

Case Series

Surgical perspective in pseudoaneurysm of peripheral arteries: a better limb salvage option

Lakshmi Sinha^{1*}, Sanjeev Kumar², Nishit Ranjan³, Rituraj⁴

¹Department of CTVS, G.B. Pant Institute of Postgraduate Medical Education and Research (GIPMER) University of Delhi, New Delhi, India

²Department of CTVS, AIIMS, Patna, Bihar, India

³Department of General Surgery, AIIMS, Deoghar, Jharkhand, India

⁴Department of Pathology, Govt. Medical College, Bettian, Bihar, India

Received: 17 March 2021

Revised: 17 April 2021

Accepted: 19 April 2021

***Correspondence:**

Dr. Lakshmi Sinha,

E-mail: dr.sannu2010@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Aneurysm involve all three layers of vessel wall. Pseudoaneurysm also known as false aneurysm is a collection of blood that forms between the two outer layers of an artery. Femoral and popliteal artery aneurysms account for more than 90% of peripheral aneurysms, with popliteal artery aneurysms being the most common (70%). The estimated incidence of femoral and popliteal aneurysms is approximately 7/100,000 men and 1/100,000 women. Femoral aneurysms usually involve the common femoral artery but may occasionally extend or be limited to the superficial femoral artery (SFA) in the mid thigh. Femoral and popliteal aneurysms are commonly associated with other aneurysms, with approximately 80% of patients having multiple aneurysms. Femoral and popliteal aneurysms show a high incidence of thromboembolic complications, which can result in limb loss. Pseudoaneurysm, if left untreated can result in deadly limb loss.

Keywords: Pseudoaneurysm, Excision, Repair

INTRODUCTION

A pseudoaneurysm, also known as a false aneurysm, is a collection of blood that forms between the two outer layers of an artery, tunica media and the tunica adventitia. It is usually caused by a penetrating injury to the vessel, which then bleeds, but forms a space between the above two layers, rather than exiting the vessel. It may be pulsatile and can resemble a true aneurysm. A true aneurysm involves all three layers of the blood vessel. A dissecting aneurysm is when blood from the vessel lumen tracks between the two inner layers, the intima and the tunica media. This can cause blockage of the flow. A perivascular hematoma is a collection of blood that is external to the three vessel layers. Due to being close to the vessel, it can also be pulsatile, and can be mistaken for a pseudoaneurysm or aneurysm. Surgical excision is gold

standard. One of the less invasive options may be preferred in a patient with many comorbidities, who is at high risk for surgery.³

CASE SERIES

Case 1

A patient of 21 years old male came to AIIMS Patna Cardiothoracic and Vascular Surgery (CTVS) outpatient department (OPD) after referral from orthopaedic department of other government hospital. Patient had road traffic accident and had developed left femur fracture for which external fixator was put. Patient developed groin swelling after 6th postoperative day. On duplex imaging there was pseudoaneurysm of left femoral artery. The patient was operated under general anaesthesia. Femoral

triangle exposed via 12 cm horizontal incision. On exploration there was 8 mm rent in femoral artery. Fogarty catheterisation done. Proximal control taken, rent repaired, through 4-0 prolene.

Case 2

Similar case, a patient of 45 year old male developed pseudoaneurysm after total knee replacement which was done 15 days back (Figure 1-4). The patient came in CTVS OPD AIIMS Patna. He was planned for surgery. Patient was taken under spinal anesthesia for exploration. Intraoperatively there was hematoma of about 1 litre and 8 mm rent in popliteal artery. During the procedure, femoral control was taken through adductor canal. The rent on popliteal artery was repaired after fogarty catheterisation and thrombus removal. Hematoma evacuated. Romovac suction drain given in cavity. Skin closed in layers.



Figure 1: Preoperative image.



Figure 2: Hematoma drained.



Figure 4: CT angi film.

Case 3

A patient of intravenous drug abuser (Figure 5-9) similarly developed pseudoaneurysm of left brachial artery after

multiple puncture of left forearm. Incision of 10 cm given over left cubital fossa. In this case there was infected muscle and surrounding vessels was fibrosed. Fogarty catheterisation done through the rent which was about 6mm in diameter. The rent over brachial artery was repaired with 6-0 prolene. Skin was closed. Postoperatively there was wound dehiscence. After 3 weeks postoperatively the wound became healthy and active mobilization of left arm done.

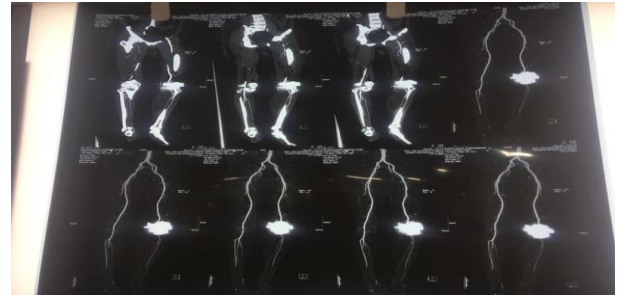


Figure 4: CT angi film.



Figure 5: Multiple punctures on forearm.



Figure 6: CT angi film.

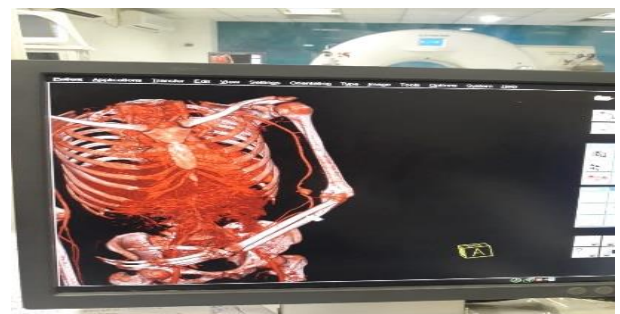


Figure 7: 3D CT angio.



Figure 8: Intraoperative picture.



Figure 9: Postop day 14.

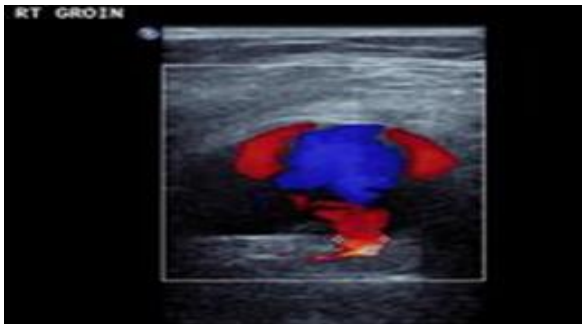


Figure 10: Yin-Yang sign.

DISCUSSION

Etiology of pseudoaneurysm trauma (dissection or laceration) includes iatrogenic (dissection or laceration or puncture), e.g. arterial catheterization, biopsy, surgery, spontaneous dissection, fibromuscular dysplasia (dissection), mycotic aneurysm (inflammatory digestion of the vessel wall), myocardial infarction (left ventricular false aneurysm), regional inflammatory process, acute pancreatitis, chronic pancreatitis, vessel injury/erosion due to a tumor: relatively uncommon, vasculitis, behcet syndrome, giant cell arteritis, Takayasu arteritis, systemic lupus erythematosus, polyarteritis nodosa, penetrating atherosclerotic ulcer.⁴

On radiographic imaging, some of the imaging features may be dependent on location. Due to the turbulent forward and backward flow, a characteristic yin-yang sign may be seen on color flow while a "to and fro" pattern may be seen with pulsed Doppler (Figure 10).

On computed tomographic scan (CT) scan, hypoattenuating (non-contrast) or hyperattenuating contrast-enhanced) smooth walled sac adjacent to an artery, usually with a communication.⁵ Treatment options includes Covered stent, ultrasound guidance, thrombin injection, surgical ligation (with or without distal bypass).

Though pseudoaneurysm communicates with an artery through a hole in the arterial wall, a covered stent may be placed endovascularly across this hole to "exclude it," or to prevent it from receiving blood flow from the artery. The covered stent is composed of metal and is covered with polytetrafluoroethylene (PTFE) or another sterile fabric-like material. Covered stent remains in place permanently, and the pseudoaneurysm, without a continuous flow of arterial blood, then thromboses. Advantages of this technique are that it has a high success rate without the need for an open surgery. Complications include covered stent migration, persistent leakage of blood into the pseudoaneurysm, fracturing (breaking) of the stent, and infection of the stent or of the arterial insertion site.^{1,2}

Under ultrasound guidance, thrombin can be injected directly into a pseudoaneurysm, causing it to clot. Advantages are that the technique is relatively easy to perform, is successful, and is minimally invasive. One contraindication to this procedure is if there is an arterio-venous fistula (communication between an artery and vein), in addition to the pseudoaneurysm. This occurs with about 10% of pseudoaneurysms. If this is present, thrombin injected into the pseudoaneurysm could then enter the venous circulation and possibly lead to distant thrombosis.⁴ Femoral pseudoaneurysms may complicate up to 8% of vascular interventional procedures. Small pseudoaneurysms can spontaneously clot, while others need definitive treatment.

Surgical ligation (with or without distal bypass) is done. Open surgery performed to remove pseudoaneurysms or prevent them from expanding. If the artery is small and "expandable" - the tissues it supplies have adequate collateral blood flow - then the artery supplying the pseudoaneurysm may be ligated both proximally and distally to the pseudoaneurysm. The pseudoaneurysm may or may not be removed. If the tissues supplied by the artery do not have sufficient collateral flow (the artery is not expendable), then a vein or synthetic graft would have to be anastomosed proximally and distally to allow for continued blood flow around the pseudoaneurysm. Advantages are that the technique has been successful in the treatment of pseudoaneurysms for many years. However, it is more invasive (a large skin incision is necessary), and there is more postoperative pain and a risk for wound infection. Proper measures are taken for wound healing, so that wound infection is prevented and early mobilisation of the limb and limb salvage can be done. Moist wound healing has the potential to address multiple factors that affect wound healing.⁶ It involves maintaining

a balanced wound environment that is not too moist or too dry.

CONCLUSION

Among the options available, surgery for pseudoaneurysm remains gold standard, as during the procedure we can identify any developing thrombus and fogarty catheterisation can be done to remove the thrombus, and limb can be saved.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

REFERENCES

1. Kouvelos GN, Papas NK, Arnaoutoglou EM, Papadopoulou GS, Matsagkas MI. Endovascular repair of profunda femoral artery false aneurysms using covered stents. *Vascular*. 2011;19(1):51-4.
2. Amato ACM, Kahlberg A, Bertoglio L, Melissano G, Chiesa R. Endovascular treatment of a triple paraanastomotic aneurysm after aortobiliac reconstruction". *J Vasc Br*. 2008;7(3):278.
3. Tisi PV, Callam MJ. Treatment for femoral pseudoaneurysms. *Cochrane Database Syst Rev*. 2013;11:CD004981.
4. Malgor RD, Labropoulos N, Gasparis AP, Landau DS, Tassiopoulos AK. Results of a new human recombinant thrombin for the treatment of arterial pseudoaneurysm. *Vasc Endovascular Surg*. 2012;46(2):145-9.
5. Saad NE, Saad WE, Davies MG, Waldman DL, Fultz PJ, Rubens DJ. Pseudoaneurysms and the role of minimally invasive techniques in their management. *Radiographics*. 2005;25:173-89.
6. Sinha L, Singh AK, Kumar S, Isser UC. Study on the Economical Way to Offload Diabetic Foot Ulcers: A Prospective Study. *Int J Sc Res*. 2018;2319-7064.

Cite this article as: Sinha L, Kumar S, Ranjan N, Rituraj. Surgical perspective in pseudoaneurysm of peripheral arteries: a better limb salvage option. *Int Surg J* 2021;8:1566-9.