

# Peripheral Vascular Surgery for Limb Salvage in Diabetes Mellitus – A Clinical Audit\*

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## ABSTRACT

Twenty-four diabetics admitted during 1993 to the Nizam's Institute of Medical Sciences (NIMS), Hyderabad for management of Peripheral vascular disease (PVD) is reviewed.

Vascular procedures undertaken were femoro-popliteal bypass in eleven, aorto-iliac (A-I) bypass in one, urokinase therapy in two, embolectomy in one, debridement in four, amputation in four and endarterectomy in one of the 24 diabetics.

Peripheral vascular disease is more common in diabetics. Thrombolytic therapy, angioplasty and bypass grafting have certainly improved limb salvage among diabetics in tertiary-care hospitals.

## INTRODUCTION

Extremity ischemic ulcers are common in diabetics, and they are often critical resulting in high morbidity and mortality. Further, smokers with diabetes are at higher risk of developing peripheral vascular disease (PVD). In diabetics, calcification of the pedal vessels are more common, and vascular interventions for limb salvage are mostly required to be undertaken in proximal vessels (1) The benefits of surgery are however hampered in diabetics, as femoro-popliteal (F-P) bypass in diabetes is reported to be less successful (2,3). Diabetes is also common among subjects with other major vessel diseases, which warrants expert therapeutic attention before, during and after any vascular surgery. A clinical audit of the diabetics admitted in the department of Vascular Surgery of a large tertiary-care hospital is presented here.

## MATERIAL & METHODS

There were 19 males and 5 females all having non-insulin-dependent diabetes. Five of them were receiving oral hypoglycemic agents pre-operatively, and others were on subcutaneous insulin.

Fasting and post-prandial blood glucose along with glycosylated haemoglobin was measured in each diabetic, and vascular surgery was planned only if the

blood glucose was normal, and the glycosylated haemoglobin below 10%. In emergency situations, random blood glucose, urine ketones and arterial blood gas analysis reports were obtained. Metabolic abnormalities were corrected immediately by intravenous infusion of glucose, (or saline) – insulin and potassium, while monitoring capillary blood glucose hourly, urine ketones bodies, pH of the blood and serum potassium at least four-hourly.

Intra-operatively, capillary blood glucose was measured if the surgery was prolonged or if the blood glucose was fluctuating in the pre-operative period. Post-operatively, blood glucose was monitored one, six or twelve-hourly based on the type and routes of insulin administered, till normal feeding was resumed. Fasting blood glucose was done every day, during recovery.

## RESULTS

Table (1) shows various procedures undertaken in our patients.

**Table 1**  
**Vascular surgery in diabetics at NIMS in 1993**

Sex/ Age	Vascular disease	Management	Pre-admission therapy
M 65	Necrotizing Fascitis in RT calf following F-P angioplasty	Debridement and SSG	Pre-mixed insulin
F 55	Pregangrene Rt hand	Brachial and Radial endarterectomy Radial A-V fistula	Glibenclamide
M 58	Lt F-P disease	Angioplasty and medical therapy	Glipizide
F 58	Rt leg F-P disease	F-P Bypass	Pre-mixed insulin (bovine)
M 55	Fracture femur with arterial injury	F-P Bypass	S-A insulin
F 65	Lt toe gangrene	Angiogram	Pre-mixed insulin
M 55	Dilated Cardiomyopathy and saddle embolus	Embolectomy	Glibenclamide
M 70	Gangrene Rt great toe	F-P bypass	Glipizide
M 58	Lt F-P block	F-P bypass	Glipizide
M 65	Rt foot gangrene	Amputation	Pre-mixed insulin
M 72	Gangrene Lt toe	F-P bypass	Pre-mixed insulin and S-A insulin
M 65	Gangrene Lt toe	*F-F graft with A-V fistula	Pre-mixed insulin
N 62	Ulcer Lt foot	Debridement	Pre-mixed insulin

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M 60	Femoral aneurysm	Excision and bypass grafting	Metformin
M 65	Non-healing ulcer gangrene	Amputation	Premixed insulin
M 50	Rt F-P and distal disease	Amputation	Premixed insulin
M 50	Bilateral F-P disease	Lt F-P Bypass Lt popliteal vein thrombectomy	Premixed insulin
F 40	Rt foot gangrene	Debridement/SSG	Premixed insulin
M 35	F-P and distal disease	Fibulectomy and F-D bypass	Premixed insulin
M 52	Neuropathic foot	Debridement/ sequestrectomy	I-A and S-A insulin
F 45	Gangrene of Rt leg	* Thrombolytic therapy	S-A insulin
M 49	Aorto-iliac disease	Tooth abscess drainage	I-A insulin
M 45	Abscess Lt thigh	High-above-knee amputation	Premixed insulin
M 57	Aorto-iliac disease	A-F Bypass	Premixed insulin

\* Two diabetics have undergone amputations, subsequently.

M = male, F = female

SSG = split-thickness skin graft

F-P = Femoro-popliteal; A-F = aorto-femoral

F-F = Femoro-femoral; F-D = femoro-distal

S-A = Short-acting I-A = intermediate-acting

Lt = left Rt = right

## DISCUSSION

Diabetes was a common medical problem in all vascular surgical patients, but metabolic complications in the perioperative period were rare at NIMS due to frequent monitoring of blood glucose and appropriate insulin therapy. Good co-ordination between the diabetologist and the vascular surgical team, is needed in managing critically ill patients with PVD.

In some patients with coincidental infection i.e. bed sore, septic phlebitis, injection abscess, blood glucose values remained high inspite of optimum insulin treatment. One of them, on the fifth-day after bypass surgery, developed a large bed-sore, which needed debridement, and the insulin requirement reached pre-operative levels after the drainage of pus. In another diabetic, one week after a 24-hour urokinase therapy and balloon angioplasty in left femoro-popliteal segment, calf was swollen as in calf-vein thrombosis. Subsequently, this was identified as necrotizing fasciitis, which required thorough debridement of the gangrenous skin and subcutaneous tissue under antibiotic cover. The raw surface was left to granulate, and a split-thickness skin grafting was done 2 weeks later.

Among 24 diabetics with PVD admitted to NIMS in 1993, primary salvage of limb was possible in 20 diabetics through appropriate vascular surgical procedures as detailed in table 1. In two cases amputation was required even after surgical intervention. Thus limb salvage was successfully achieved in 75% (18 out of 24) of the diabetics with PVD.

Indications and choice of surgery are similar in diabetics as with others (4) in diabetes PVD is often bilateral and diffuse, demanding special effort for limb salvage in the opposite leg, (5). Among 24 diabetics 12 (50%) had PVD in both lower limbs, and 4(16%) had significant disease in the opposite limb requiring active intervention. In diabetics with PVD, selection of proper patient at appropriate times is very important.

In developing countries, dacron grafts are still in use, as they are less expensive than the poly-tera-fluoro-ethylene (PTFE) grafts. In one-third of the diabetics requiring vascular surgery at NIMS, dacron grafts were used for occlusions in the thigh, as suitable veins for femoro-popliteal bypass were not available. In the present series vein graft were used in 3 (27. 3%), dacron in 5 (45.5%) and PTFE in 3 (27.3%) of the 11 femoro-popliteal bypass surgeries. Procedure as well as hospital stay was uneventful in all 5 diabetics who had received dacron grafts. Usefulness of synthetic grafts are limited as rate of graft remaining patent at the end of the 3 years is only about 17% (2).

While using dacron grafts, distal anastomosis was selected with care above the knee joint to avoid the graft crossing joint space, and it was also ensured that the distal arterial tree was adequately patent. Though western literature suggests ring-supported PTFE graft as being more appropriate for infra-popliteal bypass, such grafts continue to be prohibitively expensive in India, restricting the use of tapered and ring grafts.

The healing rates following lower extremity procedures in diabetics were similar to those in non-diabetics. On an average, hospital-stay of diabetics undergoing vascular management was about 16 days, which was not significantly different from that of non-diabetics i.e. about 13 days.

Peripheral vascular disease is more common in diabetics, thrombolytics, angioplasty and bypass grafting have certainly improved limb salvage among diabetics in tertiary-care hospitals.

## REFERENCES

1. Strandness DE, Priest RE, Gibbons GE, Combined clinical and pathologic study of diabetic and non-diabetic peripheral arterial disease. *Diabetes*. 1964; 13: 366-72.
2. Reinhold RB, Gibbons GE, Wheelock FC, Hoar CS. Femoropopliteal bypass in elderly diabetic patients. *Am J. Surg.* 1979; 137: 549-55.
3. Reichle FA, Rankin KP, Tyson RR, Finestone AJ, Shuman LR. Long term results of femoro-popliteal bypass in diabetic patients with severe ischaemia of lower extremity. *AM J. Surg.* 1979; 137: 653-6.
4. Porter JM, Baur GM, Taylor LM. Lower extremity amputations for ischaemia. *Arch Surg.* 1981;116:89-92
5. Steer HW, Cuckle HS, Franklin MPJ. The influence of diabetes mellitus upon peripheral vascular disease. *Surg Gynecol Obstet.* 1983; 157: 64-72.