

Ruptured presentation of superficial temporal artery pseudoaneurysm treated with anastomotic repair: Case report[☆]

Blessing Ndlovu^{a,b}, Mlamuli Mzamo Mkhalihi^{a,b}, Keletso Leola^{a,b},
Morena Nthuse Mpanza^{a,b}, John Richard Ouma^b, Christos Profyris^{a,b,*}

^a Department of Neurosurgery, Helen Joseph Hospital, 1 Perth Road, Auckland Park, Johannesburg, South Africa

^b Department of Neurosurgery, School of Clinical Medicine, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa

ARTICLE INFO

Keywords:

Pseudoaneurysm
Superficial temporal artery
Blunt trauma
Microvascular anastomosis
Anastomosis
Rupture

ABSTRACT

Superficial temporal artery (STA) pseudoaneurysm is a very rare occurrence that usually presents as a pulsatile mass along the STA distribution following trauma or an iatrogenic cause. We report a case of STA pseudoaneurysm that developed in a 32 year old male following blunt trauma. Unfortunately, the pseudoaneurysm was missed and led to multiple hospital presentations that culminated in an acute bleeding episode. Surgical resection of the pseudoaneurysm was performed and the STA was reconstructed with an STA-STA anastomosis. To our knowledge, this is the second reported case of an STA pseudoaneurysm treated with an STA-STA anastomosis. This case report aims to bring awareness. Although extremely rare, the importance of treating the presence of a pulsatile mass along the STA distribution following a history of trauma or recent cranial surgery with a high level of suspicion is imperative.

Introduction

Pseudoaneurysms of the superficial temporal artery (STA) are a rare entity. They may present as a pulsatile, compressible mass of the temporal area and may display periods of rapid growth [1]. Other presentations associated with STA pseudo-aneurysm are headache, and ear discomfort while acute rupture causing haemorrhage is exceptionally rare [2]. Causation of STA pseudoaneurysm formation is associated with trauma or iatrogenic cause [1]. Other rare causes include subcutaneous angiolymphoid hyperplasia with eosinophilia and coagulopathy [3,4].

We present a case of STA pseudoaneurysm that was unfortunately missed. The patient was admitted following multiple presentations and eventual rupture of the pseudoaneurysm. Treatment of the STA pseudoaneurysm was performed through surgical excision and STA-STA anastomosis. To our knowledge, there has been only a handful of cases reporting acute rupture of an STA pseudoaneurysm [2,5,6] and this is the second reported case of an STA pseudoaneurysm treated with an STA-STA anastomosis [7].

Case presentation

A 32 year old male was assaulted with a bottle and sustained blunt injury to the right side of his face. Following this incident, he was

[☆] Previous presentations: This work has not been presented previously wholly or in part.

* Corresponding author at: Department of Neurosurgery, Helen Joseph Hospital, 1 Perth Road, Auckland Park, Johannesburg, South Africa.
E-mail address: cp@drprofyris.com (C. Profyris).

admitted to the emergency department and had superficial sutures placed to his right pre-auricular area. There was no evidence of arterial bleeding at the time. Upon his return to hospital for suture removal, brisk bleeding was encountered. This was controlled with further superficial suture placement and the patient was sent home. The patient represented five days later with a pulsatile mass at his pre-auricular area (Fig. 1A) and a re-bleed. Bleeding was controlled with a pressure dressing and the patient was referred for assessment by Neurosurgical services.

The patient had sustained previous lacerations to his head secondary to trauma but these lacerations were away from the right pre-auricular region. The patient was positive for Human Immunodeficiency Virus (HIV) and on first line Tenofovir, Lamivudine and Dolutegravir anti-retroviral treatment. His CD 4 count was 445 and viral load was lower than detectable. The patient's platelet count was 445.

Computed Tomography Angiography (CTA) revealed a pseudoaneurysm of the right superficial temporal artery (STA) that had partially thrombosed (Fig. 1B).

As our institution does not have a Neuroendovascular service we proceeded to explore and repair the pseudoaneurysm surgically.

The patient was placed supine and their head was rotated to the left and supported in a horseshoe (Fig. 2A). The decision was made to expose the cervical carotid bifurcation in order to gain proximal control of the external carotid artery (ECA) – Fig. 2B. This decision was made as there was very little STA proximal to the pseudoaneurysm, which made control difficult. Furthermore, as our patient was positive for HIV, we wanted to minimise the exposure of the surgical team to blood following a potential rupture of the pseudoaneurysm. The STA course both proximal and distal to the pseudoaneurysm was marked with the assistance of doppler ultrasound. An attempt was made to expose the STA proximal to the pseudoaneurysm but this proved unsuccessful. As a result, the pseudoaneurysm was approached from the distal STA following temporary occlusion of the ipsilateral ECA. Rupture of the pseudoaneurysm was encountered despite temporary ECA clipping, which required local pressure and brisk dissection toward the pseudoaneurysm. The pseudoaneurysm capsule was dissected off the preauricular area and off the pre and post-pseudoaneurysmal aspects of the STA. As a technical note, the pseudoaneurysm was very adherent to the STA and required meticulous sharp dissection of the capsule off the STA. Once the STA was exposed, temporary surgical clips were applied to the STA both proximal and distal to the pseudoaneurysm (Fig. 2C). The pseudoaneurysmal segment of the STA was resected (Fig. 2D) and an STA-STA anastomosis was performed with a 9–0 nylon suture (Fig. 2E and F). Following completion of the anastomosis the temporary clips were removed and flow of the anastomosis was confirmed with Indocyanine Green (ICG) – Fig. 2G to H. All wounds were closed and the patient was extubated. The patient recovered well and was discharged home day 3 following surgery. CTA prior to discharge confirmed obliteration of the pseudoaneurysm and flow in the STA (Fig. 1C). Histology of submitted specimen demonstrated features in keeping with a pseudoaneurysm.

Discussion

We present a case of STA pseudoaneurysm following blunt trauma, which adds to the literature of this rare condition. As aforementioned, there has only been an handful of cases reporting acute rupture of an STA pseudoaneurysm [2,5,6] and to our knowledge, this is the second reported case of an STA pseudoaneurysm treated with an STA-STA anastomosis [7].

By definition, pseudoaneurysms are false aneurysms that arise at a site of arterial injury. They do not contain any layers of arterial wall and instead contain blood by a wall developed from clotting cascade products [1,6]. Blood flow within a pseudoaneurysms is turbulent and the pseudoaneurysm neck does not close spontaneously once past a certain size [1]. The majority of traumatic STA pseudoaneurysms arise from blunt trauma related to sports injury, falls, accidents and altercations. Formation of an STA pseudoaneurysm secondary to a penetrating injury is surprisingly rare [6].

Although STA pseudoaneurysm are exceptionally rare, they are an important diagnostic consideration in patients presenting with a pulsatile mass in the distribution of the STA, especially when this is associated with a history of trauma or a recent cranial procedure [1]. The fact that in our case, the diagnosis was initially missed, highlights the importance of improving awareness for this condition.

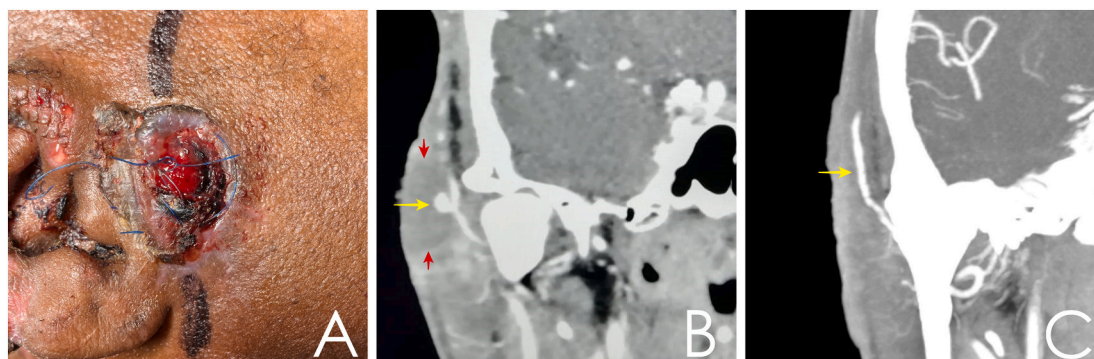


Fig. 1. A STA pseudoaneurysm eroding through skin in the preauricular area. B Pre-operative Computed Tomography Angiogram depicting flow in the superficial temporal artery pseudoaneurysm (yellow arrow) and clot within the capsule of the pseudoaneurysm (red arrow heads). C Post-operative Computed Tomography Angiogram depicting obliteration of the pseudoaneurysm and flow within the superficial temporal artery (yellow arrow). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

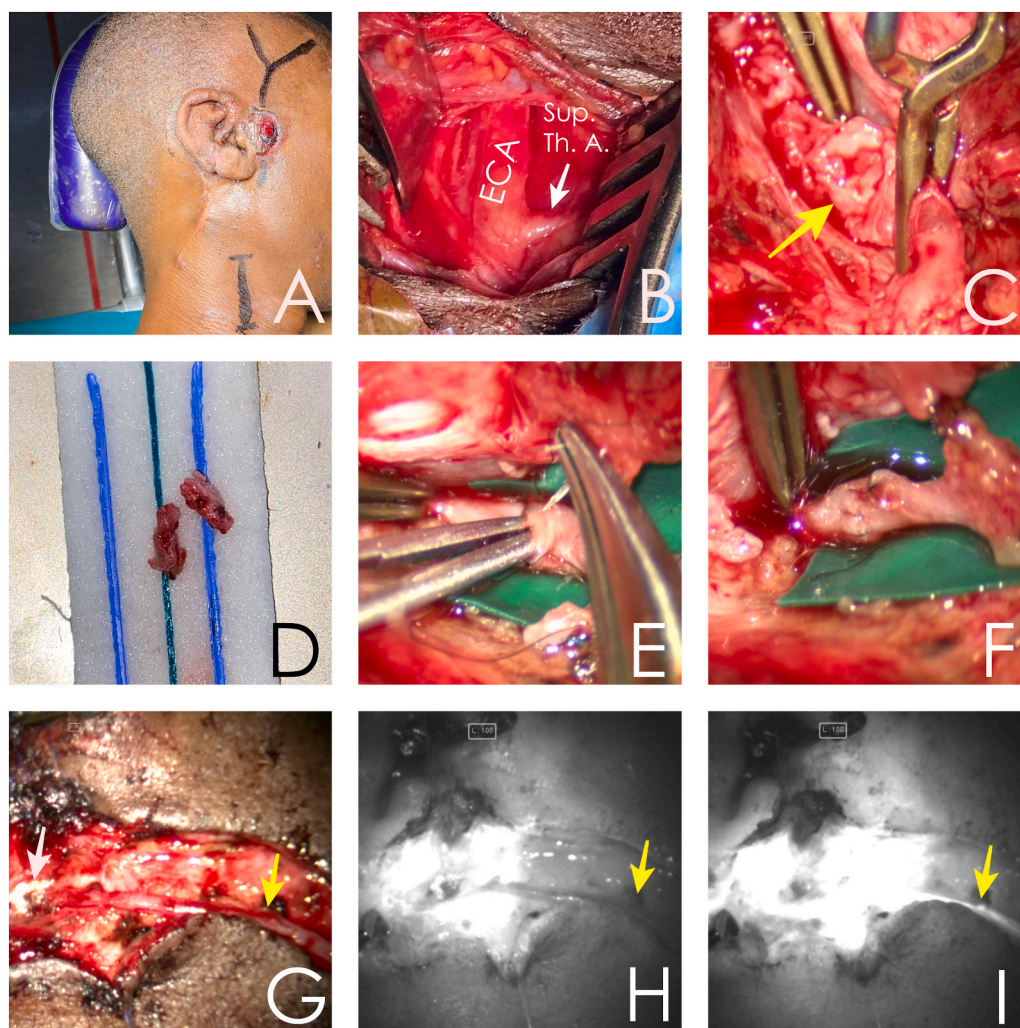


Fig. 2. A Marking of surgical incision to expose the external carotid artery in the neck and marking of the superficial temporal artery cranially. The cranial incision was made above and below the pseudoaneurysm along the superficial temporal artery markings. B Exposure of the external carotid artery in the neck. C Defect in the superficial temporal artery following resection of the pseudoaneurysm (yellow arrow). Temporary clips can be seen occluding the proximal and distal arterial flow. D Resected arterial segment displayed in C in preparation for the end to end anastomosis. E suturing of the end to end anastomosis. F completion of the end to end anastomosis. G View of superficial temporal artery following anastomosis. White arrow demonstrates anastomotic site covered with oxidized cellulose and yellow arrow demonstrates the distal superficial temporal artery. H View of the superficial temporal artery (yellow arrow) with the fluorescence filter prior to filling of the vessel with Indocyanine Green Dye. The vessel is dark. I View of the superficial temporal artery (yellow arrow) with the fluorescence filter. The vessel is displaying Indocyanine Green – bright – thus confirming patency of the anastomosis.

ECA – External Carotid Artery; Sup Th. A. – Superior Thyroid Artery. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

Treatment options for an STA pseudoaneurysm vary according to clinical and radiological parameters [2,8]. A subcutaneous STA pseudoaneurysm that displays no growth on serial imaging has been managed conservatively by some authors [8]. Conservative management has also been advocated for poor surgical candidates [9]. Non-surgical treatments for STA pseudoaneurysms have been used, such as thrombin injection and endovascular treatment with coils and embolisation [8,10]. The most common surgical intervention is exclusion of the STA pseudoaneurysm through STA ligation and sacrifice [6]. In our case, we elected to resect the STA pseudoaneurysm and perform an STA-STA anastomosis. To our knowledge, Kobayashi et al. are the only other group to perform an STA-STA anastomosis for an STA pseudoaneurysm. Interestingly, they reported a case of a stable STA pseudoaneurysm that was monitored conservatively for many years but necessitated treatment due to rapid growth following regular mask wearing as a result of the Covid-19 pandemic [7]. This report, together with the report by Kobayashi et al. demonstrates that STA-STA anastomosis following STA pseudoaneurysm resection is a viable treatment strategy, where relevant expertise exists [7].

Conclusion

Although extremely rare, the presence of a pulsatile mass along the STA distribution following a history of trauma or recent cranial surgery demands a high level of suspicion for STA pseudoaneurysm. CTA is the investigation of choice to confirm the diagnosis. Although there are several different options to treat this condition, resection of the pseudoaneurysm followed by STA-STA anastomosis is a viable treatment option.

CRediT authorship contribution statement

Blessing Ndlovu: Writing- original draft preparation, Writing – Review & Editing. **Mlamuli Mzamo Mkhaliphi:** Writing- original draft preparation. **Keletso Leola:** Writing- original draft preparation. **Morena Nthuse Mpanza:** Writing – Review & Editing. **John Richard Ouma:** Writing – Review & Editing. **Christos Profyris:** Conceptualisation, Supervision, Writing – Review & Editing.

Declaration of competing interest

The authors declare that they have no conflicts of interest (personal, financial, professional or otherwise) to disclose.

Acknowledgements

None.

References

- [1] K.S. Lee, D.J. Gower, J.M. McWhorter, Aneurysm of the superficial temporal artery, *Neurosurgery* 23 (4) (1988) 499–500.
- [2] J. Shields, J. Robichaux, K. Morrow, C. Crutcher, G. Tender, Rupture of a superficial temporal artery pseudoaneurysm following craniotomy, *J. Surg. Case Rep.* 2021 (9) (2021), rjab379.
- [3] M. Delbarre, P. Joly, M.F. Mihout, E. Clavier, E. Thomine, P. Lauret, Aneurysm of superficial temporal artery in angiolymphoid hyperplasia lesions, *Ann. Dermatol. Venereol.* 124 (3) (1997) 242–244.
- [4] M. Shimoda, A. Ikeda, O. Sato, T. Watabe, A case of multiple superficial temporal artery pseudoaneurysms following craniotomy, *No Shinkei Geka* 16 (6) (1988) 797–800.
- [5] M. Honda, T. Anda, T. Ishihara, Ruptured pseudoaneurysm of the superficial temporal artery after craniotomy, *Neurol. India* 61 (6) (2013) 698–699.
- [6] D.J. van Uden, M. Truijers, E.E. Schipper, C.J. Zeebregts, M.M. Reijnen, Superficial temporal artery aneurysm: diagnosis and treatment options, *Head Neck* 35 (4) (2013) 608–614.
- [7] H. Kobayashi, T. Morishita, S. Yoshinaga, T. Enomoto, H. Fukumoto, H. Abe, et al., Enlargement of preexisting superficial temporal artery pseudo-aneurysm co-incident to mask wearing during the COVID-19 pandemic, *Interdiscip Neurosurg.* 27 (2022), 101396.
- [8] S.W. Kim, E. Jong Kim, K.Y. Sung, J.T. Kim, Y.H. Kim, Treatment protocol of traumatic pseudoaneurysm of the superficial temporal artery, *J. Craniofac. Surg.* 24 (1) (2013) 295–298.
- [9] R.F. Grasso, C.C. Quattrocchi, P. Crucitti, G. Carboni, R. Coppola, B.B. Zobel, Superficial temporal artery pseudoaneurysm: a conservative approach in a critically ill patient, *Cardiovasc. Intervent. Radiol.* 30 (2) (2007) 286–288.
- [10] G.H. Wang, H.P. Shen, Z.M. Chu, J.G. Shen, H.H. Zhou, Traumatic pseudoaneurysms of external carotid artery branch: case series and treatment considerations, *Chin. J. Traumatol.* 24 (6) (2021) 368–373.