

# POST-TRAUMATIC PSEUDOANEURYSM OF THE POPLITEAL ARTERY

\*Akinkunmi MAN \*\*Sanusi MO \*\*Falase B

\*Dept of Radiology

Bola Tinubu Health & Diagnostic Centre

Lagos State University Teaching Hospital,

Ikeja, Lagos

\*\*Cardiothoracic Surgery Unit

Department of Surgery

Lagos State University Teaching Hospital,

Ikeja, Lagos

**Corresponding Author:** Dr. Akinkunmi MAN (FWACS)

**Email:** michaelakinkunmi@yahoo.co.uk

## **POST-TRAUMATIC PSEUDOANEURYSM OF THE POPLITEAL ARTERY**

### **Abstract**

Post-traumatic popliteal pseudoaneurysm (PP) is rare. This is an unusual case of post-traumatic PP associated with severe hemorrhage as a result of glass-cut injury. Our patient had bled repeatedly from the injury, necessitating transfusion with a total of seven pints of blood over a four week period prior to presentation. Duplex ultrasonography established the diagnosis of PP which was confirmed at surgery. This case highlights the significance of duplex ultrasonography in the pre-operative evaluation of patients with vascular trauma, especially in sub-Saharan Africa where computed tomography and digital subtraction angiography may not be readily available or affordable.

**Keywords:** *Pseudoaneurysm (“False Aneurysm”), Trauma, Duplex Ultrasonography*

*Popliteal Artery*

## **Introduction**

Popliteal pseudo-aneurysms (PPs) are rare<sup>1</sup> and may be caused by blunt or penetrating trauma.<sup>2-5</sup> Most documented reports identify PP as a vascular complication of an osteochondroma.<sup>6-9</sup> Literature is also replete with iatrogenic causes of PP, following such procedures like arthroscopy, total knee replacement, femoral embolectomy, Kirschner pin insertion for tibial fractures, and acupuncture.<sup>10-14</sup> Infective etiology such as brucellosis has also been described<sup>15</sup>.

We report the case of a young patient with post-traumatic PP with severe, recurrent, life-threatening hemorrhage following a glass cut injury to the back of the knee.

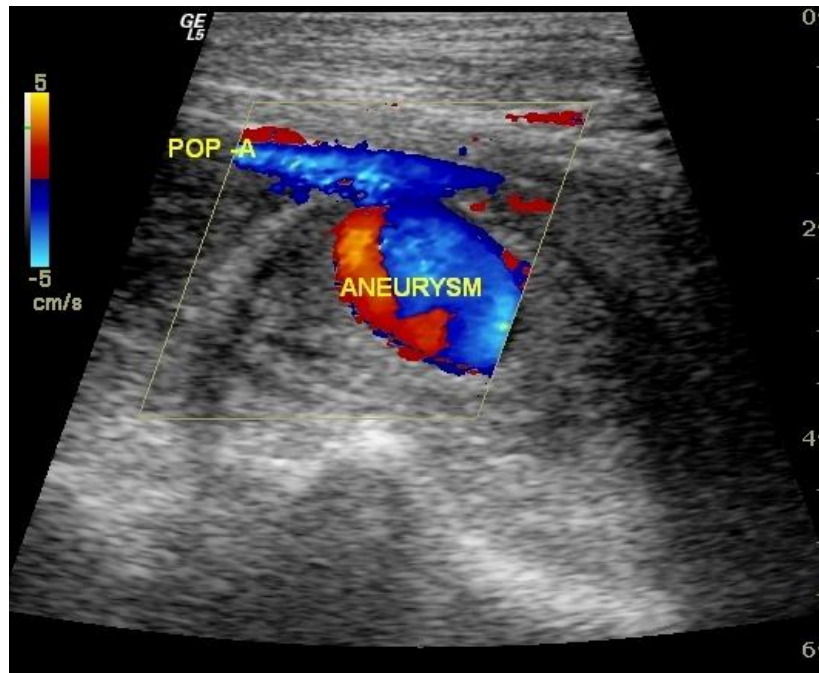
## **Case Report**

GK was a 28-year-old salesman who presented at the Lagos State University Teaching Hospital (LASUTH) with a month history of pain and bleeding from a right knee wound, which had been sustained when a broken sheet of glass fell on the back of his knee. He had five episodes of bleeding from the wound (usually provoked by ambulation), for which he was transfused with a total of seven pints of blood. He had an initial exploration of the wound in a private hospital with no respite. On examination, he was afebrile and not pale. The right popliteal fossa was swollen and tender and there was an infected wound on the anterior aspect of the proximal leg. The distal pulses were palpable; and power, sensation and reflexes in the limb were all normal.

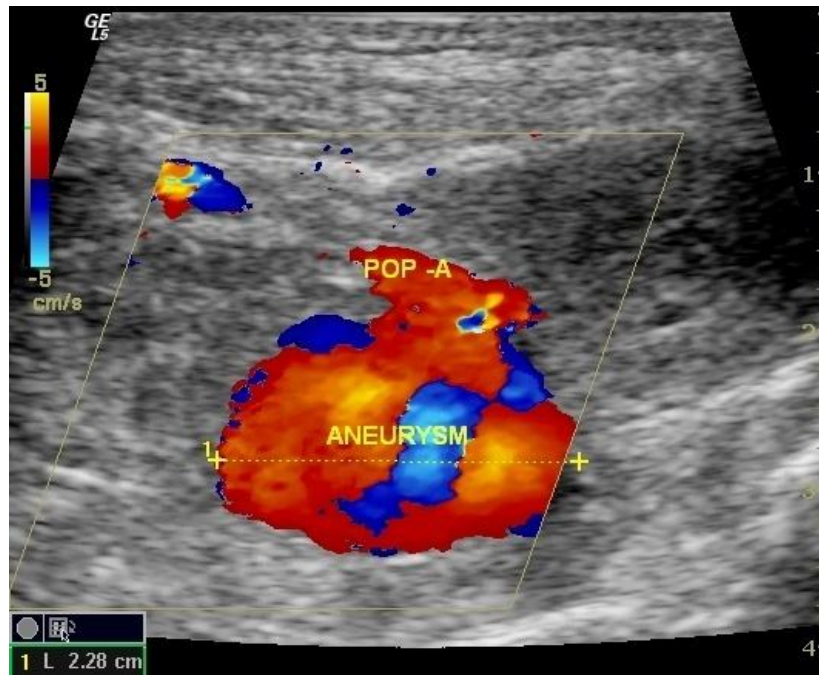
He had an emergency duplex ultrasonography done. Grey scale examination revealed a hypoechoic mass in the anterior aspect of the distal right popliteal artery (PA), close to the trifurcation, communicating with the artery through a 9mm neck. The hypoechoic mass showed swirling blood flow pattern (“yin-yang” sign) on color Doppler evaluation, in keeping with popliteal artery pseudoaneurysm (PP). The patent lumen of the PP measured 23 x 21 x 15 mm in diameter. There was no arteriovenous fistula. To-and-fro spectral flow pattern was noted in the pseudoaneurysm neck. The arteries distal to the PA showed a biphasic spectral blood flow pattern suggestive of some compromise at the level of the PA (Figures 1 and 2).

He subsequently had emergency surgery based on the duplex ultrasound findings. The intraoperative findings were: a pseudoaneurysm in the anterior aspect of the distal right PA, close to its junction with the posterior tibial artery; and an infected wound in the anterior aspect of the leg just below the knee. The PP was repaired while he had honey dressing for

the anterior leg wound postoperatively with favorable response. His surgical wound healed satisfactorily, and there were no complications. He was subsequently discharged home, and he has remained well, with no further hemorrhage from the site of injury.



**Figure 1:** Pseudoaneurysm of the popliteal artery. Sagittal color Doppler ultrasound scanogram showing swirling blood flow pattern within the patent lumen of the pseudoaneurysm



**Figure 2:** Pseudoaneurysm of the popliteal artery. Sagittal color Doppler ultrasound scanogram, showing swirling blood flow pattern within the patent lumen of the pseudoaneurysm

## Discussion

The PA is a continuation of the femoral artery. Because it is fixed superiorly at the aponeurotic hiatus in the adductor magnus muscle and inferiorly at the trifurcation, the PA is especially prone to injury<sup>8,16</sup>. Our patient presented four weeks after the offending injury. This delayed pattern of presentation is similar to the report of Chan YC *et al* of 2010<sup>17</sup>. This partly explains why ultrasound-guided compression therapy of the PP was not attempted during duplex ultrasonography of our patient. Generally, therapeutic compression of a pseudoaneurysm is less likely to be successful if it is more than ten days old, associated with large hematoma, infection or severe pain, or if the patient is on anticoagulant therapy<sup>18</sup>. Feld R *et al* found no relationship between the success of ultrasound-guided compression of seventeen pseudoaneurysms and their sizes in their study spanning a period of one year<sup>19</sup>. Furthermore, our patient gave a history of bleeding which necessitated blood transfusion. Compression therapy would not have been a wise decision for the attending radiologist in this instance.

Duplex ultrasonography is very useful in diagnosing pseudoaneurysms generally. Ultrasound examination is relatively cheap, widely available and fast. It can be conducted in the emergency room as a bedside procedure and requires no injection of iodinated contrast media. It is safe and does not involve ionizing radiation. Although, both magnetic resonance imaging (MRI) and conventional digital subtraction angiography (DSA) provide useful information, the detection of the characteristic flow dynamics in pseudoaneurysm is only possible with color Doppler<sup>15</sup>. DSA is regarded as the “gold standard” in the evaluation of arterial injuries, but it is expensive, invasive, and involves ionizing radiation. It also requires the injection of iodinated contrast medium with attendant risks and side effects, and is not readily available in sub-Saharan Africa. The diagnosis of PP was established with duplex ultrasonography in our patient. He was already being considered for open surgical intervention at the point of the request for duplex ultrasound. The aim of the ultrasonography was to determine the site and extent of the arterial lesion, so that a decision could be made regarding the need for additional imaging studies and the most appropriate surgical approach<sup>20</sup>. Our patient did not require additional imaging like DSA, computed tomography angiography (CTA) or MRI, since he had immediate open surgical repair of the PP. The arterial pressure index is a simple, rapid, and clinically valuable screening test for patients with suspected compromise to arterial blood flow<sup>20</sup>. The attending radiologist could not estimate the arterial pressure index in this patient because the wound prevented the placement of the pneumatic cuff around the extremity. This is a known limitation of the test.

An important differential diagnosis to exclude in PP is a soft-tissue sarcoma<sup>21</sup>. We had no problem excluding this in our patient because of the history and the imaging findings. Diagnostic dilemma may however arise in some cases of asymptomatic PP.<sup>1</sup> Our patient did not present with foot-drop from common peroneal nerve palsy, which is a complication of post-traumatic PP as reported by Ersozlu S *et al* from Turkey<sup>22</sup>.

### **Conclusion**

Post-traumatic PP is rare but patients can present with life-threatening hemorrhage. Duplex ultrasonography is useful in establishing the diagnosis of PP in patients presenting with vascular injuries. This observation is comforting in sub-Saharan Africa where computed tomography and digital subtraction angiography may not be readily available or affordable.

### **References**

1. **Mori S, Abe M, Kawamura A, Kazuno K, Higashi M, Ishibashi-Ueda H, Nonogi H.** Asymptomatic Huge Popliteal Pseudoaneurysm with Two Internal Solid Thrombi *Circulation* 2007; 116: 139-141.
2. **Ozisk K, Dural K, Okcu O, Han S, Yildirim E, Sakinci U.** Pseudoaneurysms of the Popliteal and Tibio-peroneal Arteries after Gunshot Injuries. *J Trauma* 2003; 55: 485-488.
3. **Wali MA.** Popliteal Artery Pseudoaneurysm in a Child due to Gunshot Injury. *Afr J Med Sci* 2002; 31: 83-85.
4. **Megalopoulos A, Siminas S, Trelopoulos G.** Traumatic Pseudoaneurysm of the Popliteal Artery after Blunt Trauma: Case Report and a Review of the Literature. *Vasc Endovascular Surg* 2006; 40: 499-504.
5. **Ge PS, Ishaque BM, Bonilla J, de Virgilio C.** Popliteal Artery Pseudoaneurysm after Isolated Hyperextension of the Knee. *Ann Vasc Surg* 2010. [E-pub ahead of print]
6. **Sadeghi-Azandaryani M, Mendl N, Rademacher A, Hoffmann U, Steckmeier B, Heyn J.** Pseudoaneurysm of the Popliteal Artery due to Osteochondroma of the Distal Femur. *Vasa* 2010; 39: 274-277.



7. **Rupprecht M, Mladenov K, Stücker R.** Posttraumatic Popliteal Pseudoaneurysm caused by a Femoral Osteochondroma. *J Pediatr Orthop B* 2010; 19: 341-343.
8. **Argin M, Biçeroğlu S, Arkun R, Parildar M.** Solitary Osteochondroma causing Popliteal Pseudoaneurysm that resented as a Mass Lesion. *Diagn Interv Radiol* 2007; 13: 190-192.
9. **Davies RS, Satti U, Duffield RG.** Popliteal Artery Pseudoaneurysm Secondary to Femoral Osteochondroma: A Case Report and Literature Review. *Ann R Coll Surg Engl* 2007; 89: 548.
10. **Kp V, Yoon JR, Nha KW, Yang JH, Lee JH, Jegal H.** Popliteal Artery Pseudoaneurysm after Arthroscopic Cystectomy of a Popliteal Cyst. *Arthroscopy* 2009; 25: 1054-1057.
11. **Papas TT, Maltezos CK, Papanas N, Antoniou G, Lazarides MK.** Popliteal Artery Pseudoaneurysm after Total Knee Replacement. *Vasa* 2007; 36: 145-148.
12. **Karkos CD, Karamanos DG, Papadimitriou DN, Demiroopoulos F, Zambas N, Gerassimidis TS.** An Unusual Complication of a "Blind" Femoral Embolectomy. *Ann Vasc Surg* 2010; 24: 824. e15-7.
13. **Yilmaz M, Doğan OF, Güvener M, Serter T.** Pseudoaneurysm of the Popliteal Artery in a Child: An Unusual Complication of Reconstruction of Traumatic Tibial Fracture using Kirschner wire. *Ulus Travma Acil Cerrahi Derg* 2010; 16: 90-91.
14. **Kao CL, Chang JP.** Pseudoaneurysm of the Popliteal Artery: A Rare Sequela of Acupuncture. *Tex Heart Inst J* 2002; 29: 126-129.
15. **Harman M, Irmak H, Arslan H, Arslan U, Kayan M.** Popliteal artery pseudoaneurysm: A Rare Complication of Brucellosis. *J Clin Ultrasound* 2004; 32: 33-36.
16. **Williams PL, Bannister LH, Berry MM, Collins P, Dyson M, Dussek JE, Ferguson MW.** Gray's anatomy. 38<sup>th</sup> ed. New York: Pearson Professional Ltd; 1995.
17. **Chan YC, Ting AC, Qing KX, Cheng SW.** Delayed Presentation of Popliteal Pseudoaneurysm following Soccer Football Injury. *Ann Vasc Surg* 2010; 24: 553.e13-6.
18. **Allan PL.** The Peripheral Arteries. In: Allan PL, Dubbins PA, Pozniak MA, McDicken WN (eds): Clinical Doppler ultrasound. Churchill Livingstone, Philadelphia, 2000: 65-87.
19. **Feld R, Patton GM, Carabasi RA, Alexander A, Merton D, Needleman L.** Treatment of iatrogenic femoral artery injuries with ultrasound-guided compression. *J Vasc Surg.* 1992; 16: 832 - 840.
20. **Zierler RE.** Ultrasound Assessment of Lower Extremity Arteries. In: Zwiebel WJ, Pellerito JS (eds): Introduction to vascular ultrasonography. Ed 5, Elsevier Saunders, Philadelphia, 2005: pp 341-3356.

21. **Otsuka T, Yonezawa M, Kamiyama F, Matusita Y, Matui N.** Popliteal Pseudoaneurysm Simulating Soft-tissue Sarcoma: Complication of Osteochondroma Resection. *Int J Clin Oncol* 2001; 6: 105-108.
22. **Ersozlu S, Ozulku M, Yildirim E, Tandogan R.** Common Peroneal Nerve Palsy from an Untreated Popliteal Pseudoaneurysm after Penetrating Injury. *J Vasc Surg.* 2007; 45: 408-410.