CASE REPORTS

From the Eastern Vascular Society

Management of non-giant cell arteritis disease of the superficial temporal artery

Nicos Labropoulos, PhD, Robert J. Meisner, MD, Antonios Gasparis, MD, and **Apostolos K. Tassiopoulos, MD,** *Stony Brook, NY*

Non-giant cell arteritis disease of the superficial temporal artery (STA) is rare, appearing only as case reports in the literature. There were nine patients with STA pathology. STA aneurysm (n = 1), pseudoaneurysm (n = 4), thrombosis (n = 1), and arteriovenous malformation (n = 3). Four patients had ligation and excision, three had percutaneous interventions and one had a combination of both. All patients had immediate technical success and eight of the nine total patients had follow-up. We present a variety of ways to approach these unusual pathologies with percutaneous and open techniques demonstrating very good early outcome. (J Vasc Surg 2011;53:200-3.)

When giant cell arteritis (GCA) is excluded, pathology of the superficial temporal artery (STA) is a rare phenomenon. The literature consists of case reports and small case series.[1,2] In this article, we present nine patients with symptomatic pathology of the STA (excluding GCA), intervention, and follow-up >12 months for eight of our nine patients.

CASE REPORTS

There were nine patients (seven men, two women age ranged 15-67 years) with STA abnormality, excluding GCA (Table). All nine patients were symptomatic complaining of pain, swelling, or localized headache in the temporal artery distribution. Eight patients underwent surgical or endovascular management. These patients were seen over a 10-year period (1999 to 2009), in two university hospitals. STA pathology included thrombosis, pseudoaneurysm, true aneurysm, arteriovenous malformations (AVMs), and acquired post-traumatic arteriovenous fistula (AVF). All patients were characterized and followed using duplex ultrasound. Two patients underwent magnetic resonance imaging for planned surgical repair.

Initial technical success was achieved in all cases using various methods. Endovascular approaches were used for the three STA arteriovenous communications. In each case, percutaneous access was obtained via femoral artery. One patient had polyvinyl alcohol (PVA) injection via micro-catheter with successful sclerosis of the 5 × 5 cm AVM. The patient with the acquired post-traumatic AVF underwent a combination of endovascular coiling and a surgical soft tissue resection and skin flap due to the disfigurement of the underlying 8 × 6 cm AVM (Fig 1). Another patient had both PVA injection and coiling of her 5 × 6 cm AVM. This patient complained of severe local pain and headache at the AVM site for 1 week postprocedure. This patient's pain resolved with oral analgesics and at follow-up was symptom free without medication. Two patients did not have any late complications or recurrence of their AVM when surveyed by duplex ultrasound. The other patient did not return to clinic.

Open excision of STA aneurysms (three PSA, one true aneurysm) was successful in all four cases. Proximal and distal ligation and exclusion of feeding branches to the aneurysm were performed. Patients had no operative complications and were all done with local anesthesia. The true aneurysm that was excised was 14 mm in size. The wall defects in the PSAs were 3.7, 4.0, and 4.5 mm and no neck was present (Fig 2). These patients were not suited for ultrasound guided thrombin injection (UGTI). No late side effects or complications were found in these four patients at 1-year follow-up. One pseudoaneurysm (wall defect 1.8 mm, neck 1.6 mm) was treated successfully with UGTI. This patient postprocedure and at 12 months had no complications and a normal duplex ultrasound.

One patient was treated with anticoagulation therapy for idiopathic ECA and STA thrombosis. This patient was a heavy smoker and laboratory testing revealed only a mildly elevated homocysteine level. There was not an obvious plaque or source of embolization in the ECA. His pain resolved over time and a duplex ultrasound at 6 months and 1 year showed chronic occlusion of both arteries.

DISCUSSION

STA pathology (excluding vasculitis) includes aneurysm, pseudoaneurysm, thrombosis, dissection, or arteriovenous communications. These entities should be distin-

From the Department of Surgery, Division of Vascular Surgery, Stony Brook University Hospital.
Competition of interest: none.
Presented at the Twenty-fourth Annual Meeting of the Eastern Vascular Society, Sept 30–Oct 2, 2010, New York, NY.
Reprint requests: Robert J. Meisner, MD, Department of Surgery, Division of Vascular Surgery, Stony Brook University Hospital, HSC Level 19, Rm 090 Stony Brook, NY 11794-8191 (e-mail: rjm124@gmail.com).
The editors and reviewers of this article have no relevant financial relationships to disclose per the JVS policy that requires reviewers to decline review of any manuscript for which they may have a competition of interest.
0741-5214/$36.00

doi:10.1016/j.jvs.2010.07.070

Table. Cases of nontemporal arteritis STA pathology

	Sex	*Age*	*Pathology*	*Presentation*	*Cause*	*Treatment*	*Follow-up*
1	M	59	ECA and STA thrombosis	Pain	Idiopathic	Heparin to coumadin	14 months asymptomatic
2	F	72	PSA	Pulsatile mass	Trauma	UGTI	12 months asymptomatic
3	M	15	PSA	Pulsatile mass	Trauma	Surgical excision	24 months asymptomatic
4	M	56	PSA	Pain	Trauma	Surgical excision	12 months asymptomatic
5	M	17	PSA	Pain and mass	Trauma	Surgical excision	12 months asymptomatic
6	M	26	Aneurysm (14 mm)	Pulsatile mass	Congenital	Surgical excision	26 months asymptomatic
7	F	28	AVM (5 × 6 cm)	Symptomatic mass	Congenital	Endo-coiling and endovasc PVA injection	1 week postprocedure pain with resolution and asymptomatic for 20 months
8	M	27	AVM (5 × 5 cm)	Mass in temporal fossa	Congenital	Endovasc PVA injection	None
9	M	36	AVF (8 × 6 cm)	Symptomatic mass	Traumatic (boxing injury)	Endo-coiling and AVF resection with local skin flap	24 months asymptomatic

AVF, Ateriovenous fistula; *AVM,* arteriovenous malformation; *ECA,* external carotid artery; *PSA,* pseudoaneurysm; *PVA,* polyvinyl alcohol; *STA,* superficial temporal artery; *UGTI,* ultrasound-guided thrombin injection.

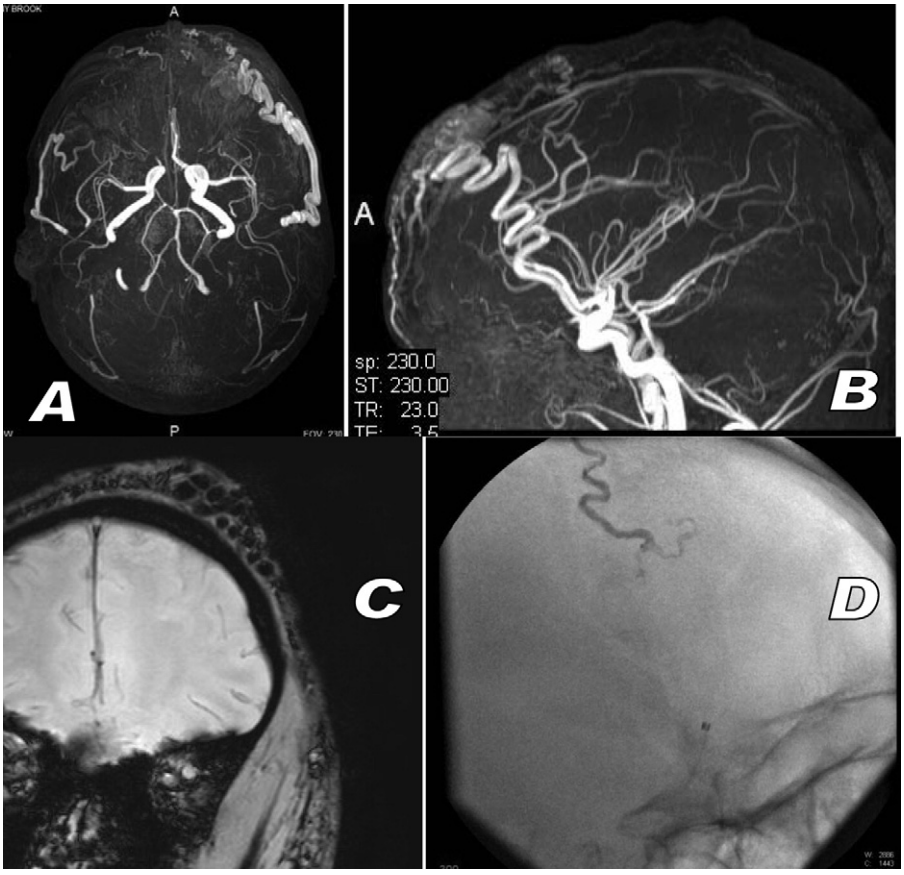

Fig 1. A 36-year-old ex-boxer with painful swelling of the right forehead and temporal fossa, diagnosed with an arteriovenous malformation (AVM) of the superficial temporal artery and large varix vein. **A** and **B,** Selected images of an magnetic resonance angiography demonstrated a large AVM. **C,** Magnetic resonance imaging showing deformity of soft tissue. **D,** Angiography after coil embolization.

guished from nonvascular lesions such as lipoma, cyst, hematoma, or abscess. The patient's complaints may include local headache, ear discomfort, skin breakdown, pulsatile mass, hemorrhage, or no symptoms.

History and physical examination alone is probably sufficient in patients with a recent trauma to the temporal fossa and a pulsatile mass, although, duplex ultrasound is useful in confirming and characterizing this pathology. Other imaging

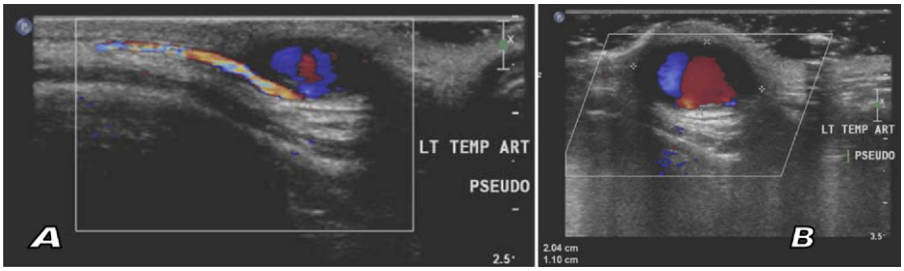

Fig 2. A 15-year-old male after sustaining a fall from a bicycle presented with a pulsatile mass in the left temporal fossa, was diagnosed with a superficial artery pseudoaneurysm. **A,** Superficial temporal artery (STA) is seen with color duplex in longitudinal view and communication with pseudoaneurysm. **B,** Cross-section of pseudoaneurysm shown, 2.0 × 1.1 cm, with surrounding hematoma as well as obvious protrusion seen in the skin.

modalities such as magnetic resonance angiography and computed tomography may be selectively employed in certain circumstances though should not be routinely used.

Vasculitis such as giant cell arteritis may also present with local headache to the temporal fossa. These patients will often also present with diplopia, jaw claudication, age older than 55, and lack history of trauma to the temporal fossa. These two pathologies are generally distinguishable by history and physical examination.

Arteriovenous communications can be congenital lesions referred to as congenital vascular malformations (CVMs) or secondary arteriovenous fistulae due to traumatic injury. These lesions, especially CVMs, are prone to recurrence and are difficult to treat. Endovascular embolization and sclerotherapy are accepted as independent therapy or as an adjunct to surgery for cure. The choice of the various sclerosing agents or embolic agents (eg, polyvinyl alcohol, cyanoacrylate glues, and various types of coils) is dependent on operator experience. Use of sclerotherapy should be undertaken with caution due to potential toxicities and side effects. Potential complications include skin and soft tissue ulceration, nerve damage, muscle or tendon injury with potential for contracture of extremity, venous thrombosis, and toxicities from sclerosing agents including transient pulmonary hypertension and hematuria.[3]

Of these three patients, one received sclerotherapy as a sole procedure for the treatment of his AVM. Unfortunately, this patient did not return for follow-up. Another patient received both sclerotherapy and coil embolization. The other patient had undergone a multidisciplinary approach with both an endovascular coiling procedure preoperatively and surgical resection of the soft tissue around the lesion. Preoperative embolization has been described to minimize morbidity and reduce excessive blood loss that is common with open surgery on AVMs.[4]

One of our patients had spontaneous external carotid artery (ECA) and STA thrombosis. Carotid thrombosis is well described in the internal and common carotid arteries. ECA and STA thrombosis is rare. We are aware of only one report by Raso et al[5] in 1970 referred to external carotid thrombosis (English title in pubmed). However, when read in Italian, it actually states extracranial instead of external and refers to internal carotid. Therefore, this is the first case in the literature.

True STA aneurysms are rare with approximately 20 reported cases. The first documented true aneurysm was in 1955.[6] In 1999, Uchida and Sakuma[7] reviewed nine STA true aneurysms including their one case. Since that time, several case reports have been published.

Pseudoaneurysms are more common with >300 documented cases.[2] Over 90% of these have been attributed to temporal fossa trauma.[8] The first reported pseudoaneurysm was by Bartholin in 1644.[9] There continue to be single cases of pseudoaneurysms published in the literature in 2010. In our series, we present four patients with PSA. Three patients underwent surgical resection and one had percutaneous thrombin injection all having no complications at 1 year.

Noninvasive options include observation only or continuous compression and eventual thrombosis of a pseudoaneurysm.[10] Aneurysm ligation and excision is an acceptable procedure with minimal operative risks. It can be done in most adults with local anesthesia alone. The percutaneous options include injection of thrombin into the pseudoaneurysm space under ultrasound guidance for patients with pseudoaneurysm and coil embolization has been described for obliterating true aneurysms as well.[11,12] Based on our experience, we present excellent results with both percutaneous thrombin injections for pseudoaneurysm and surgical excision. Due to the superficial location of this artery and relative ease of accessing it with an open surgical ligation, we recommend either an open surgical ligation or a minimally invasive method if experienced with this procedure. Both of these options have proven acceptable for repair and durable with 1-year follow-up after our interventions on STA true-aneurysms and pseudoaneurysms.

CONCLUSIONS

True and false STA aneurysms are successfully treated with local ligation and excision without complications or side effects at 1-year follow-up. Percutaneous options such as UGTI or endovascular coiling are also options, but with the relative ease in accessing the STA, the benefits do not necessarily outweigh the risks of traditional open surgical approach. Endovascular therapy alone or in combination with surgical treatment is safe and effective for treating STA AVMs.

REFERENCES

1. Kawabori M, Kuroda S, Nakayama N, Kenmotsu Y, Shimizu H, Tanino M, et al. Spontaneous giant aneurysm of the superficial temporal artery: case report. Neurol Med Chir (Tokyo) 2009;49:198-201.
2. Chen SS, Prasad SK. Traumatic pseudoaneurysm of superficial temporal artery: a case report. J Clin Ultrasound 2009;37:312-4.
3. Lee BB, Do YS, Byun HS, Choo IW, Kim DI, Huh SH. Advanced management of venous malformation with ethanol sclerotherapy: mid-term results. J Vasc Surg 2003;37:533-8.
4. Lee BB, Do YS, Yakes W, Kim DI, Mattassi R, Hyon WS. Management of arteriovenous malformations: a multidiscplinary approach. J Vasc Surg 2004;39:590-600.
5. Raso AM, Bianchi M, Gallingani R, Panieri R. Clinical and angiographic symptoms in thrombosis of the external carotid artery. Minerva Cardioangiol 1970;18:621-31.
6. Martin WL, Shoemaker WC. Temporal artery aneurysm. Am J Surg 1955;89:700-2.
7. Uchida N, Sakuma M. Atherosclerotic superficial temporal artery aneurysm: report of a case. Surg Today 1999;29:575-8.
8. Peick AL, Nichols WK, Curtis JJ, Silver D. Aneurysms and pseudoaneurysms of the superficial temporal artery caused by trauma. J Vasc Surg 1988;8:606-10.
9. Bartholin, T. Epistolarium medicinalum centuria. The Hague: Comitum 1644. p.53.
10. Edwards MR. Aneurysm of the temporal artery: cure by compression. Lancet 1861;2:135.
11. Piffaretti G, Castelli P. True aneurysms of the superficial temporal artery: report of three cases. Ann Vasc Surg 2009;23:687e15-7.
12. Pipinos II, Dossa CD, Reddy DJ. Superficial temporal artery aneursyms. J Vasc Surg 1998;27:374-7.

Submitted May 23, 2010; accepted Jul 29, 2010.