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"Arterial ligation for the treatment of infected groin pseudoaneurysm in intravenous drug abusers "

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ABSTRACT:

Background: Abuse of IV drugs is a global sociomedical issue. Drug addicts have been more prevalent in recent years. (1). The common femoral artery might be accidently punctured when injecting illegal narcotics at the femoral triangle. Constant risk associated with intravenous drug misuse is problems of the vascular system. This study discussed the outcomes of arterial ligation in intra venous drug abusers .presented with infected groin pseudoaneurysm

Methods: retrospective study with an analysis of the data from medical record of all consecutive patient with infected groin pseudoaneurysm in IV drug abusers admitted to vascular and endovascular surgery departments in Egypt healthcare authority hospitals and underwent arterial ligation with follow up of limb salvage and mortality .in these patient and any associated complications

Results: twenty patients included in this study, Hemorrhage was reported in 11 (55%) of them while 10 (50%) had complained from localized swelling in the groin. With median 3.6 years period of injection, a four sites for injection were identified intraoperative (EIA, CFA, SFA and CFA with SFA or PFA). Single ligation done in 70% of patients. With a median follow up period of 10 months we reported limb salvage in 18 patients of the cohort (90%) and critical limb ischemia and severe .necrosis in only 2 patients (10%) which led to above knee amputation

Conclusion: For vascular surgeons, IGP in IV drug abusers present a major dilemma. Apart from the debates surrounding the most effective approach for treatment, managing this patient population is frequently impeded by noncompliance and noncompliant drug usage. We suppose that management of IGP could be done safely and successfully with affected artery ligation without revascularization since most ..patients won't experience claudication symptoms and many will avoid amputation

Key words:

Addict – ligation –arterial - ampuatation

Introduction:

Abuse of IV drugs is a global sociomedical issue. Drug addicts have been more prevalent in recent years. (1). The common femoral artery might be accidently punctured when injecting illegal narcotics at the femoral triangle. Constant risk associated with intravenous drug misuse is problems of the vascular system. It is likely to result in arterial or venous harm if attempts to inject heroin and cocaine into a large lower leg deep vein are repeatedly unsuccessful.

A pulsing, encapsulated hematoma in communication with an artery that has burst is called a pseudoaneurysm (1,2). Typically, these individuals appear with painful mass in the groin and bleeding at the puncture site. Examining often reveals painful, pulsating swelling. The infected pseudoaneurysm may result in systemic infection, potentially fatal bleeding, limb loss, or even death if treatment is not received.

Other vascular problems can also arise, including arterial embolization and deep vein thrombosis (DVT) (2). For both the initial diagnosis and the intraoperative evaluation, various diagnostic techniques are employed. Furthermore, postoperative and long-term monitoring options include bedside tests like Doppler signals detection, digital PO2 by pulse oximeter, and ABI evaluation, as well as imaging modalities including duplex US (3,4), CT, CT angiography, and MRA in certain situations (2,5,6,7).

The primary goal of treatment of infected groin pseudoaneurysm (IGP) is to ligate ruptured arteries to limit bleeding, either current or potential, and the second is to remove and drain the local infected tissue. The conventional approach to treating this challenging issue involves ligation and excision of the afflicted artery in addition to local debridement (8,9). This treatment is linked to intermittent claudication and occasionally amputation. (10) There is debate regarding the best course of action for managing infected groin pseudoaneurysms: ligation versus revascularization (2,11).

Because trans-obturator bypass is a useful revascularization option, vascular surgeons may need to learn more about it and think about using it when the situation calls for it. (9)

In our study we discussed the outcomes of arterial ligation in intra venous drug abusers presented with infected groin pseudoaneurysm.

Methods

Study design

This a retrospective study with an analysis of the data from medical record of all consecutive patient with infected groin pseudoaneurysm in IV drug abusers admitted to vascular and endovascular surgery departments in Egypt healthcare authority hospitals during the period from 2020 to 2023 after approval from ethical committee board.

Data collection

Data collected from our medical record include demographic characteristics (age and sex), associated comorbidities (DVT), smoking status, hematological and virology test results.

Also, clinical presentation, procedure details and outcome are obtained from patients' registry.

Procedure:

The primary goal of surgical intervention was to stop the bleeding. There was a risk of serious bleeding during proximal control of the common femoral artery (CFA) when the pseudoaneurysm and hematoma extended up to the inguinal ligament.

Proximal control was carried out in accordance with the affected artery: in the case of external iliac artery involvement, balloon clamping via percutaneous contralateral transfemoral approach was preferred, whereas in the case of common femoral artery, superficial femoral artery, or profunda femoris artery involvement, an external iliac artery approach through an oblique incision above the inguinal ligament was used.

It is imperative to protect the collateral arteries of the CFA, both above and below the inguinal ligament, when performing the external iliac ligation procedure. An arterial thrombectomy can be carried out prior to arterial ligation in order to preserve collaterality and enable thrombi to be removed.

A simple ligation of the CFA above the origin of the Superficial femoral artery or a triple ligation may be used, depending on the involvement of the femoral bifurcation. At least 1 centimeter from the end of the contaminated artery segment was used for the ligation procedure, which was carried out in a healthy area, 1 cm above and 1 cm below healthy tissue.

Single branch ligation was carried out in cases of isolated SFA involvement or the femoral bifurcation was clear of infection, a simple ligation of the SFA was performed.

For proximal CFA ligation above the profunda femoris artery origin The superficial circumflex iliac artery and the superficial epigastric artery were left free. Moreover, it can be done below the inferior epigastric artery and deep circumflex iliac artery, above the inguinal ligament at the distal portion of the external iliac artery. Distal ligation was carried out while adhering to the sepsis safety limits above the femoral bifurcation.

If the infection spread to the femoral bifurcation, triple branch ligation of each femoral vessel was advocated. Similar to the single ligation mentioned above, proximal ligation was carried out on the proximal portion of the CFA. Distal ligation was performed on the SFA below the origin of profunda femoris artery and the proximal part of the profunda femoris artery.
In order to protect collateral arteries like the circumflex femoral arteries and the deep and superficial external pudendal arteries, arterial dissection was kept limited. Two 2/0 thread monofilament sutures were used for each ligature.

When treating a severely infected pseudoaneurysm, all affected tissues, including the infected artery were removed, and numerous samples were collected for microbiological examination. Wide excision of contaminated tissue was necessary to control local sepsis. Large tissue losses during extensive debridement may necessitate the use of local flaps to cover exposed vessels (even if they are ligated) once the infection has subsided. Furthermore, if the femoral vessels were not exposed, negative wound pressure therapy, also known as vacuum-assisted closure, might be utilized to accelerate the healing process.

Primary objective:

To assess the outcome of ligation of infected groin pseudoaneurysm without revascularization in terms of survival & limb salvage in intravenous drug abusers.

Secondary objective:

To assess complications of ligation of infected groin pseudoaneurysm without revascularization in intravenous drug abusers.

Statistical analysis.

SPSS 23 (SPSS Inc., Chicago, IL, USA) was used for statistical analysis, median was calculated for quantitative data. Frequencies and percentages were calculated for qualitative data. X2 test or fisher's exact test for categorical data. Statistical significance was considered when P value <0.05.

Results

Twenty patients included in this study were treated in the study period from infected pseudo aneurysm in patients with history of IV drug addiction. All of them were male (100 %) with median age 30.1 years. Eleven patients (55%) of the study population had a history of smoking. Deep venous thrombosis (DVT) was diagnosed in 5 patients (25%). Ten patients (50%) had negative virology markers. Patients' demographic data, associated comorbidities and virology result. listed in table I.

Table I: Patients' demographic data, associated comorbidities and virology result.

	Number or median	percentage
Male	20	100%
Age	31.1 years	
Smoker	11	55%
DVT	5	25%
HIV	2	10%
HBV	1	5%
HCV	5	25%
HCV & HBV	2	10%

On admission investigations showed anemia in all patients with median hemoglobin level 8.3 g/dl and elevated total leucocytic count with median of 19.3 * 10^9/L

Hemorrhage was reported in 11 (55%) of the study cohort while 10 (50%) had complained from localized swelling in the groin, table II summarize the clinical presentations of all patients.

Table ii: clinical presentation of the patients

	Number	Percent
hemorrhage	11	55
Painful swelling	12	60
infection-inflammation	6	30
purulent discharge	3	15
gangrene of skin	2	10
bruit-thrill	1	5
fever	1	5

Intra operative wound culture organisms showed in table III

Table iii: wound culture organisms

	number	Percent
staph	12	60
pseudomonas	4	20
E coli	2	10
strept	2	10

With median 3.6 years period of injection, a four sites for injection were identified intraoperative (EIA, CFA, SFA and CFA with SFA or PFA.

The operative details, techniques, postoperative complications are described in table IV.

Table iv: operative details, techniques, postoperative complications

		number	Percent
Site Of ligation	SFA	10	50
	CFA	4	20
	CFA, PA ,SFA	4	20
	EIA	2	10
Type of operation	single ligation	14	70
	triple ligation	6	30
On Table arterial doppler signal	Non Audible	2	10
	Audible	18	90
Complication	Secondary Hemorrhage	3	15
	sepsis	2	10

Hospital stay time postoperative recorded a median 13 days with median of APBI 0.48 in discharged patients.

With a median follow up period of 10 months we reported limb salvage in 18 patients of the cohort (90%) and critical limb ischemia and severe necrosis in only 2 patients (10%) which led to above knee amputation, and they were underwent single ligation of EIA.

No limb related mortality was reported in the follow up period.

Neither the site of injection nor the site of ligation affects the limb salvage ($p = 0.9$ & 0.07) respectively.

Discussion

Management of infected groin pseudoaneurysms (IGP) is a very challenging situation for every vascular surgeon. It is a complicated case with multiple factors as infection, bleeding and unstable condition of the patients at time of presentations. Variable management protocols are described in literature, as ligation of the affected artery only, on table revascularization or delayed revascularization according to limb viability state. No global guidelines for the best management strategy of this situation.

The main goal in these cases is to control bleeding by arterial ligation to regain hemodynamic stability and eliminate infection by removal of infected aneurysm and all necrotic tissues.

The revascularization is the major dilemma in these patients because of lack of autogenous vein conduit and presence of infection which hinder the use of synthetic graft.

Some authors advocated the trans obturator bypass for limb salvage, others reported complete endovascular management using covered stents. Both maneuvers have complications as bypass have higher reinfection rate which reach 75% in the study by Majeed et al also multiple thrombosis and occlusions (12). On the other hand, endovascular therapy is not the optimal technique with the use of covered stent in infected area also it needs to cover the profunda femoris artery ostium which may lead to major limb loss.

Therefore, the ligation of the affected artery and elimination of the infected and necrotic tissue is a safe approach for management. The data of limb salvage following arterial ligation is variable in the published studies(9,11,15,16,17).

In this cohort we assessed the limb salvage and mortality following the arterial ligation without revascularization, also post operative complications are addressed.

HIV, hepatitis B, and hepatitis C are among the infectious disorders that this group of individuals frequently possesses. According to Li et al., 89%, 49%, and 3% of patients had hepatitis C, hepatitis B, and HIV infections, respectively. The percentages in our series were, in order, 25%, 5%, and 10%.

The results of the cultures of all patients in this study showed predominance of staph aureus, which is in accordance with the recent studies, our protocol includes starting broad spectrum antibiotics on admission and perioperative until final results of the culture then antibiotics given according to the main causative organisms.

In our study, we noticed that 60% of participants were presented with painful swelling. When this group of population experiences swelling and pain in the groin, there should be strong suspicion that a pseudoaneurysm is present. Being able to clinically distinguish between a groin abscess and a femoral pseudoaneurysm is crucial. Prior research has demonstrated that a false positive diagnosis can result in severe bleeding, particularly when surgical drainage is tried for a suspected groin abscess (14).

Georgiadis et al, in his review reported amputation rate of 10% which is similar to our results(15). On the other hand, Al Shakarchi et al, reported a very high rate of amputation with 30% of his study which explained by higher level of arterial ligation(16).

We reported that the need for amputation occurred in 100% of patients with external iliac artery ligation which shows the importance of sparing the EIA branches above inguinal ligament. Quiroga et al, also reported 50% amputation rate in patients with EIA ligation (17).

Surprisingly, all patients who underwent triple ligation had limb salvage of 100%, in contrast to Tan et al., who reported higher level of amputation after triple ligation (18). We explained that all patients who had triple ligation in our series had a long period of injection which lead to development of new collaterals which prevent against amputation.

Intact pedal doppler signals after ligation of the affected artery seems to be a good indicator for limb viability and salvage. We reported absent pedal doppler signals in two patients of our cohort which were suffered from critical limb ischemia after that and were not amenable to revascularization and underwent above knee amputation. Arora et al., used this technique for assessment of limb need for revascularization (9).

In summary, there is still no agreement on how best to treat these patients, and there is no information in the literature about using anti-coagulant or anti-platelet medications after surgery. Due to the high risk of a catastrophic hemorrhage, a clinician may be unable to prescribe anticoagulant or antiplatelet medicine for these patients if they are unable to attend follow-up consultations.

Conclusion

For vascular surgeons, IGP in IV drug abusers present a major dilemma. Apart from the debates surrounding the most effective approach for treatment, managing this patient population is frequently impeded by noncompliance and noncompliant drug usage. We suppose that management of IGP could be done safely and successfully with affected artery ligation without revascularization since most patients won't experience claudication symptoms and many will avoid amputation.

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