

Peripheral Artery Pseudoaneurysm- A Single Center Experience

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Abstract

Introduction: Pseudoaneurysms are false aneurysm where disruption in the arterial wall. The common causes are, iatrogenic (vascular interventions and surgery), trauma, and infections.

Aim: The aim of this study was to analyze the etiology, management, and outcome of patients with Pseudoaneurysms of peripheral arteries.

Materials and Methods: This is a retrospective analysis of 30 patients with peripheral artery Pseudoaneurysms over 2 years at tertiary referral center in Southern India, at Institute of Vascular Surgery, Madras Medical College, India.

Results: The most common site involved was femoral artery followed by superficial femoral and anterior tibial artery. The common etiologies were iatrogenic and penetrating trauma. Most common organism was *Staphylococci aureus*. Management options included ligation with or without revascularization, debridement with vein patch repair, percutaneous thrombin injection and stent graft placement.

Conclusion: Although repair with distal revascularization is an ideal approach, debridement and simple ligation of Pseudoaneurysms is a safer alternative in patients without infection or peripheral vascular disease.

Keywords: Peripheral pseudoaneurysm; Pseudoaneurysm; Trauma

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Introduction

pseudoaneurysm as opposed to true aneurysm, do not consist of the entire arterial wall and are usually contained, organized hematoma with a persistent communication from artery of origin, which has failed to thrombose [1].

Peripheral artery pseudoaneurysm although not common, can affect any artery in the body. Common femoral artery(CFA) pseudoaneurysms are more common, being the most common site for various endovascular interventions [2]. Majority of CFA pseudoaneurysms are less than 3 centimeter in size and do not warrant any intervention as they undergo thrombosis on their own.

All symptomatic peripheral artery pseudo-aneurysms warrant treatment. Pseudoaneurysm can present as painful pulsatile mass, can get infected and rupture or can cause distal embolization [3].

Management options include Open surgical ligation with or without revascularization, percutaneous thrombin injection or use of stent graft/flow divider.

Materials and Methods

Retrospective analysis of data of patients with peripheral artery pseudoaneurysm who underwent treatment from August 2016 to

December 2018 at Institute of Vascular Surgery, Madras Medical College, Chennai, was done.

Patients who presented with CFA pseudoaneurysm less than 3 cm size, post Arterio-venous fistula for CKD patients, post erosion of vessel wall due to malignancies such as necrotic inguinal nodes and oral malignancies are not included in this analysis. Various clinical presentations and the management strategies are analyzed and reviewed.

Descriptive analysis of data was performed and presented as mean (standard deviation) for continuous variables or median and ranges as and when required. Total counts and percentages are used for categorical variables.

Results

The total number of patients was 30. Median Age at Presentation was 54 years (Range 9-73 years). Males were 83.3% (N-25) and females 16.6% (N-5).

Most common etiology was post intervention about 66%(N-20), followed by trauma 30% (N-9). One patient presented with spontaneous rupture of Common Carotid artery, with no antecedent history of trauma or intervention.



Of the patients developing pseudoaneurysm post intervention, eight patients were due to anastomotic dehiscence (26.6%), six of the patients developed pseudoaneurysm post external fixation of fracture (20%), five patients were due to access related complications (16.6%), one patient had External carotid aneurysm following excision of carcinoma cheek and reconstruction by Pectoralis major myo-cutaneous (PMMC) flap.

Of the patients who developed pseudoaneurysm post trauma, six of the patients were due to penetrating injury (16.6%) and three patients had blunt trauma (10%).

Most common artery involved was Common femoral artery, about 8 (26.6%) patients. Followed by Superficial femoral artery 4 (13.3%) and Anterior tibial artery in 4 (13.3%) patients. Other arteries that were involved are Subclavian artery, popliteal artery and brachial artery in 2 patients each. Other sites were Common carotid artery, suprascapular artery, External Carotid Artery, Profunda femoris artery, plantar artery 1 patient each.

Most common organism involved was *Staphylococci aureus* in 16 (53.3%). Followed by polymicrobial infection involving *Klebsiellapneumoniae* and *Acinetobacter* in 5 (16.6%). 9 (30%) patients showed no growth in culture sensitivity report, of which one patient was found to have multiple blow outs and found to *Harbor candida* species.

Swelling was the most common presentation seen in 17(56.6%) patients. Bleeding was seen in 13 (44.33%) patients (Table 1).

Results

Primary Repair and Evacuation of Hematoma

Common femoral artery pseudoaneurysm: 4 patients were due to access related complication. Of which 3 were due to post coronary

Table 1. Basic characteristics.

Parameter	Number (%)
Median Age	54 years (9-73 years)
Male	25 (83.3%)
Female	5 (16.6%)
Etiology	
Post Intervention	20 (66%)
Post Trauma	9 (30%)
Idiopathic	1 (3%)
Post Intervention	
Anastomotic Dehiscence	8 (26.6%)
Post External Fixation of Fracture	6 (20%)
Access Related Complication	5 (16.6%)
Post PMMC Flap Reconstruction	1 (3.3%)
Post Traumatic	
Penetrating Injury	6 (16.6%)
Blunt Trauma	3 (10%)
Artery Involved	
Common Femoral Artery	8 (26.6%)
Superficial Femoral Artery	4 (13.3%)
Anterior Tibial Artery	4 (13.3%)
Subclavian Artery	2 (6.6%)
Popliteal Artery	2 (6.6%)
Brachial Artery	2 (6.6%)
Common Carotid Artery	1 (3.3%)
Suprascapular Artery	1 (3.3%)
External Carotid Artery	1 (3.3%)
Profunda Femoris Artery	1 (3.3%)
Plantar Artery	1 (3.3%)

intervention. All 3 underwent evacuation of hematoma and sac, followed by primary repair of opening and sartorius flap coverage. Proximal and distal controls were taken prior to hematoma evacuation. All 3 patients were above 50 years and had multiple co-morbidities and experienced wound healing problems.

Superficial Femoral Artery

All 4 patients had history of penetrating injury. One patient underwent hematoma evacuation, followed by reversed vein interposition graft from superficial femoral artery to proximal popliteal artery. Two patients had vein patch repair of rent in the vessel wall.

Adhesions

Long standing pseudoaneurysms pose challenges in the form of difficulty in taking control of proximal and distal control. 25 year old male presented with lateral thigh swelling, post internal fixation for fracture femur. CT showed hematoma with no active blush of contrast seen. On exploration, clots were evacuated, it was difficult to identify the neck or take control of the vessel. The bleeding point was identified and suture ligated with prolene.

Similarly the patient with Tibio-peroneal trunk pseudoaneurysm had severe adhesions and after evacuation of hematoma, primary repair of the rent was done.

Thrombin Injection

Suprascapular artery pseudoaneurysm: Post Internal Jugular Vein cannulation for hemodialysis access. Brachial artery was used as access. Using Diagnostic angiogram, neck of the sac was identified and occluded with 8 x 59 mm balloon. Thrombin was percutaneously injected into the sac after balloon occlusion was confirmed under fluoroscopy (Figure 1 and Figure 2). Balloon occlusion was kept for ten minutes post thrombin injection (Figure 3 and Figure 4). Post procedure angiogram showed complete thrombosis of pseudoaneurysm sac.

Stent Graft

Subclavian artery pseudoaneurysms: 19 year old male came with neck swelling, had history of penetrating injury. He was managed with use of stent graft and ad resolution of symptoms, post procedure.

Ligation and the Need for Revascularization

The need for revascularization depends on various parameters like infection, hemodynamic stability, collaterals, artery involved and presence of peripheral vascular disease. Patients without peripheral



Figure 1: Clinical picture of suprascapular Pseudoaneurysm.



Figure 2: CTA showing suprascapular Pseudoaneurysm.

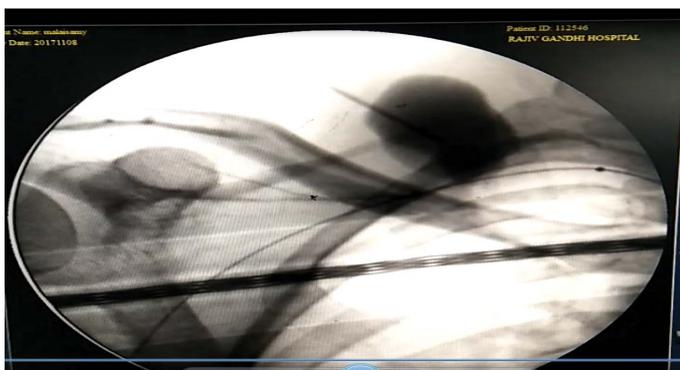


Figure 3: Percutaneous thrombin injection.



Figure 4: Post procedure DSA showing obliteration of sac.

vascular disease, tolerate ligation better.

Common Carotid Artery Aneurysm

42 year old male presented with left sided neck swelling, fungating mass with herald bleed. He was managed with ligation of proximal and distal common carotid artery, followed by debridement of sac and its contents. Revascularization was not done as wound cavity was filled with purulent pus discharge and necrotic material. Patient did not develop stroke during and after the procedure.

Subclavian Artery Pseudoaneurysm

42 year old female, presented with pus discharging sinus with herald bleed. She was managed with ligation of proximal subclavian

artery and explantation of graft. Revascularization was not attempted due to presence of infection.

Common Femoral Artery Pseudoaneurysm

One patient aged 35 years, post endovascular valvuloplasty for Rheumatic heart disease was managed with primary repair initially, recurred again after 2 weeks. Second time interposition graft was done with saphenous vein, blew out again, third time internal iliac artery was used as a conduit for repair from external iliac artery to common femoral artery, blew out again and finally ligation of common iliac artery was done. He was managed systemic anti-coagulation and titrated with Vitamin K antagonist. At the time of discharge, he had an Ankle Brachial Index (ABI) of 0.9. He has been on follow-up for 6 months without any claudication and is able to carry on with his routine activities.

4 patients were due to anastomotic dehiscence. One patient had interposition saphenous graft for Common femoral artery injury, which blew out on 6th post-operative day; he underwent ligation of External iliac artery and superficial femoral artery. He was managed with anti-coagulation and discharged with ABI of 0.7. He has been on follow-up for one year without any pain. Three patients were due to dehiscence of anastomosis for critical limb ischemia, of which 2 were ligated due to gross infection and lost their limbs and other patient had extra-anatomic bypass with lateral tunneling.

Another patient underwent primary ligation of superficial femoral artery, following penetrating injury, due to gross contamination. At time of discharge patient had a palpable dorsalis pedis pulse with ABI of 0.7.

Anterior tibial artery, radial and plantar artery pseudoaneurysm were ligated without any adverse limb events.

Amputations

4 patients lost their limbs. Two following bypasses of patients with peripheral vascular disease and two following bypasses in traumatic arterial injury. The factors against revascularization in those patients were florid sepsis.

Discussion

Pseudoaneurysm is commonly caused by a penetrating injury via blow from a sharp instrument or fracture fragments after a traffic accident [3]. Iatrogenic vascular injury has become an important reason for traumatic Pseudoaneurysms. Iatrogenic causes could be post angiographic catheterization, anastomotic dehiscence or post orthopedic skeletal fixation. The risk factors for development of pseudo-aneurysm following vascular intervention include inadequate compression, simultaneous artery and vein puncture, hypertension, obesity, hemodialysis, heavily calcified arteries, and low femoral puncture. The risk is accentuated with the use of largesized sheaths. Risk factors for developing Pseudoaneurysm, post vascular anastomosis include infection, obesity, and remote infection, prolonged duration of surgery, emergency surgeries, poor glycemic control, and unnoticed visceral injuries.

Pseudoaneurysm contains substantial amount of thrombus. Pseudoaneurysm can present with features of localized swelling causing local compression, bleeding or the thrombus can induce embolism which may present as extremity ischemia [4].

Jaiswal, et al reported, Intravenous drug abuse was the second



leading cause of Pseudoaneurysm, in their series [5]. But there were no case of Pseudoaneurysms attributed to intravenous drug abuse in our observation.

Duplex is the most common method used in diagnosing this condition, it is also the preferred method of imaging due to its easy availability, cost factor, the role in guiding compression therapy and its utility in surveillance. Management options include Open surgical ligation of the artery proximal and distal to Pseudoaneurysm opening, with debridement of debris, followed by lavage with copious amount of saline. The decision to revascularize depends on the collaterals and the flow at ankle, the hemodynamic status of the patient and the presence of infection. Adverse factors which increase the risk of limb loss are presence of infection and peripheral vascular disease.

In hemodynamically stable patient, treatment options include debridement and primary closure of the persistent opening or if the margins are unhealthy, it can be trimmed and repaired with vein patch. Other management options include use of thrombin injection and inducing thrombosis, use of stent graft across the neck of the sac

Percutaneous thrombin injection or use of stent graft/flow divider.

Conclusion

Pseudoaneurysm though rare, can complicate the outcomes, resulting in adverse events like limb loss, chronic wounds. More emphasis should be on prevention by good surgical practices. Treatment should be tailored according to patients need and the facilities available.

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