Superficial temporal artery aneurysms

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Objective: **We analyzed the data from our vascular registry to determine the cause, clinical features, and cost-effective management of this uncommon pathologic entity.**
Design: **Patients referred to the vascular surgery outpatient clinic of a tertiary referral center during the past 18 years were evaluated.**
Subjects: **The subjects were six male patients (14 to 32 years) referred for evaluation of a unilateral pulsatile mass over the temporal region of the head.**
Intervention: **Diagnosis of superficial temporal artery aneurysm was verified by loss of the aneurysm's pulse with compression of the ipsilateral proximal superficial temporal artery. All treated aneurysms were electively ligated and excised as an ambulatory procedure.**
Results: **The symptoms were resolved. No recurrences or other complications were seen.**
Conclusions: **Although rare, a superficial temporal artery aneurysm should be considered when a temporal head mass is evaluated. This condition is almost always a result of blunt or penetrating head trauma. Clinical examination is sufficient to confirm the diagnosis. Simple elective ligation and excision of the aneurysm is curative. (J Vasc Surg 1998;27:374-7.)**

Few superficial temporal artery (STA) aneurysm reports exist in the literature (187 cases during the past 250 years), depicting the rarity of reports about this pathologic entity. However, six cases were encountered by the senior author (D. J. R.) during a 18-year span. STA aneurysms may be more common than the literature suggests. Although STA aneurysms have a relatively benign course, when compared with aneurysms of larger caliber arteries, they may occasionally lead to severe hemorrhage and be associated with a multitude of bothersome symptoms.

CASE REPORTS

The details of the presentation, diagnosis, and treatment of STA pseudoaneurysms in six male patients reffered to our outpatient clinic are presented in Table I. The typical patient was a young man who sustained blunt trauma to the side of his head and arrived at the clinic approximately 7 weeks later reporting a pulsatile mass. The diagnosis of STA anerysm was verified by loss of the aneurysm's pulse on compression of the proximal STA. No further testing was required. With the exception of one patient who refused operation, all patients were treated electively in an ambulatory setting with ligation and excision of the aneurysm. All of the lesions involved the anterior branch of the STA and were identified on histologic evaluation as pseudoaneurysms. Operative treatment led to complete symptom resolution.

DISCUSSION

The first case report of an STA aneurysm was by Thomas Bartholin[1,2] in 1740. In 1884 a review of this topic was presented by De Santi,[1] in which he reviewed 37 cases. In 1934 Winslow and Edwards[3] collected reports on 108 patients from the world literature, 93 with STA aneurysms and 15 others with temporal arteriovenous fistulas. Since that time case reports have appeared sporadically in the literature. In 1970 Schechter and Gutstein[4] reviewed the subject again and accounted for a total of 131 STA aneurysms. In 1972 Mastsubara et al.[5] reviewed the English literature and could account for only 124 total cases. With both reviews compiled, the total comes to 139 cases. Since 1970 an additional 48 cases plus the 6 cases that we are adding brings the total reported count to 193.

Location. As shown in this series 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 most commonly involved is that which traverses the attachment of the temporalis fascia to the superior temporal line.[6] The superior temporal line is prominent anteriorly but fades posteriorly.[7] We postulate that the anterior

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branch of the artery, unprotected by overlying muscles, may be crushed against this prominent ridge by a blow to the side of the head (Fig. 1).[6] With its long unprotected course between the outer table of the skull and subcutaneous tissues plus the prominent ridge anteriorly, it might be expected that this artery would be injured more frequently than reports indicate. Rudolph Matas,[3] discussing Winslow and Edward's[3] article, commented on this issue as follows: "It is probable that temporal artery aneurysms are not frequent because the bleeding arteries are usually tied at the time of injury. When the temporal arteries are completely divided, the injury is not likely to be followed by aneurysm."

STA aneurysms, although ordinarily occurring as single lesions, have been reported as multiple lesions.[6-9] In one series[6] of six patients, two patients had two aneurysms each, and another had three. In the case of Hait and Mushorn[8] three separate aneurysms involved the anterior branch of the STA. These cases of multiple aneurysms represent the exception rather than the rule. None of our patients had multiple aneurysms.

Cause. Any blunt or penetrating trauma to the side of the head may result in an STA aneurysm. This finding is supported by both this report and the literature. The injury leads 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.[10]

Rapier slashes from dueling and blood-letting by temporal arteriotomy for treatment of cerebral congestion, meningitis, and apoplexy were commonly reported causes of these lesions during the nineteenth century.[3] Various sports injuries have also been implicated with these type of aneurysms including baseball,[10,11] hockey,[12,13] squash,[14] and rugby.[15,16] Iatrogenic causes of STA aneurysms have been reported after temporomandibular arthroplasty,[17] hair transplantation,[18,19] and cyst removal.[20] We have treated a patient with a false aneurysm of the occipital artery after scalp punch biopsy for hair transplantation.

Spontaneous development of this type of aneurysm is rare, with only 12 cases reported.[4,29] These aneurysms were reported to be congenital or degenerative. However, the previous trauma may have been trivial and forgotten, which may explain the cause of the aneurysm in case 5. No reports of STA aneurysms associated with periarteritis nodosa or one of the lathyrisms (Ehlers-Danlos type IV, Marfans) and no cases of mycotic or syphilitic aneurysms were encountered in our literature review.

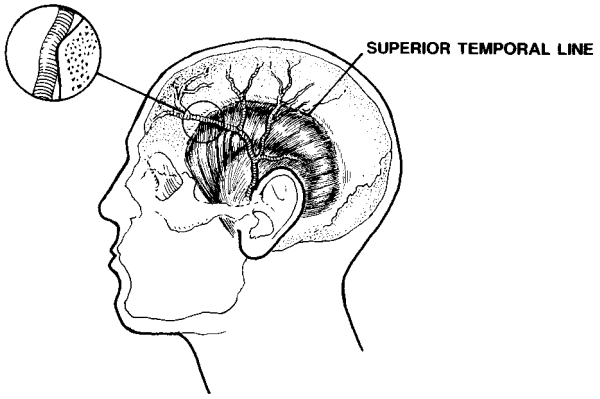

Fig. 1. Aneurysms most commonly involve the segment of anterior branch of superficial temporal artery, which traverses the superior temporal line.

Clinical features. The typical presentation of STA aneurysms is a compressible pulsatile mass on the temporal area with recent history of minor head trauma. The usual onset is approximately 2 to 6 weeks after head injury. Although some patients have had headache, pulsations, and ear discomfort, most have had no symptoms. Less frequent reports include pain, visual disturbance, dizziness, hemorrhage, and neurologic defects attributed to some associated pathologic condition.[22] STA aneurysm sizes have varied from 0.5 cm to 5.7 cm, with the most common size being 1 to 1.5 cm. However, isolated case reports describe dramatic patient presentations including bilateral periorbital ecchymosis and edema and large subgaleal hematoma.[23] The aneurysm appears as a single pulsatile mass in approximately 90% of the cases.

Differential diagnosis. The differential diagnosis of a pulsatile mass includes arteriovenous fistula, vascular tumor,[4] and aneurysm of an adjacent artery other than the superficial temporal artery. Aneurysms of the middle meningeal artery with bony erosions associated with Paget's disease are such examples.[24,25]

A simple clinical test consisting of proximal compression of the STA resulting in decrease or elimination of pulsation in the mass will differentiate between an STA aneurysm and a vascular tumor or an aneurysm of the middle meningeal artery.

Diagnosis. History and physical examination should disclose most superficial temporal artery aneurysms. Adjunctive diagnostic tests such as angiography, computed tomography scan, Doppler ultrasonography, and scull x-ray evaluations were not required in our series. Angiography was done in

Table I. Six patients with superficial temporal artery aneurysms

Age	*Sex*	*Presentation*	*History of Regional trauma*	*Time interval to Presentation*	*Size*
14	Male	Pulsatile swelling occasional headache	Yes, blunt (hit wall)	2 mo	1 × 1.5 cm
20	Male	Pulsatile swelling temporal headache	Yes, blunt (punched with fist)	2 weeks	1.5 × 1.5 cm
17	Male	Pulsatile mass that bled when explored by primary physician	Yes, blunt (hit handlebars)	2 mo	1.5 × 2 cm
29	Male	Pulsatile mass creating anxiety to patient	Yes, blunt (softball)	2 mo	2 × 2 cm
18	Male	Slowly growing pulsatile mass	Denied h/o trauma	N/A	1 × 1 cm
32	Male	Pulsatile soft swelling, local pain	Yes, blunt (punched with fist)	2-1/2 mo	1.5 × 1.5 cm

GETA, General endotracheal anesthesia; *N/A,* not available.

approximately 36 of the 48 patients reported since 1970. Although this test confirms the clinical diagnosis in a problematic case, it is unnecessary in most cases. Its risks and cost do not justify its routine use. In our series the diagnosis was made on clinical evaluation in all six patients.

Computed tomography scans of the head are required only when associated abnormalities are present. Doppler ultrasonography can be an aid during surgery in identifying the afferent and efferent vessels and in allowing for better planning of the incision. Skull x-ray evaluations may play a role in the initial evaluation of the patient with head trauma, but they do not have any specific diagnostic value for routine workup of STA aneurysms.

Treatment. Historically, a wide variety of operative and nonoperative procedures have been performed for the management of superficial temporal artery aneurysms. Operative methods included ligation of the common carotid artery,[3] ligation of the external carotid artery, or more conventionally, proximal and distal ligation of the aneurysm followed by excision. Nonoperative methods have included observation and application of continuous pressure over the aneurysm with eventual thrombosis.[26] Results of surgical therapy were reported by Winslow and Edwards[3] in 1934. Of the 93 patients studied, 77 were treated surgically with 67 cures, 2 improvements, and 1 recurrence, and 6 patients had no follow-up reports.

The surgical procedure of choice is STA aneurysm ligation and excision. It is simple, safe, and avoids recurrence.[3] Although rupture of these lesions is rare, three cases of ruptured aneurysms have been reported during the past 24 years,[18,19,23] with one of these patients having "severe hemorrhage."[18]

Ligation and excision of the aneurysm can be performed easily with the patient under local anesthesia. General anesthesia is preferred in children. We use a sterile CW Doppler ultrasound to locate and mark the exact location of the afferent and efferent vessels. An incision is then made over the aneurysm connecting these two marks. The vessels are exposed and ligated with permanent suture. If pulsation in the sac persists, a search for additional feeding vessels is made, and these are ligated accordingly. The sac is then dissected and excised, and the incision is closed. Should the sac be inadvertedly entered before control of the feeding vessels is achieved, hemorrhage can be controlled easily with proximal pressure on the STA.

When the aneurysm is located in a relatively inaccessible area such as the proximal STA, selective catheter embolization is an alternative therapeutic option. Proper dissection of these proximal lesions requires exposure of the parotid and the facial nerve before ligation and resection of the aneurysm are performed. Facial nerve injury may pose a greater threat than the aneurysm itself.[27] Selective catheter embolization has been performed successfully for traumatic aneurysm of the proximal STA[28] and the internal maxillary artery.[29]

Diagnosis	*Operation*	*Segment of STA involved*	*Histology*	*Outcome*
Physical exam only	GETA, CW Doppler localization of efferent and afferent vessels - ligation and excision of the mass	Anterior branch of STA	Pseudoaneurysm	Complete resolution of symptoms
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Physical exam only	GETA, CW Doppler localization of efferent and afferent vessels - ligation and excision of the mass	Anterior branch of STA	Pseudoaneurysm	Complete resolution of symptoms
Physical exam only	Patient refused treatment and was lost to follow-up	Anterior branch of STA	N/A	N/A
Physical exam only	Local anesthetic CW Doppler, ligation and excision	Anterior branch of STA	Pseudoaneurysm	Complete resolution of symptoms

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