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

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INTRODUCTION

A pseudoaneurysm, also known as a 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 midthigh. 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.

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

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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.

**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 dehisence. After 3 weeks postoperatively the wound became healthy and active mobilization of left arm done.
DISCUSSION

Etiology of pseudoaneury sm trauma (dissection or laceration) includes iatrogenic (dissection, 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 artherosclerotic ulcer.

On computed tomographic scan (CT) scan, hypoattenuating (non-contrast) or hyperattenuating contrast-enhanced smooth walled sac adjacent to an artery, usually with a communication. 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.

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 arteriovenous 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.

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.

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).
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.

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