
ARTERIAL LIGATION OF LOWER LIMB ANEURYSMS: IS IT EVER SAFE ?

Abdul Salam Y. Al-Museilih

FICMS, Assistant Professor of Thoracic & Cardiovascular Surgery, Dept. of Surgery, College of Medicine, University of Basrah, Iraq.

Introduction

Arterial ligation is the oldest and simplest method of treatment of peripheral aneurysms. For centuries, it was the standard operation for limb aneurysm. Aetius, 600 AD, showed how to expose and ligate the brachial artery in its upper course before opening the antecubital aneurysm. John Hunter applied the high ligation method to the cure of popliteal aneurysm. The first successful case of popliteal aneurysm treated by arterial ligation was in December 1785. This was the best known contribution of John Hunter to vascular surgery. In 1912, Subottitch repaired aneurysms from Serbian war. Graft replacement with saphenous vein was successfully carried out by Lexer of Jena in 1913, and by Hogarth Pringle, in Glasgow, later in the same year⁽¹⁾. The aim of a vascular surgeon treating

peripheral aneurysms should be resection and arterial reconstruction to resume arterial continuity and lumen. Ligation should not be his primary objective. However, in certain clinical settings, ligation is the only option. Moreover, it can be life saving. In this paper, 4 cases of lower limb aneurysms treated by ligation with good outcome are presented. The cases are discussed with review of literature. The aim of this paper is to test the safety of arterial ligation in treating lower limb aneurysms.

Case (1): M.T.A a 21 year old man sustained a perforating bullet injury to the right knee at 23-September 1996 presented 5 hours after the injury. He had transection of both popliteal vessels and a crack of right femur. The limb viability was doubtful on clinical examination as well as on fasciotomy later.

First intervention: end to end repair of artery, vein ligation and fasciotomy.

Second intervention (5 days later): for a bleeding. Saphenous vein grafting. Palpable pedal pulses postoperatively.

Third intervention (one month after grafting): anastomotic false aneurysm due

Correspondence to:

Dr. Abdul-Salam Y. Al-Museilih
Department of Surgery, College Of Medicine
University of Basrah, Basrah:IRAQ.

to infection. Aneurysmectomy, removal of the graft and arterial ligation (35 days following the injury).

Final outcome: good. Viable limb despite absent pulses.

Case (2): H.M.H In September 1997, a 43 year old man referred to our section from another hospital where he had a surgical incision of a misdiagnosed popliteal aneurysm thought to be an abscess. He arrived in a state of shock with bleeding popliteal aneurysm, partly controlled by packing. Past history revealed that he was a known case of Behcet's disease. He consulted an orthopedic surgeon complaining of a painful popliteal mass of one-month duration with no prior trauma.

Operative findings and treatment: after resuscitation, the popliteal region was explored. A big true aneurysm was seen with atherosclerosed artery. After resection; a good back bleeding was observed indicating efficient collaterals. Saphenous vein grafting failed due to severe friability of the vessel. Ultimately, the artery was ligated.

Final outcome: surprisingly, the limb remained viable. The patient resumed walking without claudication. He died 2 years later due to a malignant mediastinal tumour.

Case (3): B.M in October 2000, a 53-year-old normotensive lady presented with a painful pulsatile left groin swelling for few months. Examination revealed a systolic thrill and bruit. Pedal pulses were palpable. Doppler and angiography (Fig.1 &2) confirmed the diagnosis of common femoral aneurysm (type 2), mostly atherosclerotic.

Operative findings and procedures: exploration showed a true fusiform atherosclerotic aneurysm. Resection is performed. No satisfactory saphenous

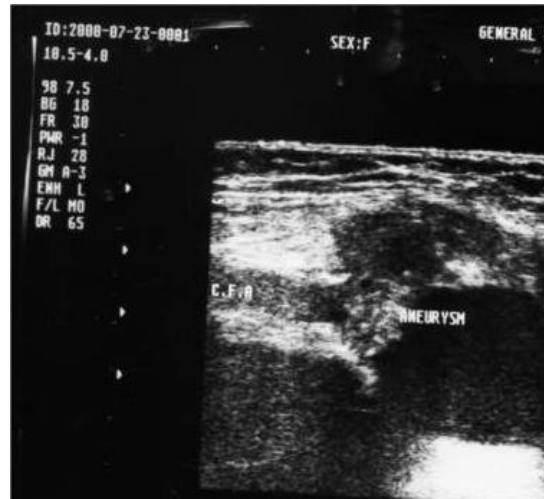


Fig.1

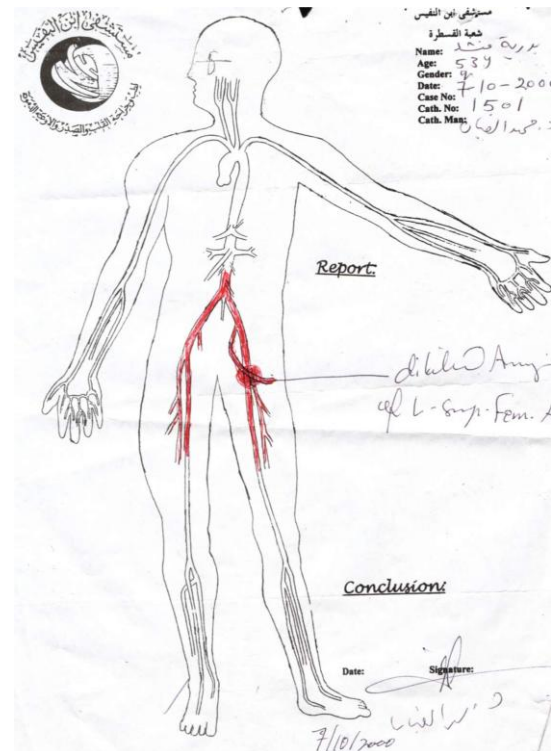


Fig.2

vein was available, thus a Gore-Tex graft is used (external iliac to superficial femoral).

Final Outcome: the distal pulses remained palpable till 9th postoperative day when they have disappeared indicating graft thrombosis due to infection. However, the limb remained viable. One month later, the graft was

removed and the external iliac artery ligated. No change in limb viability occurred. The lady was discharged home in excellent health (Fig.3). She resumed her daily activities without claudication and was followed up for 2 years. Postoperative magnetic resonant arteriography (Fig.4) showed a big collateral artery descending from the abdomen to the region of the thigh.



Fig.3

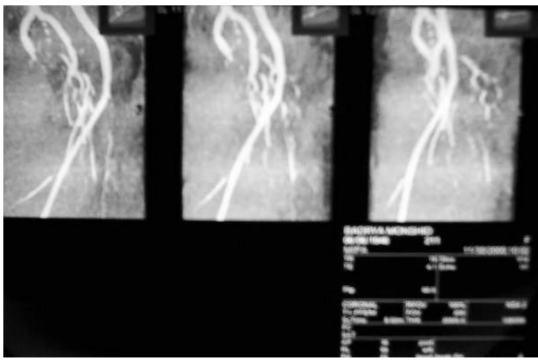


Fig.4

Case (4): H.A.Sh In June 2002, a 55 year old smoker man presented with a painful pulsatile left-sided groin swelling of three months duration. Physical examination revealed a systolic thrill and bruit over the mass with intact distal pulses. Magnetic resonant arteriography (Fig.5) showed bilateral aneurysms (the

right-sided one involved the external iliac artery while the left one involved the common femoral artery). Blood pressure was normal.

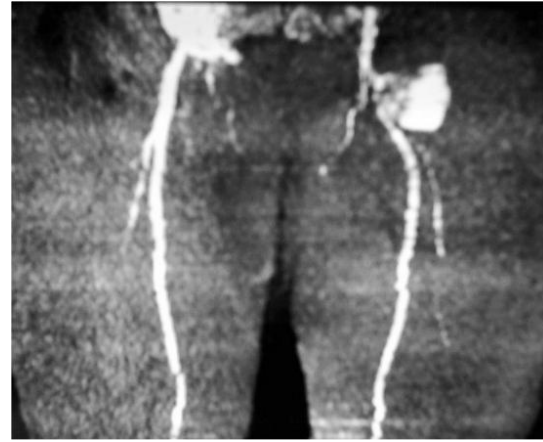


Fig.5

First intervention: at exploration, a true atherosclerotic saccular aneurysm of common femoral artery was found (type 1). Aneurysmectomy and lateral arteriorrhaphy was done.

Second intervention: the same night, the patient was re- explored for arterial thrombosis. Thrombectomy was performed. The arterial segment, the site of origin of the aneurysm was friable; thus, resection and end to end anastomosis was performed (external iliac to superficial femoral). Good distal pulse was obtained after repairing.. However, severe wound infection has developed.

Third intervention: two weeks later, secondary bleeding developed. To save his life; the patient had ligation of external iliac artery.

Final outcome: viable extremity but with rest pain.

Discussion:

Popliteal artery aneurysms are the most common peripheral arterial aneurysms managed by the vascular surgeons. More than 90% of these aneurysms occur in men. In one series of 233 popliteal artery

aneurysms, 231 were considered to be atherosclerotic ⁽²⁾. The complications of popliteal arterial thrombosis, distal embolization, or rupture resulting in lower limb ischaemia occur in 50% to 70% of reported series and are associated with amputation rates as high as 20% (2). It is important to do immediate surgical reconstruction whenever a popliteal artery aneurysm has been detected to avoid these complications ⁽³⁾.

Aneurysms of the femoral arteries are comparatively rare but important because of their limb-threatening potential due to acute thrombosis or rupture and their frequent association with aneurysms in other locations ⁽⁴⁾. There is a strong male preponderance, with men affected 45 times as frequently as women ⁽⁵⁾. Type 1 aneurysms are confined to the common femoral artery, and in type 2 the profunda femoris originates from the aneurysm ^(6,7).

When the surgeon is forced to do ligation of a major extremity artery, the threat of severe ischaemia, gangrene and limb loss is great. Analysis of the presented cases indicates that the outcome of such an option may not be bad (none of the patients developed gangrene or required amputation). In other words, it may be safe provided good collateral circulation is present. The adequacy of such collateral vessels can be judged from preoperative Doppler and angiography, clinical observations e.g., limbs remaining viable despite graft thrombosis and intraoperative finding of good back flow from the distal arterial segment.

An arterial lesion of a long duration like a true atherosclerotic aneurysm has a sufficient time to build up efficient collateral circulation which guards against limb loss. Ligation is least tolerated if done for an acute arterial

lesion such as arterial trauma, obviously due to poor collateral circulation. In case (1), ligation was done 35 days after the onset of (disease: vascular trauma) while in the remaining cases, the disease was probably present for years. The adequacy of collateral circulation is well illustrated by the postoperative magnetic resonant arteriography of case (3).

Ligation was chosen in initial operation in case (2) i.e., Behcets disease. It was done secondarily in other cases i.e., after unsuccessful repair. Patients with Behcet's disease and aneurysm formation carry the highest morbidity and mortality rates among all those with the disease. The results of reconstructive surgery in the treatment of patients with Behcet's disease and aneurysms are discouraging, with many anastomotic aneurysms and grafts occluding ⁽⁸⁾. Tuzun-et al reported 16 aneurysms in 12 patients with Behcet, s disease ⁽⁸⁾. It was possible to ligate major arteries such as the common iliac, superficial femoral and popliteal without limb loss. It is suggested that ligation either at initial surgery or reoperation should be performed to avoid complications of reconstructive surgery in this disease ⁽⁸⁾.

Case (2) has been referred with a recent stab incision packed tightly with gauze. H.H.G. Eastcott reports two such cases ^(9,10). This classical error of incising an aneurysm is explained as follows: extravasation or progressive acute thrombosis of the sac is accompanied by an acute inflammatory reaction. The aneurysmal sac becomes tender and swollen, with discolored overlying skin. Thus the aneurysm can be mistaken for an abscess and surgical drainage attempted ^(9,10).

Ligation has now given place to arterial reconstruction except for small, peripheral aneurysms and those within

the cranium. Hunterian ligation, however, is still the operation of choice for rapidly expanding; painful and probably leaking popliteal aneurysm in a patient who is too ill for complicated arterial surgery⁽⁸⁾. Arora-S et al reported 6 patients with infected femoral artery pseudoaneurysms due to drug abuse treated by ligation of common femoral artery (CFA) with satisfactory results⁽¹¹⁾. After vascular isolation and test clamping of the distal external iliac artery (EIA), the pedal pulses were examined with continuous wave Doppler scan. If a Doppler signal was present, this was followed with CFA ligation⁽¹¹⁾. This policy is similarly agreed upon by Padberg-F Jr et al who recommend primary arterial ligation for infected femoral aneurysms as none of their patients treated this way required

amputation opposite to those treated by arterial reconstruction⁽¹²⁾. The limb viability is assessed during surgery by an audible Doppler signal at the ankle. Revascularization is done only when this signal is absent^(12, 13).

In conclusion, although reconstruction is the primary goal of vascular surgeons dealing with lower limb aneurysms, ligation may be necessary to some patients like those with Behcet's disease and infected arterial aneurysms or unavoidable if repair failed. It is definitely safe for small non-critical arteries. It is relatively safe for more proximal arteries if adequate collateral circulation is present. The intraoperative use of continuous wave Doppler scan to detect a signal in a pedal artery is recommended before ligation.

References:

1. H.H.G. Eastcott. Aortic and peripheral aneurysms. In Arterial Surgery. Edited by H.H. G. Eastcott. Pitman Medical Press 1969 P 274.
2. Robert W Hobson 11. Popliteal artery aneurysm. In Current therapy in vascular surgery. p 325-326.
3. Miani-S. Boneschi-M and Giuffrida-GF et al. Aneurysm of popliteal artery. Prognostic and therapeutic criteria. *Minerva Cardioangiol.* 1993 Jul-Aug; 41(7-8): 319-23
4. Pappas G, Janes JM, Bernatz PE, and Shirger A. Femoral aneurysms: Review of surgical management. *JAMA* 1964; 190:489-493.
5. Brown OW, Hollier LH. Atherosclerotic aneurysms of the femoral artery. In: Bergan JJ, Yao JST, Eds. *Aneurysms: Diagnosis and treatment.* New York: Grune & Stratton, 1982:505.
6. Culter BS, Darling RC. Surgical management of arteriosclerotic femoral aneurysms. *Surgery* 1973; 74: 764-773.
7. Vasquez-G, Zamboni-P and Buccoliero-F et al. Isolated true atherosclerotic aneurysms of the superficial femoral artery: case report and literature review. *J-Cardiovasc-Surg-Torino.* 1993 Dec; 34(6): 511-2
8. Tuzun-H, Savin-A and Karaozbek-Y et al. Peripheral aneurysms in Behcet's disease. *Cardiovasc-Surg.* 1993 Jun; 1(3): 220-4
9. Roggo-A, Hoffman-R and Duff-C et al. How often does an aneurysm of the popliteal artery rupture? *Helv-Chir-Acta.* 1993 Sep; 60(1-2): 145-8
10. H.H.G. Eastcott
- Aneurysms. In *Peripheral Vascular Surgery.* Edited by Martin Birnstingl. William Heinemann Medical Books LTD London 1973 P 284.
11. Arora, -S, Weber, -M-A and Fox, -C-J et al. Common femoral artery ligation and local debridement: a safe treatment for infected femoral artery pseudoaneurysms. *J-Vasc-Surg.* 2001 May; 33(5): 990-3.
12. Padberg-F Jr. et al. Femoral pseudoaneurysms from abuse of drugs: ligation or reconstruction? *JVasc-Surg.* 1992 Apr; 15(4): 642-8
13. Cheng-SW, Fok-M and Wong-J. Infected femoral pseudoaneurysm in intravenous drug abusers. *Br-J-Surg.* 1992 Jun; 79(6): 510-2