

Extra-Anatomic prosthetic bypass grafts in management of Sub-inguinal vascular infections

Muthanna D.R. AL-Assal^{*}, Sabah N.Jaber^{**}, Mohammed H. Nemat^{**}, Uday Hussien^{**}

ABSTRACT

Background: Infection at the site of vascular anastomosis is a serious complication of vascular surgery and is associated with a high limb loss and mortality rate. The classical method of management is ligation of the injured artery, adequate wound debridement and restoration of circulation. The latter is achieved by either in situ or extra-anatomic bypass. If the distal circulation is not maintained, subsequent amputation is most likely.

Objectives: In this study we tried to assess the efficacy of extra-anatomic synthetic bypass grafts in the treatment of vascular infection in the groin to save the limb and avoid the inevitable amputation.

Methods: Between January 2006 and December 2007, ten male patients aged twenty to thirty five years (mean=27.3years), with previous vascular surgery (reversed saphenous vein grafting) for sub-inguinal penetrating injuries complicated with infection and bleeding were admitted and managed surgically in the Department of Thoracic and Vascular Surgery, Surgical Specialties Hospital, Medical City Teaching Complex, Baghdad. These patients were studied retrospectively regarding their demographic and clinical features as well as details of the operative procedures and surgical outcome.

All patients received emergency wound debridement, arterial ligation and extra-anatomic synthetic (PTFE) bypass

grafts (External iliac or common femoral to distal superficial femoral or popliteal artery, six routed laterally and four routed medially in the thigh away from the original surgical field).

Results: Excellent results were obtained in nine patients who saved amputation while one patient ended with above knee amputation. No mortality recorded.

Conclusion: Extra-anatomic bypass is a useful approach in dealing with infected and disrupted vascular anastomosis and can be used in emergency as well as elective situations as mentioned in most literatures.

Keywords: Vascular anastomosis, Extra-anatomic bypass, infra-inguinal graft infection management.

*Al-Kindy College Medical Journal 2014: Vol.10 No. 2
Page: 19-20*

** Al-Kindy Medical School, Faculty of Medicine, Baghdad University, Baghdad, Iraq.*

***Senior specialist vascular surgeons, department of Thoracic and Vascular surgery, surgical specialties hospital, Medical City Teaching Complex.*

Received first July 2013, accepted in final 17 Oct 2013

Address correspondence to Dr Muthanna AL-Assal, email: muthannaalassal@yahoo.com

Despite routine antibiotic prophylaxis and refinements in implantation technique, microbial infection of the vascular prosthesis can occur. Infection involving a vascular graft is difficult to eradicate. If not recognized or treated promptly, implant failure will occur by producing sepsis, hemorrhage or thrombosis. Management involves graft excision alone, graft preservation within the implant wound, in situ graft replacement, or graft excision in conjunction with extra-anatomic bypass grafting¹. The rate of vascular graft infection (VGI) varies, with the incidence ranging from less than 1% for abdominal aortic grafts, to 2.6% for lower extremity grafts, to approximately 6% for infra-inguinal vascular grafts². The mortality related to VGI has been reported between 13% and 58%, and the amputation rate in survivors varies between 8% and 52%². The aim of this study was to assess the efficacy of extra-anatomic synthetic bypass grafts in the treatment of vascular infection in the groin to save the limb and avoid the inevitable amputation.

Methods: This is a retrospective study of ten male patients (20 to 35 years old) admitted to the Department of Thoracic and Vascular Surgery, Surgical Specialties Hospital, Medical City Teaching Complex in Baghdad over two years period (January 2006 through December 2007). All of them had previous vascular surgery for penetrating injuries of the infra-inguinal region where they had received reversed saphenous vein graft for repair of a damaged superficial femoral artery. The cause of admission in all patients was a heavy vascular surgical site infection with clinical manifestations of vascular insufficiency of the previously injured limb. For all of them re-exploration was made after the necessary pre-operative preparation. Surgery

entailed removal of the infected vascular graft, ligation of the proximal and distal ends of the injured arterial segment and the insertion of the PTFE graft making the proximal anastomosis to the external iliac artery approached extra peritoneally in five patients and to the common femoral artery in the remaining five patients. The distal anastomosis was made to the distal superficial femoral artery in four patients and to the popliteal artery in six patients. The graft was buried in a tunnel created away from the infected site laterally in six patients and medially in the remaining four patients.

Patients were anticoagulated, (to start with), heparin changed to Warfarin and oral anti platelets on discharge. All of them were covered with heavy antibiotics both preoperatively and post operatively. Graft patency was regularly checked by colored Doppler on outpatient's bases.

Results. Seven out of ten patients had uneventful postoperative course with the disappearance of vascular insufficiency symptoms. They had regular follow up for the last two years with no morbidity recorded. While complications developed in three patients; one of them presented with a false aneurysm at the proximal anastomotic site. Exploration done and removal of the graft with ligation of the involved artery. Two of them had infection with an acceptable postoperative course and the limbs remained viable, while the first one developed progressive ischemia, which necessitated an above knee amputation, i.e. the overall limb salvage rate is 9 out of 10.

Discussion. Infections of both native and prosthetic vessels are most frequently seen in the region of the groin. The main predisposing factors for vascular groin infection are infected lymph glands or surgical division of lymphatic

channels, the proximity of the groin to the perineum, the relatively superficial location of vascular grafts in the groin, and the development of wound infection adjacent to a vascular graft³.

Surgical site infection (SSI) after arterial intervention is the most common nosocomial vascular infection and an important cause of post operative morbidity⁴. Peripheral arterial injuries, often complicated by infection have increased in recent years⁵. A high percentage of these patients require resection of a segment of the artery with placement of a vascular graft in an extra-anatomic location⁵.

Previous studies were on a non trauma cases⁶⁻⁸, dealing with the occurrence of vascular graft infection following reconstructive surgery at lower limbs, while our study dealt with trauma cases only.

All of our patients were males in the third and fourth decades of life and these young people are the usual victims of trauma in both civilian accidents or military conflicts and this is a common daily event in our country nowadays.

Most of these patients, when subjected to vascular trauma and operated upon require vascular graft, and once such a graft gets infected there is a high possibility of limb amputation, as ligation of the affected vessel and graft removal is necessary in most of these cases to protect them from sudden uncontrolled bleeding. In our study, we offered them an alternative extra anatomic pathway for the arterial flow aiming to solve their problem and minimize the rate of limb amputation.

Ligation of the main artery of a limb is a major decision taken to save the patient's life. Most likely such a step would be followed by limb loss unless the circulation is restored by either in situ or extra-anatomic bypass. However, Al-Museilih AS reported on four cases of lower limb aneurysms managed by arterial ligation with a good outcome, that is, with no limb loss.^[9] In his opinion, arterial ligation may be safe provided good collateral circulation is present. It seems that an arterial lesion of a long duration 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 lesion⁹.

A lateral thigh tunnel was used in six patients and a medial tunnel in four patients avoiding the surgical infected sites, while there are other methods using trans-obturator

foramen bypass, which has statistically significant lower mortality but no difference in graft infection rate and graft patency. Our results are similar to other studies^{10,11}.

Seventy percent of our patients run a smooth post-operative course while 30% developed complications. During the two-year follow-up, the grafts remained patent in the successful seven cases with no sign of infection.

In conclusion, limb salvage following secondarily infected arterial repairs can be achieved by appropriate extra-anatomic arterial reconstruction, which is an excellent approach in dealing with such a problem.

References:

1. Eliza Russu, Adrian Muresan, Bianca Grigorescu. Vascular Graft Infections Management. *Management in Health* 2011;(15): 16-19
2. Michael H. Young, Gilbert R. Upchurch Jr, Preeti N. Malani. Vascular Graft Infections. *Infect Dis Clin N Am* 2012; (26):41-56 doi:10.1016/j.idc.2011.09.004
3. Cagatay Engin, Hakan Posacioglu, Fatih Ayik, Anil Ziya Apaydin. Management of Vascular Infection in the Groin. *Texas Heart Institute Journal* 2005;(32):529-34
4. Bandyk DF. Vascular surgical site infection: risk factors and preventive measures. *Semin Vasc Surg*. 2008 ;21:119-23.
5. Feliciano DV, Accola KD, Burch JM, Spjut-Patrinely V: Extra-anatomic bypass for peripheral arterial injuries. *Am J Surg* 1989;158:506-10.
6. John P. Fletcher, J.Miles Little, Sir John Loewenthal et al. Initial experience with polytetrafluoroethylene for extra-anatomic bypass. *The American Journal of Surgery*, 1980;(139):696-99.
7. Renato A. Mertens, Patrick J. O'Hara, Norman R. Hertzler. Surgical management of infra inguinal arterial prosthetic graft infections: Review of a thirty-five-year experience. *Journal of vascular surgery* 1995; (21):782-91.
8. Taylor SM, Mills JL, Fujitani RM, Robison JG. The influence of groin sepsis on extra-anatomic bypass patency in patients with prosthetic graft infection. *Ann Vasc Surg*. 1992;6:80-4.
9. Al-Museilih AS. Arterial ligation for lower limb aneurysms: is it ever safe? *Bas J Surg*;2004(10):1-5
10. Davidović LB, Kuzmanović IB, Kostić DM et al. An obturator or "lateral" bypass in infected vascular prostheses in the groin. *Srp Arh Celok Lek*. 2002;130:27-32.
11. David V. Feliciano MD, Kevin D et al. Extra-anatomic bypass for peripheral arterial injuries. *The American Journal of Surgery*, 1989; (158):506-10.