Initial Experience of Complex Peripheral Bypass Surgery at Dhulikhel Hospital, Kathmandu University Hospital

Karmacharya RM,[1] Shrestha B,[1] Devbhandari M,[1] Tuladhar SM,[1] Hodde A,[2] Thermann F[3]

[1]Department of Surgery (CTVS),
Dhulikhel Hospital, Kathmandu University
Dhulikhel, Nepal

[2]Department of Vascular Surgery,
University Medical Center, Groningen, Holland

[3]Department of Vascular Surgery,
Carl von Basedow Klinikum, Merseberg, Germany

Corresponding Author

Robin Man Karmacharya

Department of Surgery (CTVS)

Dhulikhel Hospital, Kathmandu University

Dhulikhel, Nepal

E-mail: reachrobin773@hotmail.com

Citation

Karmacharya RM, Shrestha B, Devbhandari M, Tuladhar SM, Hodde A, Thermann F. Initial Experience of Complex Peripheral Bypass Surgery at Dhulikhel Hospital, Kathmandu University Hospital. *Kathmandu Univ Med J* 2017;58(2):188-90.

ABSTRACT

Peripheral arterial disease is seemingly silent yet is a major pubic health problem with limb threatening and life threatening consequences. This condition can initially be asymptomatic and gradually may progress to intermittent claudication and finally to critical ischemia. When conservative management is not sufficient and there is option of surgical management, peripheral bypass surgery is an established modality of treatment of peripheral arterial disease. We present our initial cases of peripheral arterial bypass surgery all of which are technically demanding surgeries. All the cases have resulted into limb salvage until current follow-up.

KEY WORDS

Claudication, critical ischemia, peripheral arterial bypass, peripheral arterial disease

INTRODUCTION

Peripheral arterial disease is seemingly silent yet is a major pubic health problem with limb threatening and life threatening consequences. Commonly underrecognised and untreated in this part of the world, peripheral arterial disease can have strong association with cardiovascular morbidity and mortality. This condition can initially be asymptomatic and gradually may progress to intermittent claudication and finally to critical ischemia. In this case conservative treatment is no option and most often surgical treatment is the only way to salvage the limb. Peripheral bypass surgery is a highly demanding procedure both in resource and in surgical skills and should be performed in specialiced centers. We present our first experiences of complex bypass surgery.

Seven consecutive patients with severe PAD were treated in our hospital. Every patient underwent diagnostic modalities according to the recommendations of the vascular society guidelines. Following clinical examination, Doppler/ duplex ultrasonography (Siemens Acuson P300) was performed and CT angiogram (Phillips 64 Slice) was performed.

CASE SERIES

Between May 2016 to November 2017, seven cases of peripheral bypass surgery were performed at Dhulikhel Hospital. Summary of the cases are presented in Table 1.

Table 1. Details on the cases of complex peripheral arterial bypass surgery at Dhulikhel Hospital, Kathmandu University Hospital.

Case No.	Name	Age/ Sex	Short history	Diseased segment of artery	PAD Stage (Fontaine)	Nature of bypass	Results	Limb salvage goal
1	Mr. J B Rana	55/M	Claudication of bilateral leg (rt>lt) *4 months, Rest pain on right side.	Bilateral common femoral artery, right distal femoral artery.	3	Left femoral artery patch plasty, femoro-femoral bypass, right femoro popliteal bypass	Discharged in 8th postoperative day, No claudication in followup of a year.	Achieved
2	Mr. S B Yonjan	49/M	Right great toe necrosis which required amputation, claudication in right calf *6 months.	Distal SFA to popliteal artery	4	Femoro-anterior tibial bypass	Absence of claudication and wound healing of the amputation site in followup of 3 months.	Achieved
3	Ms. A Bajracharya	16/F	Left great toe necrosis (following minor procedure) *2 months	Bilateral popliteal artery Hypoplasia (Lt>Rt)	4	Lt. Femoro to posterior tibial and fibular artery bypass.	Absence of claudication in followup of 3 months.	Achieved
4	Mr. K Tamang	30/M	Lacerated popliteal artery (Lt side) due to fall injury.	Lacerated popliteal artery with distal artery loss of segment.	(Traumatic)	P1-tibiofibular trunk including the Anterior Tibial Artery with reversed GSV-graft.	Good wound healing, No claudication in follow-up of two months.	Achieved
5	Mr. G. Khadka	74/M	Claudiation in right leg, amputation of right 1st and 2nd toes.	Right external iliac, right popliteal artery.	4	Left femoral to right femoral bypass using silver impregnated Dacron graft.	No claudication in followup of a month.	Achieved
6	Mrs. Shrestha J	70/F	Claudication in right leg, Gangrenous right 4th toe.	Right superficial femoral artery PAD.	4	Right femoral to right popliteal (P1) bypass.	No claudication in followup of a month.	Achieved
7	Mr. Yadav S	25/M	Right tibial communited compound fracture with segmental avulsion of PTA	Right PTA	(Traumatic)	Reversed saphenous vein interposition graft for long (7cm) segment of PTA	Good viability of foot at follow up of two weeks	Achieved

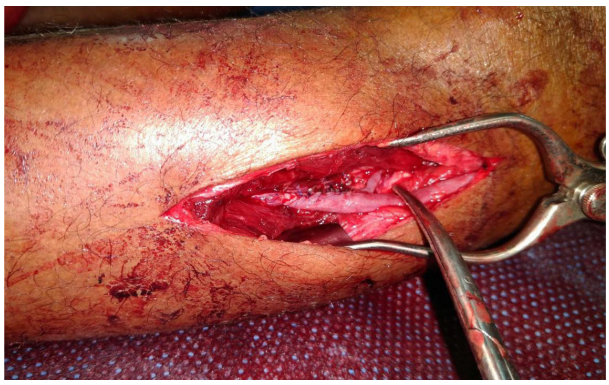

Figure 1. Anastomosis (End to side of reversed great saphenous vein to Anterior Tibial artery). Other end of the reversed great saphenous vein is anastomosed to femoral artery.

Figure 2. Tunnelator being used to track reversed great saphenous vein from inguinal region (Anastomosis site with femoral artery) to distal thigh and subsequent to upper calf. Multiple incisions in right thigh are for harvesting great saphenous vein.

DISCUSSION

Peripheral arterial bypass surgery is established surgical treatment modality for disease conditions of peripheral artery where by the diseased segment of artery is rerouted by prosthetic or autologus grafts.[1,2] This is the ultimate management option so as to salvage the limb to maximum extent. Conditions requiring peripheral arterial bypass surgery are peripheral arterial disease (commonly due to atherosclerosis), arterial trauma not amenable

for end to end anastomosis. In case of Buerger's disease, however medical management is the common modality of treatment.[3,4] Hypercholesterolaemia, diabetes and smoking are the most important risk factors for peripheral arterial disease.[5] Preoperatively, in addition to clinical examination the diagnosis is confirmed by Doppler ultrasonography, CT angiogram or MR angiogram to delineate the site and nature of obstruction. For every bypass, there are three major components as donor site vessel, graft and recipient site vessel. Nature of anastomosis can be end to end, end to side. In terms of graft, it can be autologus as reversed saphenous vein, or prosthetic grafts as Poly Tetra Fluoro Ethylene (PTFE) or Dacron conduits.[6,7] In some cases, veins and prosthetic grafts are sewn together to form composite grafts.[8] Regarding different peripheral bypass, it depends on site and nature of obstruction. Some of the common bypass are femoro-femoral (Crossover) bypass, femoro-popliteal bypass and popliteal-crural bypass. Amongst all of these, popliteal-crural bypass are the most difficult ones whereby distal anastomosis sites can be on posterior tibial, anterior tibial or fibular arteries. In terms of location of the graft in-situ the grafts can be in anatomical (interposition) or extra-anatomical location. In many of the cases, more than one peripheral bypass need to be performed for the same patient. In case of stenosis of vessel segment, patchplastymay also be needed.

In relation to the cases mentioned above, all the cases inevitably will have limb loss if proper surgical interventions had not been done. In the first case, due to disease in bilateral lower limb and also in multiple segments, surgical plan was even more difficult and staged bypass had to be done in terms of patch pla due to disease in bilateral lower limb and also in multiple segments, surgical plan was even more difficult and staged bypass had to be done in terms of patch plasty, femorofemoral (crossover) bypass as well as right femoro-popliteal bypass. Postoperatively he had excellent flow as well as function outcome in distal limb. In second case, due to severe disease in P3 segment of popliteal artery, more desired option of femoropopliteal bypass could not be done and crural bypass had to be done instead. In third case, we were extremely surprised to see hypoplastic nature of arteries especially in popliteal artery and crural bypass had to be done with extreme caution and difficulty. In fourth case, due to severe damage to long segment of popliteal artery with lacerated distal part of transacted popliteal artery, P1 to crural bypass had to be done. In fifth case, the diseased right external iliac artery has been bypassed by use of Dacron graft connecting right femoral artery and left femoral artery. Postoperatively triphasic flow pattern has been achieved even in right lower limb arteries. In the sixth case, diseased superficial femoral artery has been bypassed using Dacron patch from common femoral artery to P1 segment of popliteal artery. The seventh case had avulsion of right PTA following trauma which has been reconstructed using reversed saphenous vein interposition graft of length 7 cm.

In all the seven cases, good distal flow could be achieved and our ultimate goal of limb salvage could be achieved. Despite resource and skills demanding, due to very good functional outcome to patients, peripheral bypass surgery should be know-how of a skilled vascular surgeon and should be provided for by every tertiary vascular center.

REFERENCES

1. M. Lepantalo. Part One: For the Motion. Lower Extremity Bypass versus Endovascular Therapy for Young Patients with Symptomatic Peripheral Arterial Diseases. *European Journal of Vascular and Endovascular Surgery.* 2012; 44: 112-5.
2. Beard JD. Which is the best revascularization for critical limb ischemia: endovascular or open surgery? *J Vasc Surg.* 2008;48:11-6.
3. Lazarides MK, Georgiadis GS, Papas TT, Nikolopoulos ES. Diagnostic Criteria and Treatment of Buerger's disease: a review. *Int J Low Extrem Wounds.* 2006; 5: 89-95.
4. Mills JL Sr. Buerger's disease in the 21st century: diagnosis, clinical features and therapy. *Semin Vasc Surg.* 2003; 16: 179-89.
5. Verma A, Prasad A, Ghasan H. E, Yung-Wei C. Peripheral Arterial Disease: Evaluation, Risk Factor Modification, and Medical Management. *J Clin Outcomes Manage.* 2011;18,607-14.
6. Twine CP, McLain AD. Graft type for femoro-popliteal bypass surgery. *Cochrane Database of Systematic Reviews.* 2010;5.
7. Singha K, Singha M. Cardio Vascular Grafts: Existing Problems and Proposed Solutions. *International Journal of Biological Engineering.* 2012,2:1-8.
8. Rogers AC, Reddy PW, Cross KSC, McMonagie MO. The Diamond Anastomosis: Optimizing Composite Sequential Vascular Grafts for Peripheral Vascular Disease. *Journal of Vascular Surgery.* 2015;61:21.
9. Damme V, Zhang L, Baguet E, Creemers E, Albert A, Limet R. Crural Artery Bypass with the Autogenous Greater Saphenous Vein. *Eur J Vasc Endovasc Surg.* 2003; 26: 635-42.