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## Outcome of ligation of peripheral arterial pseudo aneurysm with or without revascularization in intravenous drug abuser

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### Abstract

**Background:** Current treatment options of pseudo aneurysm in intravenous drug abuser (IVDA) include either excision of pseudo aneurysms sac with only ligation or with routine revascularization.

**Methods:** This is a retrospective study of 53 patients over a period of 14 years done in Bir hospital where we describe the management of the pseudo aneurysm either with ligation only or with revascularization.

**Results:** Out of total 53 patients, 43 (81.13%) were male and 10 (18.87%) were female. Ligation of the artery of the pseudo aneurysm in 42 (80.77%) cases and revascularization in 10 (19.23%) cases were done. Post-surgery claudication pain was in 9 (17.31%) cases, thrombosed and infected grafts in 9 (17.31%) cases. However there was no case of amputation and mortality.

**Conclusion:** Ligation and debridement of pseudo aneurysm is a simple, safe and effective procedure with minimal morbidity in IVDA.

**Keywords:** Intravenous drug abuser; ligation; pseudo aneurysm; revascularization

### Introduction

A pseudo aneurysm is a pulsating, encapsulated hematoma in communication with the lumen of a ruptured artery. In Nepal, overuse of marijuana and other drugs has escalated when the hippies began to enter into Nepal. There are about 50,000 intravenous drug abuser in Nepal <sup>[1]</sup>.

The common presentation is pain, bleeding in a pulsatile swelling. Colour flow Doppler, CT angiogram of the lower limbs are commonly performed <sup>[2]</sup>.

An important factor in the management of pseudo aneurysm is the presence of infection <sup>[3]</sup>. The conventional treatment of infected femoral artery pseudo aneurysm is ligation of the infected artery with routine revascularization <sup>[4]</sup>. Because of the high incidence of complications, selective revascularization is done <sup>[5]</sup>. Other options are end luminal stent grafting <sup>[6]</sup> and percutaneous thrombin injection <sup>[7]</sup>.

Common femoral artery ligation without arterial revascularization is not routinely used by many surgeons for fear of limb loss <sup>[8]</sup>. We report our experience of ligation of pseudo aneurysm artery with or without revascularization and their outcome in IVDA.

### Methods

This is the hospital based retrospective study, carried out over the period of 14 years from 2006 to 2019 in CTVS, department of surgery Bir Hospital. Total of 53 patients with pseudo aneurysm who were admitted in our hospital for the treatment were taken for the study. Patients with pseudo aneurysm due to other causes were excluded.

### Procedure Details

The diagnosis of femoral pseudo aneurysm was made on clinical evaluation, which included detail history and examination. All patients had routine base line investigations. The diagnosis was confirmed in all patients by ultrasound followed by CT angiogram and when required.

The surgical procedure included excision of pseudo aneurysm and debridement of necrotic tissue followed by ligation of artery with or without distal revascularization.

Surgery was performed on an emergency basis after stabilizing the normal vitals. The surgical technique consisted of first exposing the distal EIA for proximal control through a retroperitoneal incision made just above and parallel to the inguinal ligament through an uninvolved and uninfected field. Once proximal control was achieved, the EIA just above the inguinal ligament was test clamped. The femoral artery was ligated just under the inguinal ligament, preserving the lateral circumflex and inferior epigastric arteries as far as possible. After ligation of the CFA, the wound was closed and covered with a Tegaderm dressing. The groin mass was then incised and drained, and the back bleeding was controlled with digital pressure or with a Fogarty balloon catheter, if necessary. The SFA and profunda femoris artery just distal to the pseudoaneurysm were then suture ligated if the aneurysm involved the femoral bifurcation. All necrotic material was excised and the cavity irrigated copiously with saline. If the pseudo aneurysm involved the CFA above the bifurcation, the distal ligation of the CFA was just above or at the bifurcation was done. In these patients the SFA and profunda femoris artery did not have to be ligated separately. Then in some cases PTFE or autologous great saphenous vein bypass was performed. The wound was closed loosely or left open for healing by secondary intention and antibiotics against Gram-positive and Gram-negative microorganisms given. Patients were observed for early complications like haemorrhage, thrombosis, ischaemia and infection. Complications was accordingly managed and patients were followed up to 3 months.

#### Data collection

Total of 53 cases, who were admitted with the diagnosis of pseudoaneurysm in the patients of intravenous drug abuser were taken for the studies. Approval from Subject Committee and Institutional Review Board of National Academy of Medical Sciences taken prior to study. Data were collected from the surgery registers. Confidentiality was assured by not disclosing the information and maintained by coding the data with number.

**Table 3:** Surgical Procedure & Serological Study

Surgical procedure	Serological study	
	Positive	Negative
Ligation of both proximal and distal portion of pseudo aneurysm	23 (44.23%)	19 (36.54%)
PTFE bypass graft	1 (1.92%)	6 (11.53%)
Reversed GSV bypass	1 (1.92%)	2 (3.85%)
Total	25 (48.07%)	27 (51.92%)

Out of total 53 patients, only 52 patients underwent surgery. We were not able to perform surgery in one patient, he expired while resuscitating in Emergency room. Out of 52 patients, we ligated the artery of the pseudo aneurysm in 42 (80.77%) cases, revascularization with PTFE graft was done in 7 (13.6%) and reversed GSV bypass was done in 3(5.77%) cases as shown in Table 3.

**Table 4:** Outcome of Surgical Procedure

Outcome	Frequency	Percentage
Claudication	9	17.31%
Amputation	-	-
Re exploration for bleeding	1	1.92%
Revision after thrombosis of the graft	9	17.31%
Uneventful recovery	33	63.46%

Out of 52 cases, there was a complication in 19 (36.54%) cases. There was claudication in 9 (17.31%) cases, re exploration for

#### Results

Total of 53 cases of patients with the diagnosis of pseudo aneurysm in the patients of IVDA who were admitted in Bir hospital were taken for the study.

**Table 1:** Age & sex distribution

Age	Male	Female
10 -20 year	7 (13.20%)	1 (1.89%)
21 -30 year	19 (35.85%)	8 (15.09%)
31- 40 year	10 (18.87%)	1 (1.89%)
41 – 50 year	5 (9.43%)	-
51 – 60 year	2 (3.77%)	-
Total	43 (81.13%)	10 (18.87%)

Duration of study was fourteen years from 2006 to 2019. Out of these, 43 (81.13%) were male patients and 10 (18.87%) were female.

The age of the patient ranges from 17 to 60 years, with the maximum number of patients were in the age group of 21 to 30 years in both male and female patients as shown in Table 1.

**Table 2:** Site and Presenting Features of the Pseudo aneurysm.

Site and Presenting Features	Femoral	Brachial	Total
Infected pulsating mass	25(47.17%)	6(11.32%)	31(58.49%)
Ruptured pseudo aneurysm	16(30.19%)	2(3.77%)	18(33.96%)
Bleeding following I&D (groin abscess)	4(7.55%)	-	4(7.55%)
Total	45(84.90%)	8(15.09%)	53(100%)

Diagnosis of the pseudo aneurysm is usually straightforward but clinical presentation may be different. Most common presentation was infected pulsating mass in 31 (58.49%) cases, followed by bleeding due to ruptured pseudo aneurysm 18 (33.96%).

Similarly most common site for the pseudo aneurysm was femoral artery in 45 (84.90%) cases, then brachial artery in 8 (15.09%) cases as shown in Table 2.

bleeding in 1 (1.92%) case and revision for thrombosis of the graft was done in 9 (17.31%). There was an uneventful recovery in 33 (63.47%) cases. However there was no case of amputation and mortality (Table 4).

#### Discussion

A pseudo aneurysm is a pulsatile haematoma communicating with an artery through a disruption in the arterial wall. Intra venous drug abuser is increasing in the world so the case of pseudo aneurysm. Mostly the younger population is affected. In our study most cases of pseudo aneurysm was found in the age between 21 to 30 years. Though male is dominant, female drug abuser is also increasing in our country. In our study there were 10 (18.87%) female IVDA with pseudo aneurysm. These findings are similar to the study done by Levi where the female were 25% [9].

Pseudo aneurysm is the common complication in IV drug abuser [2]. The pathogenesis of these pseudo aneurysms in IV drug

abusers consists of introduction of infected material by non-sterile techniques combined with inadvertent or intentional arterial trauma when venous access is impossible because of thrombosis. If left untreated, they can lead to hemorrhage, sepsis, limb loss, and even death. The first site of approach for IV access in most cases was cubital fossa, but the site most affected with pseudo aneurysm was the groin. In our study, pseudo aneurysm of femoral artery was in 45 (84.90%) and in brachial artery was in 8 (15.09%). This finding is similar to the study done by Saini *et al.* where the femoral arterial pseudo aneurysm was in 61 (84.72%) cases and brachial arterial pseudo aneurysm was in 8 (11.11%) cases<sup>[10]</sup>. There is also high incidence of HIV/HbsAg/HCV because of needle sharing habits. In our study also there were almost half the cases 25 (48.07%) positive for HIV/ HbsAg/ HCV which is also similar to the study done by Klonaris *et al.*<sup>[11]</sup>.

The most common presentation is pain in a pulsatile groin swelling and bleeding. Diagnosis is usually straightforward but it can be mistaken as an abscess, which can lead to massive bleeding upon draining. In our study all patients attended in Emergency Room with presentation of with pulsating swelling in 31(58.49%), bleeding from the ruptured pseudo aneurysm in 18 (33.99%) and bleeding following I&D of groin abscess in 4 (7.55%) cases. These findings were similar to the study done by Saini *et al.* where the commonest presentation was pain and swelling in 67 (93.06%), followed by bleeding from the pseudo aneurysm in 52 (72.22%) cases<sup>[10]</sup>.

Management of these patients is challenging as they have poor general health and nutritional status coupled with the fact that most of them continue addiction despite drug rehabilitation. The treatment of pseudo aneurysms in IV drug user is mainly surgical as they are mostly infected due to repeated puncture of artery with unsterile needle. Untreated infected pseudo aneurysm can lead to sepsis, hemorrhage, limb loss and death. The surgical treatment of these pseudo aneurysms remains challenging and controversial. Current treatment options include: excision and debridement of infected pseudo aneurysms with ligation of affected artery without revascularization<sup>[12]</sup> and extensive debridement of infected pseudo aneurysms with routine revascularization<sup>[13]</sup>.

Revascularization can be achieved with an autologous or synthetic graft placed either in situ or extra-anatomically<sup>[14]</sup>. Choice of graft is also a challenging issue, if revascularization is to be attempted. Great saphenous vein, because of prolonged direct injections, is usually not available as a conduit. Consequently, use of prosthetic graft usually associated with high reinfection risk even when placed in extra-anatomic route through obturator foramen. These drug dependent patients can also abuse these reconstructed vessels which is of grave consequences<sup>[13]</sup>. In our study revascularization was done in 10 (19.23%) cases, out of that PTFE bypass graft in 7 (13.46%) and autogenous GSV bypass in 3 (5.77%). These findings are similar to the study done by Jaiswal where revascularization done in 20% cases<sup>[15]</sup>. In our study there was a graft thrombosis in 9 (17.31%) where we had done the revision of the surgery.

Studies have shown ligation of artery without revascularization is associated with high incidence of lower extremity ischemia and limb loss especially in traumatic condition and triple ligation. The same principle cannot be utilized in IV drug user as they are found to have better collaterals<sup>[16]</sup>. We have done the ligation with out revascularization in 42 (80.77%) cases. Mild claudication was observed in 9 (17.31%) cases, which was similar to the study done by Saini *et al.* (12) In the study done by Patel there was a amputation rate of 11%<sup>[14]</sup>. Similarly in the

study done by Ewida *et al.* the amputation rate was 15%<sup>[17]</sup>. But in our study there was no case of amputation. Similar finding was observed in the study done by Zhu *et al.* where out of 83 cases of ligation of femoral artery none required amputation<sup>[18]</sup>. In the study done by Saini the mortality rate was 4.16%. In our study we were not able to perform the surgery in one patient who expired while resuscitating due to massive haemorrhage. But post-surgery there was no mortality in our study, which was similar to the study done by Zhu *et al.*<sup>[18]</sup>, Naqi *et al.*<sup>[19]</sup>.

## Conclusion

Pseudo aneurysm in IVDA usually present late, so high index of suspicion helps in their timely diagnosis and management. Infected pseudo aneurysms should be managed by simple ligation and excision of involved vessel with delayed revascularization if required. Early reconstruction is not recommended since most of pseudo aneurysms are infected at the time of presentation. IVDA have tendency to reuse reconstructed vessels so the arterial reconstruction may be in jeopardy of recurrent infection and can be threat to life. Patients with pseudo aneurysm usually have well-established collaterals and are less affected after ligation. So, ligation and debridement is a simple, safe and effective procedure with minimal morbidity.

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