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Clinical Outcome of Surgical Treatment of Giant Femoral Artery Pseudoaneurysms

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ABSTRACT

Femoral artery was used as an access site for cardiovascular procedures and by IV drug abusers, Femoral Artery Pseudoaneurysm (FAP) was a common complication associated with these procedures. **Objective:** To evaluate clinical outcome of surgical repair of femoral artery pseudoaneurysms. **Methods:** The prospective study was conducted in Doctors Hospital, Lahore from October 2022 to October 2023. The study included patients with giant femoral artery pseudoaneurysms who required surgical intervention. Data from a total of 50 patients were included in whom both peripheral vascular interventions and percutaneous cardiac catheterization was performed. Patients were followed up at 1-, 3-, 6- and 12 months postoperatively. SPSS version 23.0 was used for data analysis. **Results:** All patients underwent open surgical treatment. Of 50 patients, 25 (50%) had SFA pseudoaneurysm, 20 (40%) had CFA pseudoaneurysm and 5 (10%) had PFA pseudoaneurysm. The mean duration of clinical manifestations was 16.30 ± 7.74 days. Surgical repair was successful in all 50 (100%) patients and distal ischemia was fully resolved. There was no case of limb loss or post-operative mortality. One patient had an infection in the groin wound and had raised Total leucocyte count (TLC), which was resolved by early drainage and antibiotic treatment. Patients were followed up at 1, 3, 6, and 12 months and there were no signs of clinical or angiographic evidence of post-operative complications and changes in distal pulse. **Conclusion:** Surgical repair was first-line treatment for giant FAP. It was clinically feasible and has a high success rate and low complication rate.

INTRODUCTION

The femoral artery is used as an access site for cardiovascular procedures and by IV drug abusers, femoral artery pseudoaneurysm (FAP) is a common complication associated with these procedures [1]. There has been an increase in the incidence of pseudoaneurysm because increased complexity and number of invasive endovascular procedures [2]. The femoral artery is a commonly used access site for intra-arterial procedures. Access site complications such as vessel thrombosis, bleeding, arteriovenous fistula, emboli, and thrombosis are common clinical presentations. FAP is the most common complication with an incidence rate of 0.2-2% [3]. Incomplete closure of arterial puncture leads to FAP formation causing arterial blood to enter surrounding tissues creating a pulsating hematoma [3]. FAP presents as bruit or thrill and may cause pain and tenderness, local skin ischemia, neuropathy, and distal embolization [4]. It can also manifest as pulsatile mass, audible murmur and tremor [5]. Small pseudoaneurysms can be treated conservatively. Recently, femoral artery pseudoaneurysms have been managed through radiological instead of surgical intervention. Radiological

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intervention includes transcatheter embolization through thrombin, transcatheter fibrin adhesives, coils, and percutaneous injection of thrombin. While surgical intervention includes arterial repair and aneurysmectomy. Surgical intervention is done in case of large pseudoaneurysms or when radiological intervention has failed [6]. Audeh A et al., found that surgical repair resulted in complete resolution of giant femoral artery pseudoaneurysms and had no major complication [7].

There is a scarcity of local data on this topic, thus the aim of this study was to clinical outcome of surgical repair of femoral artery pseudoaneurysms.

METHODS

The prospective study was conducted in Doctors Hospital, Lahore from October 2022 to October 2023. The study included patients with giant femoral artery pseudoaneurysms who required surgical intervention. Pseudoaneurysms sized >2cm were considered giant FAP. FAP was diagnosed through clinical examination and Computed Tomography Angiography (CTA). Post-operatively, all patients were administered oral aspirin (75-150 mg/day) for 3 months. Patients were followed up at 1, 3, 6, and 12 months postoperatively. Patients with anastomotic site pseudoaneurysms were excluded. Data from a total of 50 patients were included and they underwent both peripheral vascular interventions and percutaneous cardiac catheterization. Informed consent of the participants was taken. The ethical review board of the hospital approved the study Ref: IRB/43/2022/01. To perform the procedure, the patient was placed in the supine position. The character of posterior tibial and dorsalis pedis pulses were recorded before, during, and after the procedure. The aneurysm was exposed through a vertical incision which was extended distally and proximally to view the Superficial Femoral Artery (SFA), Common Femoral Artery (CFA) and Profunda Femoral Artery (PFA). After exposing the pseudoaneurysm pouch, the hematoma was excavated and the distal part of PFA and SFA and proximal part of CFA were carefully dissected followed by placement of nylon tapes and 6/0 polypropylene suture. Twenty-five (50%) patients had small defects and underwent primary repair, 8 (16%) underwent vein patch repair. Eight patients (16%) received an interposition reversed saphenous vein graft, while nine patients (18%) underwent an interposition synthetic ePTFE graft. The primary outcome was success of surgical repair and resolution of ischemia. Secondary outcomes included postoperative mortality and complications and incidence of infection and limb loss. SPSS version 23.0 was used for data analysis. Descriptive analysis was performed to present variables by mean ± SD for categorical variables like BMI and age and by percentage for continuous variables.

RESULTS

The mean age of the participants was 49.07 ± 12.01 years. There were 16 (32%) females and 34 (68%) males. Thirty-three (66%) patients had groin pain and distal ischemia, 8 (16%) had infected pseudoaneurysm, 4 (8.1%) had leaking pseudoaneurysm and 5 (10%) had very large pseudoaneurysm (>5cm). All patients underwent open surgical treatment. Of 50 patients, 25 (50%) had SFA pseudoaneurysm, 20 (40%) had CFA pseudoaneurysm and 5 (10%) had PFA pseudoaneurysm. The mean duration of clinical manifestations was 16.30 ± 7.74 days. Surgical repair was successful in all 50 (100%) patients and distal ischemia was fully resolved. There was no case of limb loss or post-operative mortality. One patient had an infection in the groin wound and had a raised Total leucocyte count (TLC), which was resolved by early drainage and antibiotic treatment. TLC count was assessed by a hematologist. Patients were followed up at 1, 3, 6, and 12 months and there were no signs of clinical or angiographic evidence of post-operative complications and changes in distal pulse.

Table 1: Patient's Characteristics

Variables	Patients N (%) / (Mean ± SD)
Age (Years)	49.07 ± 12.01
Gender	
Male	34 (68%)
Female	16 (32%)
BMI	33.8 ± 6.4
Location of Pseudoaneurysm	
SFA	25 (50%)
CFA	20 (40%)
PFA	5 (10%)
Sign	
Pain	33 (66%)
Infection	8 (16%)
Rupture	4 (8.1%)
Enlargement (>5cm)	5 (10%)
Surgery	
Elective	3 (6%)
Emergency	47 (94%)
Intervention	
Primary Repair	25 (50%)
Vein Patch Repair	8 (16%)
Interposition Reversed Saphenous Vein Graft	8 (16%)
Interposition Synthetic ePTFE Graft	9 (18%)

DISCUSSION

In this study, we evaluated the outcome of the surgical repair of giant FAP. FAP was a complication associated with percutaneous-based interventions and IV drug abuse. Pseudoaneurysms occur due to incomplete closure of the arterial puncture site and result in hematoma formation and bleeding [8, 9]. A study found out that there has been an increase in incidence of FAP in recent years, its incidence

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after diagnostic procedures was 0.9%, and in therapeutic procedures was 9% [10]. Pseudoaneurysms were mostly found in the superficial femoral artery, and may also be present in the common femoral artery, deep femoral artery, and at the junction of superficial and deep femoral arteries. Stable pseudoaneurysms were benign and resolve spontaneously; however, 14% of pseudoaneurysms need open repair [11]. Minor Post-Catheterization Pseudoaneurysms (PCPA) may undergo thrombosis and were treated conservatively by the surgeons; however, this prolongs hospital stay, delays ambulation, and requires repeated sonographic evaluation. [12]. Development of more conservative techniques has diminished the role of surgery; however, surgical repair was required for managing large hematoma, infected pseudoaneurysms, FAP causing distal ischemia, neuropathy, soft tissue and skin ischemia and cases of failed percutaneous treatment [13]. Traditionally, surgery was the gold standard for treating femoral artery pseudoaneurysms, though it has a risk of complications in patients with cardiovascular disease. The results of our study reveal that various types of surgical procedures can effectively treat giant FAP. These results were in line with previous literature which suggests that open surgical repair has various benefits and fewer complications [14, 15]. Surgical repair was successful in all patients and there was only one case of post-operative infection which was resolved through drainage and antibiotic treatment. A study reported that groin incision was usually recommended in case of painful and enlarged pseudoaneurysms [16]. However, few studies reported that non-surgical closure of FAP using ultrasound-guided compression was successful in patients undergoing catheterization [17, 18]. Percutaneous thrombin injections were also used for treating FAP, currently thrombin injections with ultrasound-guided visualization were used [19, 20]. Duplex ultrasound-guided compression was another less invasive option but has limited efficacy. There was a general consensus that enlarged painful pseudoaneurysms should be repaired surgically. The limitation of this study was small sample sizes, larger studies were required for further analysis.

CONCLUSION

Surgical repair was the first-line treatment for giant FAP. It was clinically feasible and has a high success rate and low complication rate.

Authors Contribution

Conceptualization: AM
Methodology: AM, ANA, NF, SNJ
Formal analysis: SA
Writing, review and editing: AM, AU

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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