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Case Report

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A rare case of post-traumatic occipital artery pseudoaneurysm diagnose by doppler ultrasonography

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Abstract

A pseudoaneurysm is caused by a disruption to the continuity of the arterial wall, which can be triggered by inflammation, trauma or iatrogenic factors, such as surgery, percutaneous biopsy or drainage. Here, we present the case of an eight-year-old patient who presented with progressive enlargement of an occipital swelling following head trauma involving an occipital point of impact. Doppler ultrasonography confirmed the diagnosis of an occipital artery pseudoaneurysm. While this location is uncommon, the clinical diagnosis was straightforward, given the presence of a pulsatile mass and a history of trauma. Imaging plays a vital role in diagnosis. Echo-Doppler imaging revealed that the pseudoaneurysm was in direct continuity with the occipital artery and that there was turbulence within it.

Keywords: Pseudoaneurysm; Occipital artery; Traumatic vascular injury; Doppler ultrasound.

Introduction

A pseudoaneurysm is a focal rupture of the arterial wall that remains connected to the feeding artery. In order for a pseudoaneurysm to occur, all three layers of the arterial wall (the tunica externa, media and intima) must be ruptured. The main risk is rupture resulting in active bleeding. This differs from an aneurysm, which retains the integrity of its wall [5]. Pseudoaneurysms can result from a number of causes, the most common of which are trauma, medical procedures and inflammation. Ultrasound has been reported to have 94% sensitivity and 97% specificity in diagnosing pseudoaneurysms. On colour Doppler examination, pseudoaneurysms are characterised by the "yin-yang" sign [2]. This sign is also known as the 'Pepsi sign' and has been observed in both true and false aneurysms using various imaging techniques [1]. We present a rare case of a pseudoaneurysm of the occipital artery, diagnosed via Doppler ultrasound. This superficial mass is often unrecognised and may be mistaken for a cyst or lipoma. It typically develops following direct trauma to the occipital artery. Due to the risk of potentially fatal complications such as haemorrhage and rupture, most authors recommend excision [8].

Case report

An eight-year-old male patient presented with a painless, mobile swelling on the back of his head that had been gradually getting bigger for five months following an uncomplicated head injury sustained in a fall. Upon examination, the swelling was found to be in the left occipital region. It was oval-shaped, soft and slightly tender, moving freely in relation to the superficial and deep planes (Figure 1). The scalp was normal. The cervical lymph nodes were free. Although the appearance was suggestive of a trichilemmal cyst, the presence of a thrill raised the possibility of a vascular tumour.

The patient underwent an ultrasound examination with Doppler imaging. B-mode ultrasonography revealed an oval, well-defined, saccular structure with regular contours and a thickened pseudowall in the left-sided subcutaneous occipital softs tissus. This structure exhibited echogenic turbulent flow with

Figure 1: Occipital mass located on the left side.

posterior enhancement. The lesion measured 12 × 8 mm (Figure 2). Pulsed colour Doppler imaging revealed red and blue colours corresponding to swirling blood flow within the false aneurysm. The internal flow was slow and communicated with the left occipital artery through a small opening (Figure 3A). Due to prolonged flow within the mass being difficult to visualise in the subsequent images, the classic yin-yang sign could not be clearly demonstrated in this case. Pulsed Doppler confirmed arterial flow within the mass, originating from the occipital artery. The to-and-fro pattern was also not clearly evident due to the slow flow (Figures 3B & 3C). Based on these clinical and ultrasonographic findings, a pseudoaneurysm of the left occipital artery was suspected. The patient was referred to neurosurgery for further management.

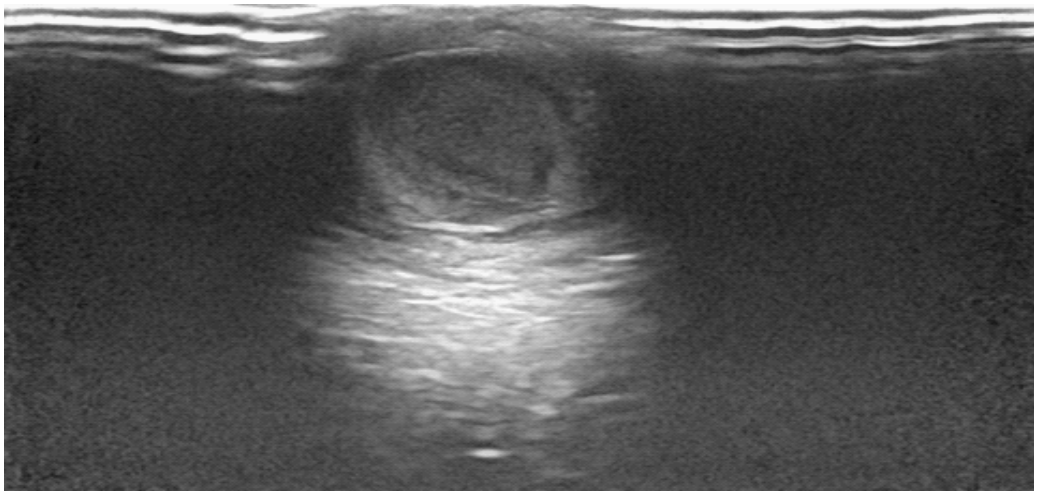

Figure 2: Subcutaneous left occipital pseudoaneurysm with echogenic turbulent flow and posterior enhancement.

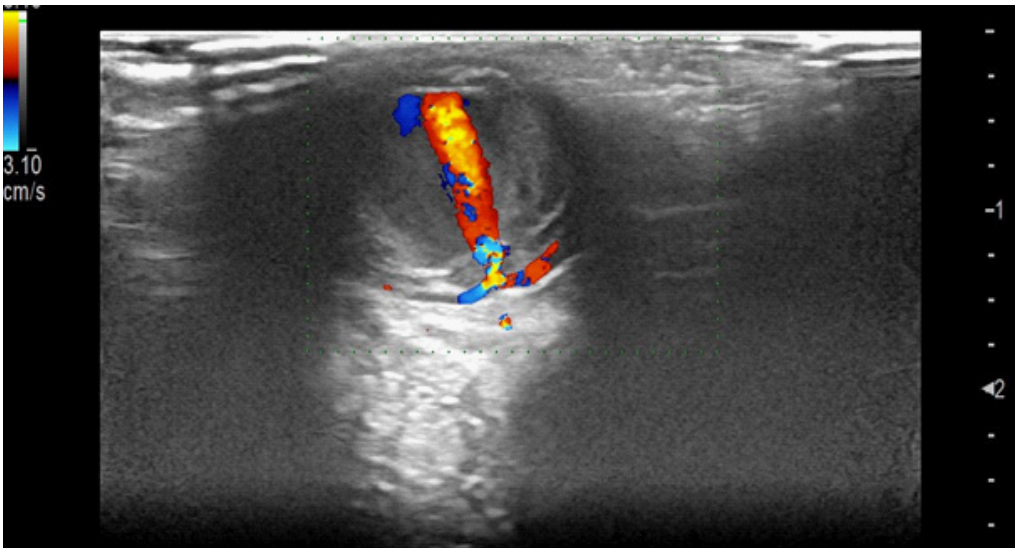

Figure 3A: Pulsed colour doppler imaging of a left occipital pseudoaneurysm with swirling flow and slow internal circulation, communicating with the occipital artery via a fine perforation.

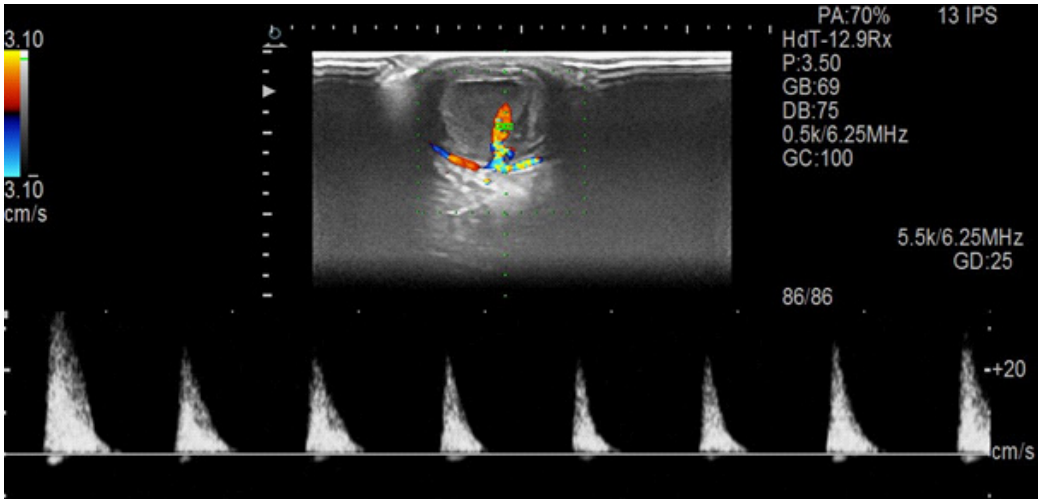

Figure 3B: Spectral doppler waveform of arterial flow within the mass.

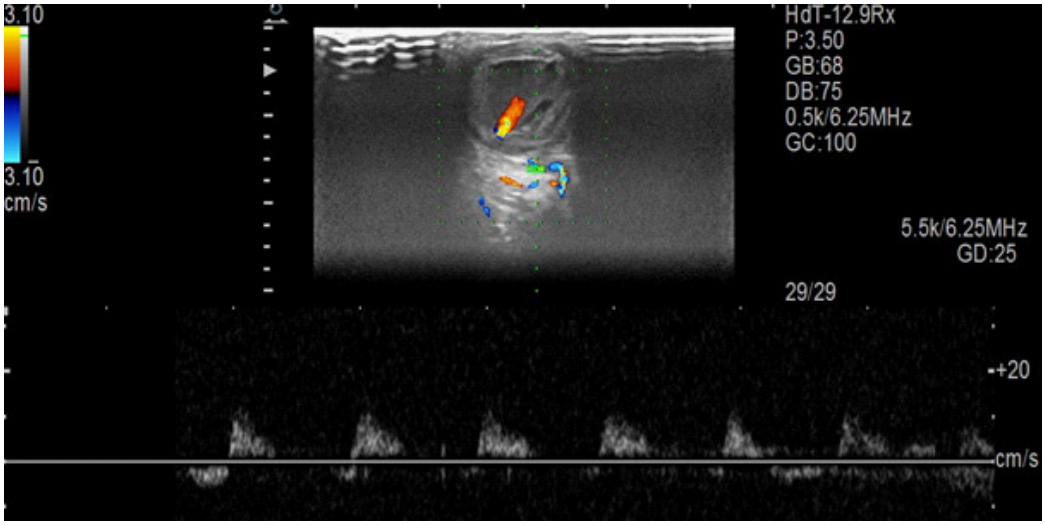

Figure 3C: Spectral doppler waveform of the occipital artery.

Discussion

A traumatic pseudoaneurysm in the face and temple region most commonly occurs in the superficial temporal artery. To date, only four cases have been reported in the occipital artery [8]. These lesions are primarily described as a consequence of blunt, penetrating or iatrogenic trauma [7]. The superficial temporal artery, facial artery and internal maxillary artery are particularly vulnerable to trauma due to their anatomical locations. In contrast, the occipital artery is relatively protected throughout its course. After originating from the external carotid artery, it is covered by muscle tissue until it pierces the fascia of the trapezius muscle. Beyond that point, the occipital artery remains surrounded and insulated by soft tissue. Pseudoaneurysms are often asymptomatic and discovered incidentally. When they are symptomatic, local manifestations are usually due to mass effect. These may include a palpable thrill, an audible bruit or a pulsatile mass. Occasionally, oedema is caused by compression of adjacent venous structures. Various imaging techniques are available to evaluate pseudoaneurysms. B-mode ultrasound typically reveals a cystic structure in continuity with the feeding artery via a neck. Ultrasound can also provide an internal assessment of the pseudoaneurysm, revealing septations or thrombus. Doppler mode often shows the classic 'yin-yang' sign, which reflects a swirling blood flow pattern within the sac [3]. Furthermore, pulsed Doppler can demonstrate communication between the pseudoaneurysm and the feeding artery. The corresponding spectral Doppler waveform exhibits a distinctive 'to-and-fro' pattern, resulting from inflow into the pseudoaneurysm sac during systole and outflow during diastole. Recognising this sign is crucial for promptly identifying aneurysms or pseudoaneurysms and preventing complications such as expansion or rupture [4]. Rupture is a particularly feared complication as it can result in haemorrhaging and hypovolaemic shock. Thrombosis and infection of the pseudoaneurysm are also possible. On average, it takes a few weeks to make a diagnosis [6]. In this patient's case, the diagnosis was made five months after the initial trauma. On non-contrast CT scans, a pseudoaneurysm may appear as a rounded, hypodense formation adjacent to the artery of interest. This is often associated with infiltration of the surrounding structures and has an intermediate or high density, depending on how long it has been present. A similar appearance can be seen on contrast-enhanced imaging, where the pseudoaneurysmal sac may be partially or fully filled with the contrast agent depending on whether thrombosis is present. Pseudoaneurysms typically have well-defined, thin walls, except in the case of mycotic pseudoaneurysms, which tend to have irregular, thickened walls. For patients for whom CT angiography cannot be performed due to impaired renal function or a contrast allergy, magnetic resonance angiography (MRA) is a viable alternative. Conventional angiography offers excellent spatial resolution and enables the dynamic study of the supra-aortic vessels and collateral circulation. It remains the gold standard for detecting pseudoaneurysms. Three-dimensional acquisitions allow for precise characterisation of pseudoaneurysm morphology, including shape, contour regularity, sac size mea-

surement, and especially the size of the neck and feeding artery anatomy [3]. However, conventional angiography is an invasive procedure that exposes both patient and physician to ionising radiation. Consequently, it is no longer routinely used for the initial diagnosis of pseudoaneurysms, but rather for therapeutic planning or during endovascular treatment itself [3]. In this case, Doppler ultrasound was sufficient to confirm the diagnosis. Differential diagnoses include haematoma, lipoma, cyst, abscess, inflamed lymph node and neuroma of an adjacent nerve, as well as vascular malformations and fistulas. The treatment of symptomatic pseudoaneurysms can involve various approaches, such as observation where spontaneous thrombosis is possible (especially for small pseudoaneurysms), pharmacological thrombosis with ultrasound-guided compression, surgery (bypass or ligation), stenting and embolisation. Surgery is indicated in cases of confirmed mycotic infection, distal ischaemia, or neurological deficit. However, there is no universal treatment protocol and management must be tailored to each clinical presentation [3]. In our case, ligation was considered due to the patient's age.

Conclusion

Pseudoaneurysms of the occipital artery are extremely rare, particularly in children. Due to their superficial location and benign appearance, they may be clinically misdiagnosed as cystic or lipomatous lesions. Taking a thorough clinical history, especially if there is a history of trauma, and using Doppler ultrasound are crucial for accurately and non-invasively diagnosing this condition. Early recognition is essential to prevent potentially serious complications, such as rupture or haemorrhage. Surgical management is the preferred option for symptomatic or enlarging pseudoaneurysms, particularly in children.

Declaration of interest statement: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper. The authors declare the following financial interests/personal relationships which may be considered as potential competing interests.

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