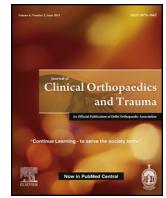




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Endovascular management of traumatic pseudoaneurysm: Short & long term outcomes

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ABSTRACT

Background: Pseudoaneurysms as result of orthopaedic injuries are a known clinical entity. But with increase in operative interventions and use of implants, its incidence is bound to increase. It is important to detect this complication at the earliest to avoid any limb or life threatening problems. Selective angiography is a minimally invasive technique to pin point the diagnosis and at the same time allow for therapeutic embolization/stenting of the pseudo aneurysm.

Methods: A retrospective review of inpatients from January 2007 to January 2013 requiring transarterial embolization/stenting for pseudoaneurysm in the limbs. All patients had evidence of pseudoaneurysm as proved by radiological findings. Angiographic intervention in a cath lab was performed, following which patients were monitored for morbidity and mortality benefits on short and long term follow up.

Results: Out of the total 13 patients; 7 adults and 1 child underwent embolisation with polyvinyl alcohol particle/soft metal coil, whereas the remaining 5 adults underwent revascularisation with covered stent. The mean age of patients in our case series was 41.92 ± 18.89 years. The mean follow up period of the group was 14.61 ± 12.21 months. All but one patients showed significant clinical improvement with endovascular management with no procedure related mortality.

Conclusion: Endovascular management is the modality of choice in comparison to other procedures for traumatic pseudoaneurysms in both paediatric and adult patients.

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1. Introduction

Pseudoaneurysm as a result of orthopaedic injuries¹ and their management is a well known entity with pseudoaneurysms being documented after all spectrum of musculoskeletal injuries varying from sprains, closed reductions, interlock nailing,² plating, arthroscopies³ and joint replacements.⁴ These aneurysms are the result of a tangential injury in an arterial wall through which blood continues to flow.⁵ This continues gradually and the aneurysm continues to grow and encroach upon the surrounding tissues. It may at times rupture causing massive haemorrhage which can be life or limb threatening. Once the diagnosis of a

pseudoaneurysm has been made, it is imperative to intervene surgically to prevent the growth and the complications of these aneurysms.

The conventional approach in the management of these aneurysms has been a direct approach to the lesion followed by ligation or resection with a venous graft. This technique is demanding, costly in terms of prolonged hospital stay and patient morbidity. Selective angiography and therapeutic embolization for the treatment of pseudoaneurysms is a technique which aids in diagnosing the exact site and size of the aneurysm. The embolization can be done with a variety of materials and is a minimally invasive method to diagnose and treat pseudoaneurysms.

Taking into consideration the complications associated with the conventional open surgical methods and the advantages of arterial angiography and embolization, seven patients with a pseudoaneurysm as a result of orthopaedic surgical intervention were

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diagnosed and managed by selective arterial angiography and simultaneous therapeutic selective embolisation.

In the present study, we audited our experience with the use of endovascular management in a catheterisation laboratory for traumatic pseudoaneurysm to address various important issues of limb survival benefit, morbidity and mortality on short to long term follow up.

2. Material and methods

A retrospective review of hospital record of inpatients from January 2007 to January 2013 was performed after approval from Ethics Committee in a tertiary care hospital. Data was collected on patients who underwent Arterial Embolisation which included demographics, injury specific data, physical findings, X-ray findings, operative intervention, length of hospital stay and final outcome at discharge.

A high index of suspicion of pseudoaneurysm was kept in patients presenting to emergency and outpatient department who presented with either a pulsatile swelling, uncontrollable bleeding or non responding pain following an Orthopaedic injury with the use of metal work. Indications to perform angiography were determined after active extravasation of contrast on CT scan. Angiography/Angiographic embolization was performed after taking informed consent from patient/patient's relative as per protocol.

Angiography and embolization/stenting was performed in a cath lab with angiographic Philips Allura Integris System (Philips Medical Systems, Best, The Netherlands). Arterial access was obtained via the femoral artery in the lower limbs and brachial artery in the upper limbs using the Seldinger technique. A 5–8, 10 French Cordis sheath was then placed to secure the arterial access and different diagnostic catheters (3 French Cook's microcatheter, 5–7 French Judkin catheter, 6–7 French crossover sheath, 0.014 PTCA guidewire of Abott and 0.35" Teurner guide to cross the lesion) were then used to access the culprit vessels and diagnostic arteriograms were performed. The arteriograms of culprit vessels either demonstrated active contrast extravasations, pseudoaneurysms and were selectively embolised/stented resulting in stasis of blood flow.

In cases where pseudoaneurysm was found to be arising from a small artery, of less importance which could be sacrificed, it was embolised with help of poly vinyl particles/coils or thrombin injection; and where it was arising from large artery it was isolated with help of an expandable stent graft of appropriate size, using front and back technique.

3. Results

During the 6 year period, out of 15,786 trauma patients presenting to Orthopaedics and trauma department, thirteen patients were taken up for arterial angiographic embolization/stenting in the catheterisation laboratory and were evaluated. Demographics showed that 62% were men and 38% were women. During the 6 year period, out of 15,786 trauma patients presenting to Orthopaedics and trauma department, thirteen patients were taken up for arterial angiographic embolization/stenting in the catheterisation laboratory and were evaluated. Demographics showed that 62% were men and 38% were women. The mean age of patients was 41.92 (range 10–71 years). Mechanism of injury was due to road traffic accidents in 8 (61.5%) and accidental/domestic fall in 4 (30.8%). 6 (46%) patients had post traumatic vascular injury, while 7 (54%) had injury following operative intervention Fig. 1 out of which 6 (46%) were following use of metal work and one had following central venous cannulation. 7 (54%) patients presented early (within 15 days of

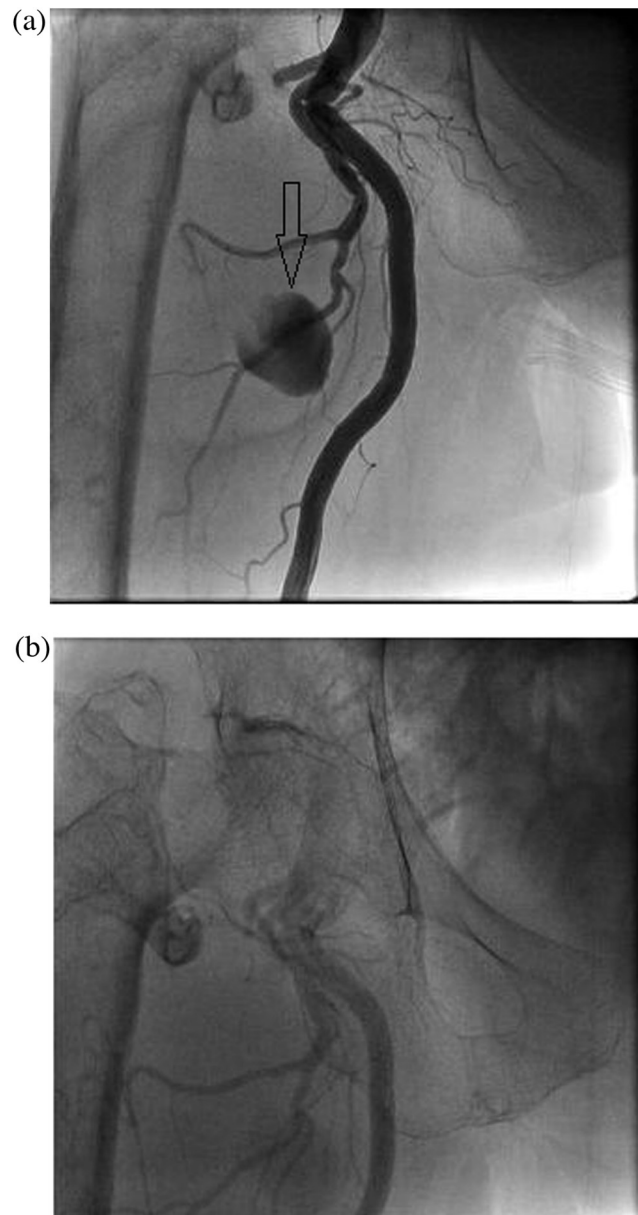


Fig 1. (a): Case 2: Pseudoaneurysm in branch of Profunda Femoris following Dynamic Hip Screw Removal. (b): No leakage following embolisation with PV particles.

trauma/intervention), while 6 (46%) presented late (3 weeks–9 months following trauma). None of the late presenting cases was infected in our series.

Arterial injuries was confirmed by MDCT scan in 100% of the series. 8 (61.5%) patients had pseudoaneurysm in artery of lower limb, while upper limb was involved in 5 (38.5%). Embolisation was done in 7 (53.8%) patients. Polyvinyl alcohol (PVA) particles ranging from 350 to 750 μm and soft metal coils made from Teflon O35 wire were used for embolization. (Fig. 2) In 5 (38.5%) patients covered stent (WARD) was used to bypass the pseudoaneurysm. (Fig. 3) In one patient (Case No. 13), additional thrombin injection was used, as following stenting there was filling of pseudoaneurysm from the surrounding vessels and good end result was obtained.

All patients underwent successful angiographic embolization/stenting and there was no procedure related mortality in the

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