patient's history and physical examination and is confirmed with colour duplex. Surgical excision with arterial ligation under local anesthesia is advocated. It leads to a good clinical and cosmetic outcome with no recurrences.

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