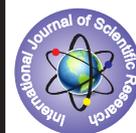


## EFFECT OF REVASCULARIZATION IN DIABETIC FOOT – OUR EXPERIENCE



### General Surgery

**KEYWORDS:** Diabetic foot ulcer, ischemia, revascularization, healing of ulcer

**Dr S.K. Ajaiya Kumar**

Addl.Professor in Surgery, Government Medical college, Thiruvananthapuram, Kerala

### ABSTRACT

Ischemia is an important cause of non healing of ulcer in Diabetic foot. Ischemia promotes spread of infection and often results in limb loss. Contrary to the common belief that non healing ulcers and gangrene, non healing of minor amputations are due to disease of arterioles-the so called small vessel disease, macro vascular occlusion of leg arteries due to atherosclerosis has been established as the cause of limb ischemia. Revascularization of the foot helps in achieving ulcer healing and prevention of amputation.

### Introduction

**Diabetes mellitus (DM)**, commonly referred to as **diabetes**, is a group of metabolic diseases in which there are high blood sugar levels over a prolonged period. Symptoms of high blood sugar include frequent urination, increased thirst, and increased hunger. If left untreated, diabetes can cause many complications. Acute complications include diabetic ketoacidosis and nonketotic hyperosmolar coma. Serious long-term complications include cardiovascular disease, stroke, chronic kidney failure, foot ulcers, and damage to the eyes.

As of 2014, an estimated 387 million people have diabetes worldwide, with type 2 DM making up about 90% of the cases. This represents 8.3% of the adult population, with equal rates in both women and men. From 2012 to 2014, diabetes is estimated to have resulted in 1.5 to 4.9 million deaths each year. Diabetes at least doubles a person's risk of death. The number of people with diabetes is expected to rise to 592 million by 2035.

The lifetime risk for foot ulcers in people with diabetes is estimated to be 15%.<sup>3</sup> Diabetic patients are at higher risk for limb loss owing to neuropathy, infection and presence of arterial occlusive disease. However, the distribution of peripheral vascular disease in diabetics has regional differences. Arterial disease was present in 48% of foot ulcers in Germany but only 11% in Tanzania and 10% in India.

Diabetes increase the risk of long-term complications. These typically develop after many years (10–20), but may be the first symptom in those who have otherwise not received a diagnosis before that time. The major long-term complications relate to damage to blood vessels. Diabetes doubles the risk of cardiovascular disease and about 75% of deaths in diabetics are due to coronary artery disease. Other "macrovascular" diseases are stroke, and peripheral vascular disease.

The primary complications of diabetes due to damage in small blood vessels include damage to the eyes, kidneys, and nerves. Damage to the eyes, known as diabetic retinopathy, is caused by damage to the blood vessels in the retina of the eye, and can result in gradual vision loss and blindness. Damage to the kidneys, known as diabetic nephropathy, can lead to tissue scarring, urine protein loss, and eventually chronic kidney disease, sometimes requiring dialysis or kidney transplant. Damage to the nerves of the body, known as diabetic neuropathy, is the most common complication of diabetes. The symptoms can include numbness, tingling, pain, and altered pain sensation, which can lead to damage to the skin. Diabetes-related foot problems (such as diabetic foot ulcers) may occur, and can be difficult to treat, occasionally requiring amputation. Additionally, proximal diabetic neuropathy causes painful muscle wasting and weakness.

Critical limb ischemia (CLI) and infection are strongly associated with high risk of amputation and mortality in diabetics, the majority of whom have attendant CLI and infection requiring urgent efforts from several medical specialists for limb salvage. In the presence of

severe infection and concomitant severe morbidities less invasive revascularisation is crucial for successful treatment, and percutaneous transluminal angioplasty has become the first-choice procedure.

The ankle brachial pressure index (ABPI or ankle brachial index (ABI) is the ratio of the blood pressure in the lower legs to the blood pressure in the arms. Compared to the arm, lower blood pressure in the leg is an indication of blocked arteries (peripheral artery disease or PAD). The ABI is calculated by dividing the systolic blood pressure at the ankle by the systolic blood pressures in the arm. In a normal subject the pressure at the ankle is slightly higher than at the elbow (there is reflection of the pulse pressure from the vascular bed of the feet, whereas at the elbow the artery continues on some distance to the wrist).

The ABPI is the ratio of the highest ankle to brachial artery pressure. An ABPI between and including 0.9 and 1.2 considered normal (free from significant PAD), while a lesser than 0.9 indicates arterial disease. An ABPI value of 1.3 or greater is also considered abnormal, and suggests calcification of the walls of the arteries and incompressible vessels, reflecting severe peripheral vascular disease. Provided that there are no other significant conditions affecting the arteries of the leg, the following ABPI ratios can be used to predict the severity of PAD as well as assess the nature and best management of various types of leg ulcers

In medicine, revascularization is the restoration of perfusion to a body part or organ that has suffered ischemia. It is typically accomplished by surgical means. Vascular bypass and angioplasty are the two primary means of revascularization. The basic aim of any successful revascularization is to achieve pulsatile flow to the foot. The two methods currently available are peripheral bypass surgery and peripheral angioplasty.

### Methods:

We analyzed the patients who underwent revascularization procedures in a period from 01Jan2014 to 31 Dec 2015. The nature and level of obstruction, the ulcer, the type of procedure used and the outcome were examined.

We classified the early outcome into –

- 1) Technical Success - defined as improvement in ABI 0.7 or more by Doppler assessment of the distal arteries.
- 2) Partial failure- improvement in ABI from less than 0.4 to 0.7.
- 3) Complete failure – No improvement in ABI

Patients were followed up to one year . Complete healing of ulcer/SSG, Revision Minor Amputation, Revision Major Amputations, Recurrence of ulcer, Mortality at the end of 1 year Were assessed

### Results

Distribution of Lesions

**Total number of patients- 32**

**Total number of major Lesions - 44**

Iliac+ FP	4
FP Lesions	
TASC II A	9
TASC II B	0
TASC II C	21
zTASC II D	0
Infra Popliteal Lesions	
Single Tibial Artery Occlusion	6
Both Tibial Artery Occlusion	2
Both Tibial + Peroneal	1
Peroneal Artery Occlusion	1

IL = iliac, FP = femoropopliteal, IP = infrapopliteal, TASC = Trans-Atlantic Inter-Society Consensus

#### Types of Procedures used:

1. Bypass using reverse saphenous vein graft
2. Bypass using PTFE graft
3. Endovascular procedures namely- Balloon Angioplasty

#### Distribution of procedures

Total Number of patients- 32

Femoro femoral Bypass-2

Femero femoral and Femero popliteal Bypass - 1

Femero popliteal Bypass- 16

Femero Tibial Bypass - 7

Femero Tibial Bypass & Aorto Iliac Endarterectomy with PTFE Patch graft- 1

Femoral and Anterior Tibial Balloon Angioplasty – 6

#### Early Out come

Technical success	23	71.8 %
Partial failure	3	9.4 %
Complete failure	6	18.8 %
30 day Mortality	6	18.8 %

#### Final Out come

Complete healing of ulcer/SSG	16	50 %
Revision Minor Amputation	5	15.6 %
Revision Major Amputations	3	9.4 %
Recurrence of ulcer	7	21.8 %
Mortality at the end of 1 year	9	28.1 %

#### Conclusion

Revascularisation procedures improve ulcer healing and have an important role in the management of critical limb ischemia in Diabetic foot.

#### References:

1. Diabetes mellitus [Internet]. Wikipedia, the free encyclopedia. 2015 [cited 2015 Oct 20]. Available from: [https://en.wikipedia.org/w/index.php?title=Diabetes\\_mellitus&oldid=68452734](https://en.wikipedia.org/w/index.php?title=Diabetes_mellitus&oldid=68452734)
2. Dr Ivan Sitkin et al. Critical limb ischemia and diabetic foot treatment in a multidisciplinary team setting. [Internet]. [Cited 2015 Oct 20]. Available from [http://www.cvi-online.com/emea/sites/www.cvi-online.com.emea/files/pdf/CLL\\_diabetic\\_foot.pdf](http://www.cvi-online.com/emea/sites/www.cvi-online.com.emea/files/pdf/CLL_diabetic_foot.pdf)
3. Ankle brachial pressure index [Internet]. Wikipedia, the free encyclopedia. 2015 [cited 2015 Oct 20]. Available from: [https://en.wikipedia.org/w/index.php?title=Ankle\\_brachial\\_pressure\\_index&oldid=682653203](https://en.wikipedia.org/w/index.php?title=Ankle_brachial_pressure_index&oldid=682653203)
4. Revascularization [Internet]. Wikipedia, the free encyclopedia. 2015 [cited 2015 Oct 20]. Available from: <https://en.wikipedia.org/w/index.php?title=Revascularization&oldid=678234359>
5. Revascularization in the diabetic lower limb « Journal of Diabetic Foot Complications [Internet]. [cited 2015 Oct 20]. Available from: <http://jdfc.org/2013/volume-5-issue-1/revascularization-in-the-diabetic-lower-limb/>