CASE REPORT

Endovascular embolisation of an iatrogenic superficial temporal artery pseudoaneurysm using liquid embolic

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SUMMARY

Pseudoaneurysms of the superficial temporal artery (STA) are rarely reported consequences of surgical interventions. They carry a high rupture risk and expedient management is required. Both surgical resection and endovascular intervention are available management options. We present the case of a patient with a pseudoaneurysm of the STA, managed by a combination of endovascular embolisation using liquid embolic, followed by surgical resection.

BACKGROUND

Injury to the superficial vascular supply overlying a craniotomy is rarely of major consequence due to the rich collateral circulation that supplies the scalp.¹ The superficial temporal artery (STA) is a commonly encountered artery during many neurosurgical approaches. It is a branch of the external carotid artery, terminating in the anterior (frontal) and posterior (parietal) branches.² While the typical concerns of iatrogenic injury or sacrifice of this vessel revolve around incisional healing, pseudoaneurysms postcraniotomy are a seldom reported complication. We present the case of a patient who developed an STA pseudoaneurysm postoperatively, which was complicated by rupture.

CASE PRESENTATION

An 83-year-old retired college professor underwent surgical resection of a right frontal glioblastoma

Figure 2 Lateral digital subtraction angiography (A) pre-embolisation with partially thrombosed pseudoaneurysm arising from the superficial temporal artery; (B) postembolisation with liquid embolic (ONYX) with resolution of the pseudoaneurysm.

multiforme via frontal craniotomy using a question-mark incision, without complication at an outside institution. He subsequently suffered a fall while at rehab and subsequently noticed a slowly enlarging and pulsatile mass in the right preauricular region (figure 1A). Beyond a cosmetic deformity, the patient remained asymptomatic from this lesion. CT angiography was concerning for a pseudoaneurysm of the STA (figure 1B). He was scheduled for outpatient angiography to evaluate the lesion with planned resection to follow within a week of his appointment.

The day before his scheduled treatment, he experienced a small amount of bleeding from the pseudoaneurysm and was taken urgently for angiographic evaluation, confirming the diagnosis (figure 2A). Decision was made to embolise the lesion under conscious sedation using liquid embolic using Medtronic ONYX, which is composed of ethylene vinyl alcohol copolymer dissolved in dimethyl sulfoxide and suspended micronised tantalum powder, (figure 2B). This preoperative embolisation was done to allow the skin to be properly prepped without rupturing the pseudoaneurysm, decrease the blood loss during the surgery and also to facilitate resection.

Access to the pseudoaneurysm was achieved via 6-French short sheath, Chaperone guide catheter, a Headway Duo microcatheter and a Syncro2 soft microwire. Vessel occlusion was achieved with gradual injection of liquid embolic, and the patient remained clinically stable with resolution of active flow, and embolisation of the afferent branch. The acute haemorrhage stopped during the gradual introduction of the embolic material. To alleviate

Figure 1 (A) Pre-embolisation photo of a haemorrhagic right preauricular pulsatile mass; (B) coronal CT angiography demonstrating pseudoaneurysm with superficial temporal artery tributary.

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Figure 3 (A) Surgical removal of the pseudoaneurysm with adherent portions of ONYX; (B) resected pseudoaneurysm.

the risk of skin necrosis, we placed the microcatheter right in the pseudoaneurysm so no distal vasculature arising from the parent artery was compromised. The following day, he was taken for surgical resection (figure 3, video 1). Minimal skin bleeding was experienced. He was discharged on postoperative day one.

OUTCOME AND FOLLOW-UP

The patient was seen in clinic regularly for 2 months, with no further issues or recurrent pseudoaneurysm. A cosmetically acceptable closure was achieved (figure 4). No further intervention was required for this lesion.

DISCUSSION

While STA pseudoaneurysms as a result of surgery have been previously reported, the most common cause of this pathology remains blunt or penetrating trauma.^{3–7} It is presumed that the STA is at risk for injury and pseudoaneurysm formation during impact due to the lack of muscular cushion protecting the artery from the temporal bone underneath it.^{3–9} On the other hand, surgically induced pseudoaneurysm in this location is likely secondary to fusiform dilatation of the STA as a result of microtrauma to the intima during dissection in the region of the temporal muscle.² In addition, the patient had received radiation therapy, which may have previously weakened the vessel wall.

Most cases present with a progressively enlarging pulsatile mass that can present acutely (within days) or months after vessel injury. Though many patients remain otherwise asymptomatic beyond the obvious cosmetic deformity, headache, facial pain, or facial palsy (due to the proximity of the facial nerve in this location) have been reported.^{4 10 11}

While several imaging modalities exist to aid in establishing a diagnosis—including ultrasound, CT, MRI and diagnostic subtraction angiography—clinical diagnosis based on history and physical examination remains the most useful tool.^{5 10 12}

Video 1 Surgical dissection of the pseudoaneurysm.

Figure 4 Postoperative surgical result.

Differential diagnoses include abscess, arteriovenous fistulae, subcutaneous cysts or vascular tumours. Diagnostic cerebral angiography allows for confirmation that no intracranial extension exists which is of particular concern in a patient who is postcraniotomy.

Expedient management is critical, as these lesions are prone to rupture given the weakness of the intimal wall surrounding them. While surgical resection by ligating the afferent and efferent supplies remains the treatment of choice, endovascular management is an alternative management strategy.^{3 5 6 11 13} Current reports describe coil embolisation of the efferent branches of the STA supplying the pseudoaneurysm. In our patient, decision was made to proceed with liquid embolic embolisation, which provided acute haemostasis as well as minimal intraoperative blood loss despite the preoperative rupture the patient experienced. While our patient underwent subsequent surgical resection to manage the open wound, as well as for cosmetic purposes, other authors have reported regression of the pseudoaneurysm after coiling alone.³ As always, care should be taken in this area to avoid injury to the facial nerve during dissection. Additional management modalities include direct injection with thrombin and, for smaller lesions, manual pressure causing thrombosis and ultimately resolution of the pseudoaneurysm.¹⁰

Learning points

- We present the rare complication of superficial temporal artery pseudoaneurysm following craniotomy and radiation therapy, presenting with rupture.
- Endovascular embolisation using liquid embolic allowed for both diagnostic confirmation and rapid haemostatic control.
- Management of this rare complication ultimately rests on appropriate diagnosis, with a favourable prognosis reported for all treatment modalities.

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contributed to the drafting of this manuscript. Authors PE, JD and AP were involved in obtaining images and figures. Authors JD completed the supplemental video.

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