

Case reports

One Paintball and Multiple Pseudoaneurysms: Case Report on Traumatic Pseudoaneurysms of the Superficial Temporal Artery

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Traumatic pseudoaneurysm of the superficial temporal artery (STA) is a rare and potentially life-threatening lesion that generally presents as a pulsatile mass in the temporal region. Most STA pseudoaneurysms are solitary. Limited evidence for treatment of STA pseudoaneurysms is available for minimally invasive techniques such as embolization because the mainstay treatment option is surgical resection. Hence, we report the case of a 25-year-old male who presented with multiple STA pseudoaneurysms after being struck by a paintball. He was initially treated with glue embolization and ultimately had to undergo surgical resection to completely resolve the pseudoaneurysms.

INTRODUCTION

A pseudoaneurysm or false aneurysm is defined as a vascular lesion that results from a disruption of the tunica intima and tunica media while the tunica adventitia remains intact. True aneurysms, on the other hand, involve all three layers of the arterial wall.¹⁻³

Pseudoaneurysms have a high risk of rupture and hemorrhage due to the disruption of vessel wall support. Superficial temporal artery (STA) pseudoaneurysms are rare lesions, but clinicians should still be cognizant of its presentation as timely diagnosis and treatment are critical. 75% to 95% STA pseudoaneurysms result from blunt trauma, while the remaining etiologies include iatrogenic causes or penetrating injury.^{1,2} STA pseudoaneurysm generally presents as an expansible, pulsatile, and/or indolent mass that may be associated with headaches, neurologic symptoms due to cranial nerve VII compression (dizziness, facial pain, ear discomfort, or facial droop), and occasional bruits auscultated over the temporal region.²

Arterial angiography is the diagnostic tool of choice for pseudoaneurysms and allows for endovascular treatment such as embolization and stent-graft placement at the time of diagnosis. Computed Tomography (CT) angiography and Magnetic Resonance (MR) angiography may also be used but have lower sensitivity than conventional arterial angiography.³ Noninvasive diagnostic methods include duplex ultrasonography which can demonstrate turbulent flow and vessel dilation related to the pseudoaneurysm.^{1,3} Needle aspiration should be avoided due to the risk of hemorrhage.¹

The main treatment option for STA pseudoaneurysms is surgical resection, but embolization with IR is an emerging means of treatment. Moreover, most STA pseudoaneurysms secondary to blunt trauma are solitary.⁴ Here, we present a case of multiple STA pseudoaneurysms that were treated initially via glue embolization with IR but ultimately



Figure 1. Clinical Image of the Left forehead.

The Left forehead, frontotemporal region. Presence of a subcutaneous pulsatile mass (perforated black circle).

needed surgical resection. A literature search on STA pseudoaneurysms' pathophysiology, diagnosis, and treatment was also performed.

CASE PRESENTATION

The patient is a 25-year-old male who was struck by a paintball in the left frontotemporal region, initially causing bleeding and ecchymosis. Two months later, he presented to an outpatient vascular clinic due to the development of a pulsatile mass of the left forehead (Figure 1). The clinical finding prompted a diagnostic US including arterial duplex evaluation of the site which confirmed tandem pseudoaneurysms in the scalp left of midline arising from the parent left superficial temporal artery (Figure 2).

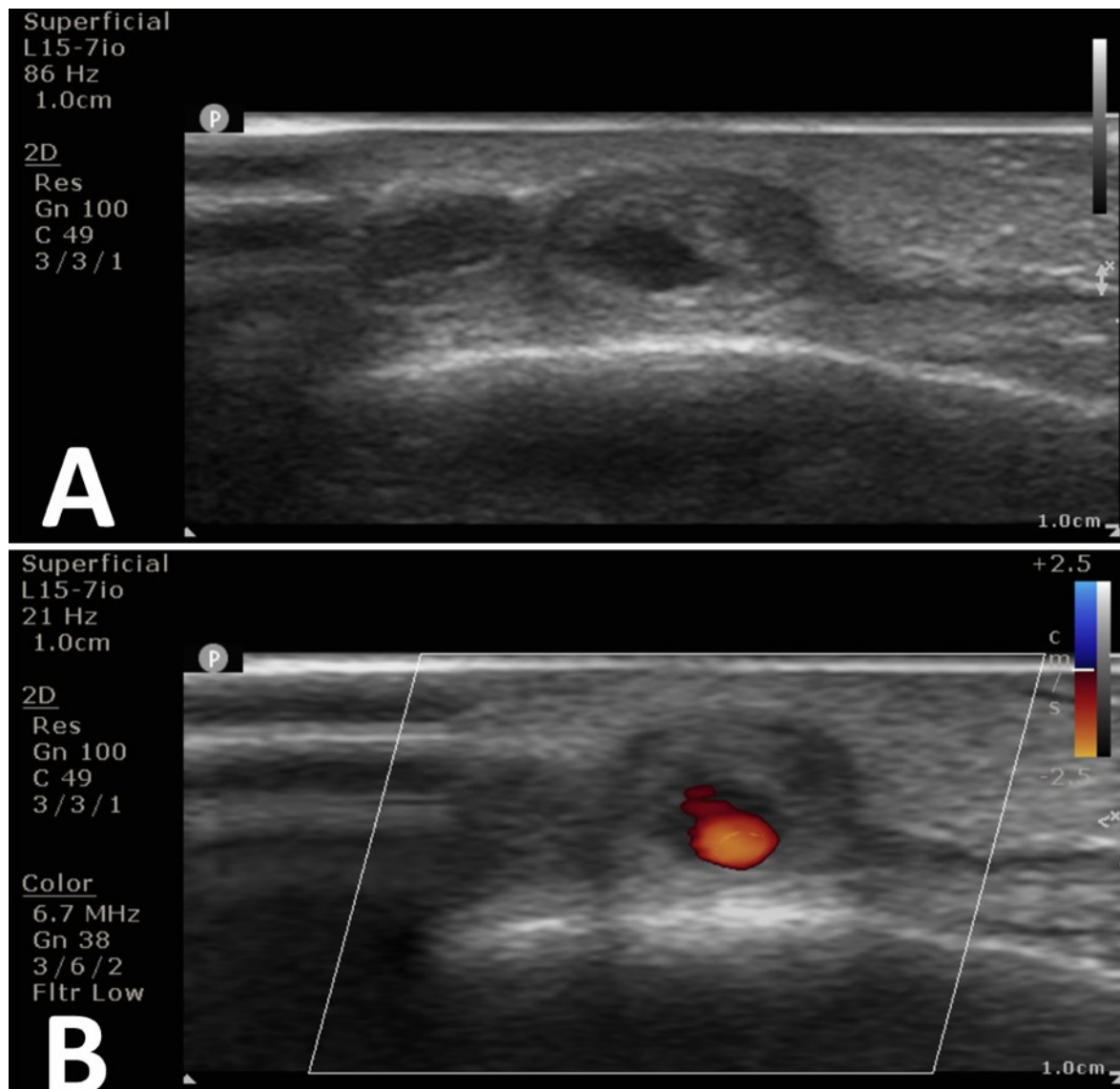


Figure 2. Diagnostic Ultrasound

A: Grayscale Ultrasound confirms tandem 4mm complex cystic thick-walled appearing masses. B: Upon arterial duplex color flow evaluation, these structures have corresponding arterial blood flow. Collectively, these ultrasound images confirm the presence of tandem partially thrombosed pseudoaneurysm arising off the superficial temporal artery (not shown).

After discussion and counseling regarding the treatment options, the patient elected to have the percutaneous procedure performed in lieu of surgery as his initial choice of treatment. The patient emphasized understanding that a surgical excision may be required in the future for complete cosmetic and symptomatic resolution. Two weeks after the ultrasound study was conducted, the pseudoaneurysms were treated with direct, percutaneous pseudoaneurysm needle access and subsequent angiogram and n-BCA glue embolization. Specific procedure details include: the procedure was performed under moderate sedation with IV administration of midazolam and fentanyl. The forehead was prepped and draped in sterile fashion and subcutaneous injection of 1% lidocaine was used for local anesthesia. Then, the pseudoaneurysm was percutaneously accessed with a 21-gauge needle under direct US guidance. Angiography through the needle demonstrated successful access to the pseudoaneurysm; which was located at a branch point of the STA. Further angiographic opacification of the vascu-

lar territory demonstrated two additional small pseudoaneurysms, one arising from each branch (Figure 3).

There was normal venous drainage on the scalp and no evidence of intracranial communication. Embolization with n-BCA glue was then delivered under fluoroscopic guidance. The glue embolized all three pseudoaneurysms including a short segment of the parent inflow artery and short segments of the outflow arteries. The glue cast was well visualized on fluoroscopy. Post-intervention ultrasound confirmed thrombosis of the pseudoaneurysms (Figure 4). The patient tolerated the procedure well without complications.

Unfortunately, one year later, embolization did not completely resolve the pseudoaneurysms as his lesions continued to undulate in size. He also experienced left-sided temporal headaches. Ultimately, he underwent excision of the remnant pseudoaneurysms with plastic surgery. A brief timeline of the case presentation is presented in Figure 5.

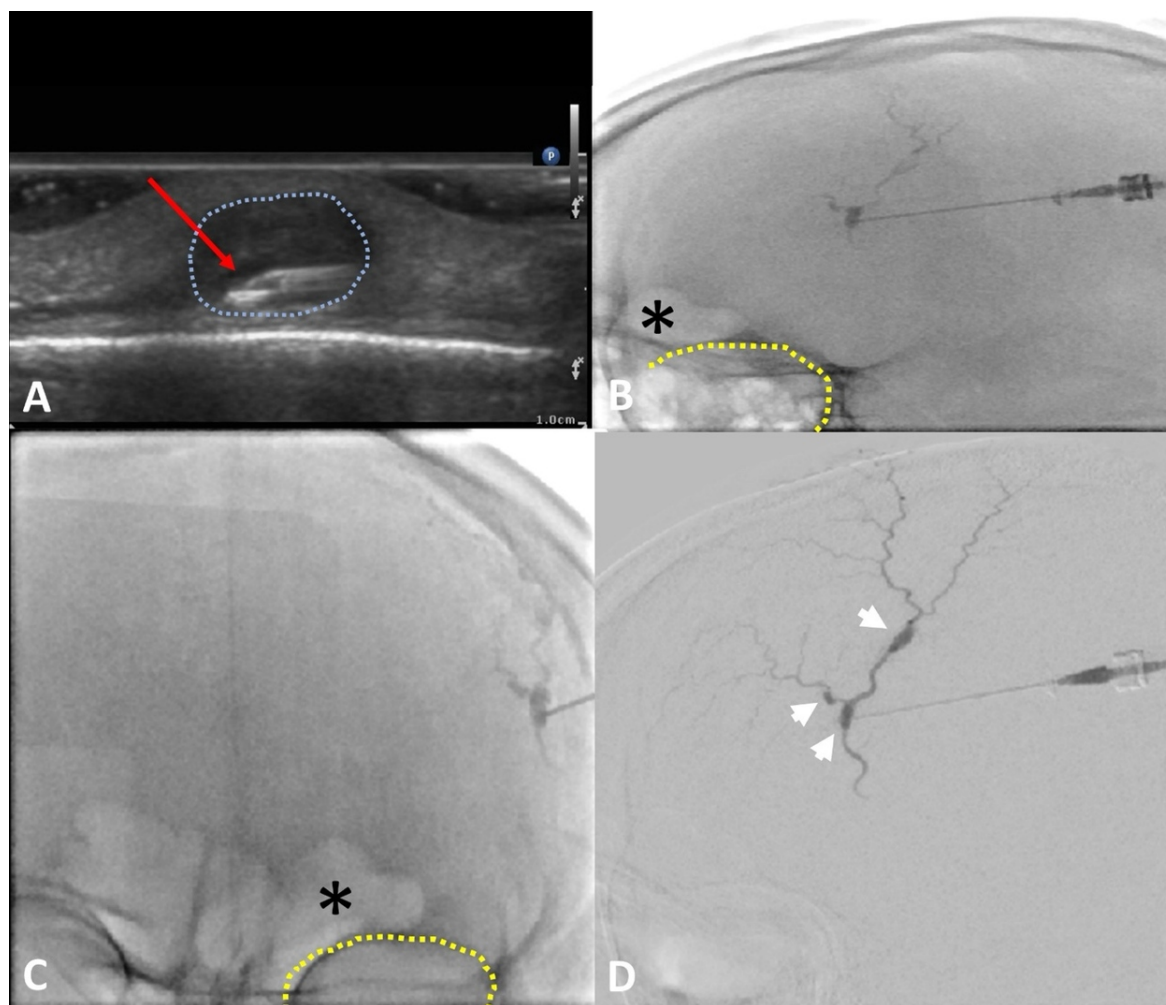


Figure 3. IR Intervention. A: Ultrasound image showing percutaneous 21G needle access (red arrow) into the pseudoaneurysm (blue perforated circle). B: Lateral projection fluoroscopic spot image showing the percutaneous needle within the pseudoaneurysm after injection of iodinated contrast. Moreover, the left frontal sinus (*) and left orbit (yellow perforated circle) are depicted for relative positioning of the needle access. C: An anteroposterior projection fluoroscopic spot image showing the relative position of the left frontal sinus (*) and left orbit (yellow perforated circle). D: Three pseudoaneurysms (white arrowheads) arising from parent superficial temporal artery are confirmed during digital subtraction angiography achieved through percutaneous needle access into one of the pseudoaneurysms.

Written informed consent was obtained from the patient for the procedure which also included the ability to publish accompanying images from the procedure. This study was conducted in accordance with relevant ethical guidelines and institutional policies regarding case reports.

DISCUSSION

STA pseudoaneurysms are rare lesions. The first reported case of STA pseudoaneurysm secondary to blunt trauma was in 1740 by Thomas Bartholin which was treated by opening the mass and applying direct pressure.^{4,5} The STA, a terminal branch of the external carotid, is vulnerable to blunt head trauma due to its superficial course over the frontal bone, running within the temporoparietal fascia.^{1,6} Most pseudoaneurysms of the STA, especially due to blunt trauma, are solitary. Multiple pseudoaneurysms of

the STA have mainly been reported as a complication resulting from craniotomy.⁷ Our patient's case is unique in its presentation of multiple pseudoaneurysms secondary to blunt trauma with a paintball.

Patients often present two to six weeks after injury which is attributed to the slow expansion of the vascular lesion from the pressure of local blood flow.¹ Differential diagnoses of a mass overlying the temporal region include but are not limited to lipoma, cyst, simple hematoma, abscess, inflamed lymph node, arteriovenous fistula (AVF), meningocele, encephalocele, and angiofibroma.¹ Vascular inflow and outflow differentiate a pseudoaneurysm from a hematoma. While a hematoma does not have vascular inflow and outflow, a pseudoaneurysm presents with a communicating vessel to the main artery, allowing blood flow in and out of the pseudoaneurysm.⁶ Furthermore, a pseudoaneurysm is an extra-arterial lesion that remains connected to the arterial lumen, associated with pulsations and thrills

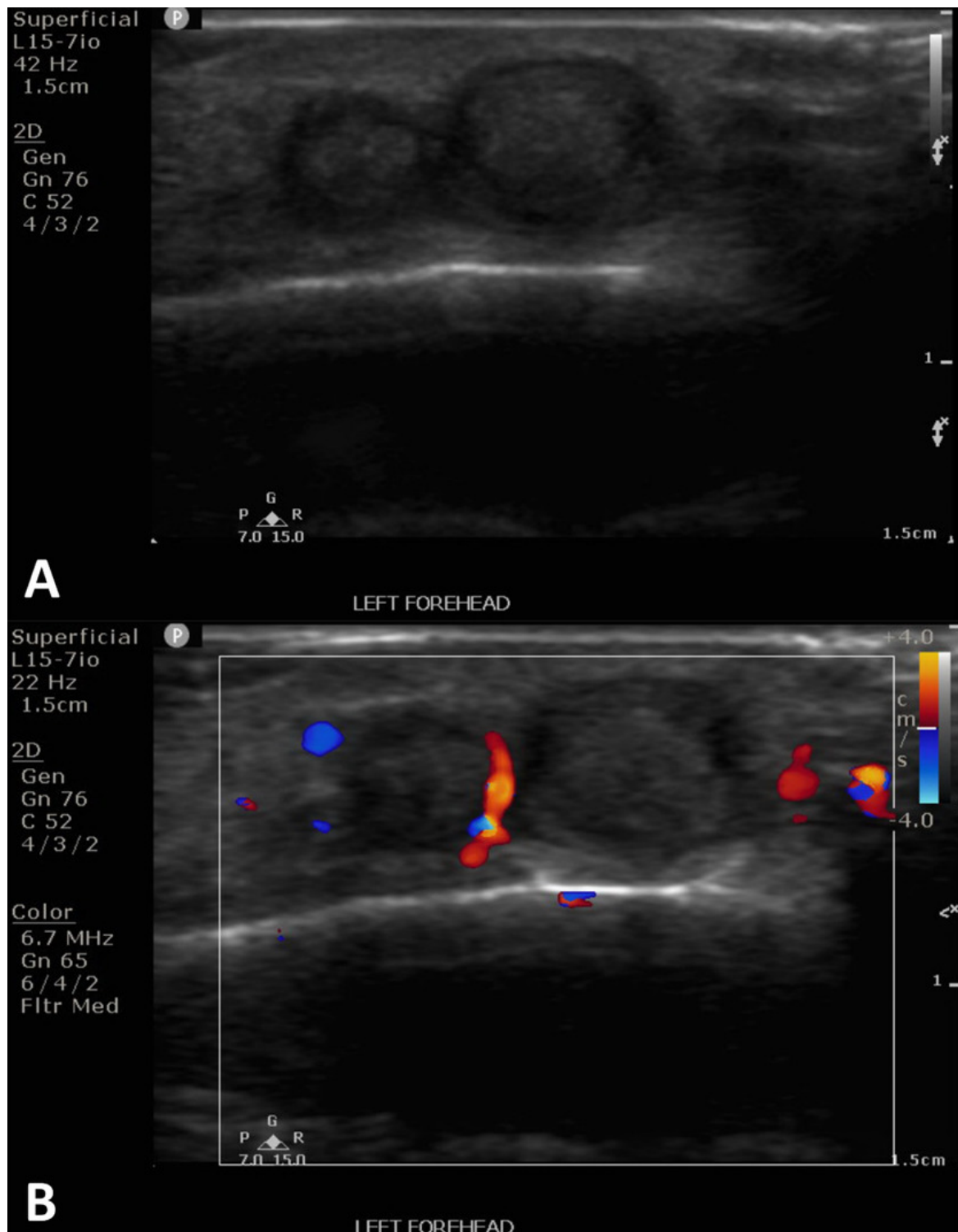


Figure 4. Post Intervention Ultrasound. A: Grayscale Ultrasound demonstrates new presence of internal echogenicity within the tandem pseudoaneurysms consistent with thrombotic material. B: Further confirmation of pseudoaneurysm thrombosis is shown as absence of color flow within the pseudoaneurysms on arterial duplex.

related to systole. Imaging studies are necessary to differentiate between the vascular and nonvascular pathologies and ensure proper treatment.

Treatment generally consists of surgical resection. In a systematic review of 166 patients with reported STA pseudoaneurysms from 1861-2010 by van Uden et al., the primary treatment of STA pseudoaneurysms for 77% of patients was surgical resection.⁵ Other treatment options in-

clude manual compression, percutaneous thrombin injection, or endovascular intervention. In one case, Raskin et al. describe a patient who had spontaneous resolution of the STA pseudoaneurysm in nine months under close observation.⁶ Using shared decision-making, the patient presented in this case elected to have the pseudoaneurysms treated with percutaneous injection before pursuing the more invasive option of surgical resection. Counseling dur-

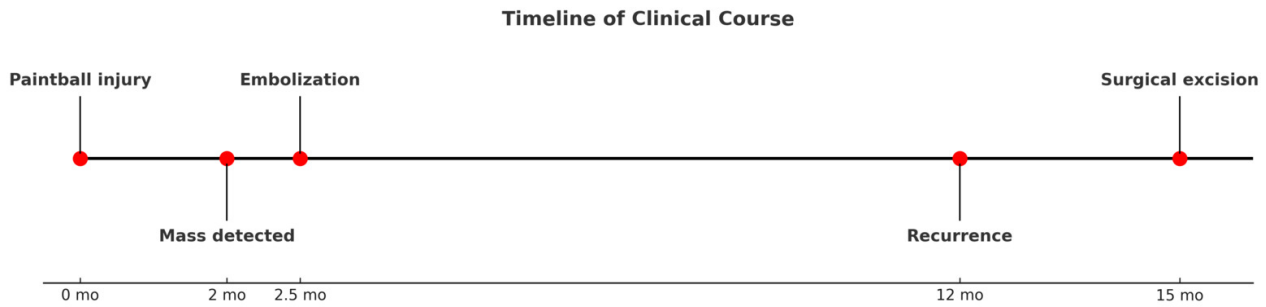


Figure 5. Timeline of case presentation.

ing the initial consultation was performed to inform the patient that despite percutaneous injection, there may be residual cosmetic deformities of raised and superficial protuberances on the skin surface which could potentially require cosmetic surgery to address. Our patient initially underwent glue embolization for his pseudoaneurysm but ultimately required surgical resection to address the remaining cosmetic deformities and his residual symptom of headaches. van Uden et al. reported 6% of patients with STA pseudoaneurysms require more than one intervention.⁵

Minimally invasive treatments for pseudoaneurysms such as coil embolization, thrombin injection, and glue embolization are promising due to their decreased risk of incisional complications (i.e. facial nerve palsy), infection, and scarring.^{5,8} On the other hand, surgical resection remains the treatment of choice due to its historically high success rate. Limitations to this case study include that is an isolated case presentation of a rare entity and phenomenon, potentially limiting the generalizability of the study. Additionally, given this patient's young age and otherwise healthy status, outcomes may differ in diverse populations

who may present with a different medical history than the patient in this case.

CONCLUSION

A case of traumatic superficial temporal artery pseudoaneurysms, initially treated with glue embolization and ultimately resolved with surgical excision, is reported. This case report contributes to the better characterization of the clinical features and treatment of this rare vascular lesion.

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