

# Early Versus Delayed Presented Patients with Acute Lower Limb Ischemia Undergoing Revascularization: A Comparison of Limb Salvage Rate

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## ABSTRACT

**Objective:** To examine the success rate of limb salvage in patients with acute lower extremity ischemia of Rutherford class IIb who presented early vs late and were receiving revascularization

**Study Design:** Comparative/observational study

**Place and Duration:** This study was conducted in multi centers at Mardan Medical Complex and Teaching Hospital and DHQ Battagram during the period from January, 2021 to June, 2022

**Methods:** 60 patients with acute lower limb ischemia of Rutherford class IIB, ranging in age from 18 to 65, were recruited in this research. Two groups of patients were formed. 35 patients make up Group I (delayed presentation >6 hours), while 25 patients make up Group II (early presentation 6 hours). Embolectomy was performed on each patient. At the third month following surgery, the limb salvage rate in the two groups was compared. P-value 0.05 was considered significant when the data were analyzed using SPSS 22.0.

**Results:** Regarding age and gender, there was no discernible difference between the two groups (p-value >0.05). A substantial difference was seen in the limb salvage rate between the two groups (p-value 0.05), with group I having 22 (62.9%) patients with limb salvage and group II having 21 (84%) patients with limb salvage. When compared to group II, mortality was higher in group I (delayed presentation) (17.1% Vs 0%) with a p-value <0.05.

**Conclusion:** The limb salvage rate was found to be much higher in early-presented patients than in delayed-presented patients. Patients who were presented later than those who were presented earlier had substantially higher 30-day death rates and amputation rates.

**Keywords:** Early Presented, Acute Lower Limb Ischemia, Late Presented, Limb Salvage, Revascularization

## INTRODUCTION

An rapid reduction in arterial perfusion of the limb causes acute limb ischemia (ALI), which can cause tissue loss and jeopardise limb viability if left untreated for more than a few of weeks. Tissue loss occurs due to unmet metabolic demands at rest, in contrast to critical limb ischemia (CLI), where the limb has time to form collaterals. In order to prevent amputation, patients with ALI must have urgent revascularization, either endovascularly, surgically, or by a hybrid method. Approximately 12% of the adult population in the United States has peripheral artery disease (PAD), which affects an estimated 8-10 million people. Rarely occurring, the incidence of ALI is estimated to be between 1.2 and 2.2 per 10,000 people annually in the general population, with greater rates of occurrence (1.7% or more) found in patients with prior severe PAD. Even with early revascularization, the prognosis is dismal; amputation rates hover between 10% and 15% [2]. [3] The frequency of ALI is rising as the population ages, and its causes are complex. Since rheumatic fever has become less common, the average age of the population has gone up from 50 to over 70, and atherosclerosis appears to be the primary cause of this shift [4]. Since the risk of amputation increases with delay in removing the blockage, emergency surgery is the standard treatment for patients whose symptoms indicate they may lose a limb soon. The urgency of care, however, might mean that other prevalent co-morbidities, such heart illness, don't get the attention they need, resulting in high rates of cardiovascular morbidity.

Within the healthcare systems of Europe and North America, centralization of highly specialised surgery has been a prevalent tactic[5]. Greater surgeon and vascular unit volumes have been shown to enhance patient outcomes[6, 7], prompting the National Health Service (NHS) to centralise its vascular arterial surgical services and use a hub-and-spoke model within geographic areas. These arterial nodes serve as centres for arterial surgery and complicated endovascular operations within their respective regional vascular systems. Outpatient services are provided by non-arterial spoke hospitals, such as local evaluation and diagnostic services, and, if necessary, peripheral angioplasty and

stenting on the same day[8]. When patients in a hospital that is not an arterial hub in the region need to have surgery, they are moved to a facility that is[9]. As a result of organisational changes, the number of English NHS acute Trusts performing lower limb bypass surgeries dropped from 110 in 2011 to 70 in 2017[10].

This research aimed to assess the limb salvage rate between patients who presented early and those who presented late for revascularization with Rutherford class IIB acute lower limb ischemia.

## MATERIALS AND METHODS

This comparative/observational study was conducted in multi centers at Mardan Medical Complex and Teaching Hospital and DHQ Battagram during the period from January, 2021 to June, 2022. In all, 60 patients with acute lower limb ischemia of Rutherford class IIB, ranging in age from 18 to 65, were recruited in this research. All the patients were split into two groups; group I included 35 patients who arrived after a delay of more than six hours, whereas group II included 25 patients who arrived sooner than six hours. After obtaining written consent from each patient, thorough demographic information about each patient was recorded, including age, sex, body mass index, and co-morbidities. This study excluded patients with traumatic acute limb ischemia, Rutherford classes I, IIA, and III, and patients with a history of vascular surgery.

In every instance, embolectomy was done. In delayed groups, almost half of the patients received fasciotomies, but only three patients did so in early groups.

In the event that a significant issue developed, the patients were first thoroughly examined in the ICU 24 hours following surgery. Clotting times were monitored and kept every fourth hour between 250 and 300. After the release of vitamin K antagonists, the anticoagulation that had been in place for two weeks was switched to low molecular heparin and then, for an undetermined amount of time, to oral anticoagulation.

Three months after surgery, a follow-up was done. At the last check-up, the limb salvage rate for patients who presented

early and late was compared. The 30-day death rate and the rate of amputation were also compared between the two groups. Using SPSS 24.0, all the data was analysed and mean and SD calculated. The results of the two groups were compared using the paired t test. P-values less than 0.05 were deemed statistically significant when using SPSS 22.0 to analyze the data.

**RESULTS**

Regarding age and gender, there was no discernible difference between the two groups (p-value >0.05). Mean BMI in group I was 26.7±5.25 kg/m<sup>2</sup> and in group II mean BMI was 26.7±5.36 kg/m<sup>2</sup>. Diabetes, smoking, hypertension and obesity were the most common comorbidities among both groups.(Table 1)

Table 1: A complete patient demographic breakdown

Variables	Group I (35)	Group II (25)
Mean Age (Yrs)	51.12±10.61	51.7±11.32
Gender		
Male	22 (71.4%)	18 (72%)
Female	13 (28.6%)	7 (28%)
Co-morbidities		
Diabetes Mellitus	16 (45.7%)	11 (44%)
Smoking	9 (25.7%)	4 (16%)
Hypertension	8 (22.9%)	6 (24%)
Obesity	7 (20%)	3 (12%)
Ischemic Heart Disease	5 (14.3%)	2 (8%)
Artrial Fibrillation	3 (8.6%)	2 (8%)
Mean BMI (kg/m <sup>2</sup> )	26.7±5.25	26.7±5.36

P-value >0.05

Most common vessel was femoral artery followed by popliteal artery, superficial femoral artery and brachial artery among both groups. (Figure 1)

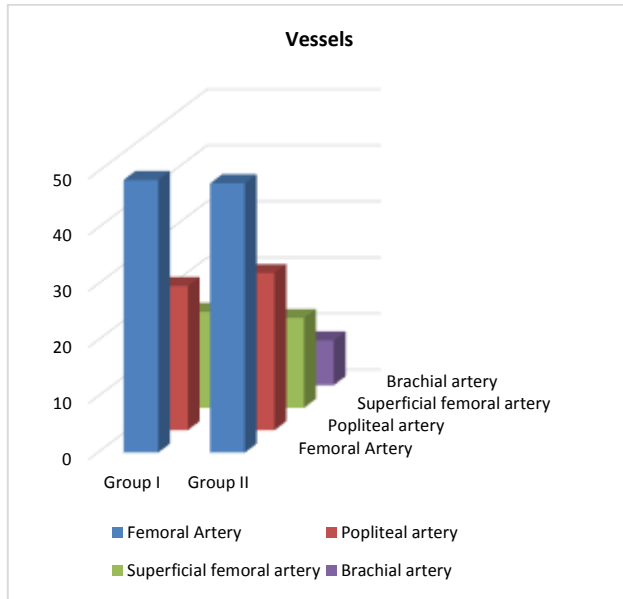


Figure-1: Blood Vessels for Revascularization

It was statistically significant that the mean hospitalization duration for group II was just 5.8±4.10 days, whereas that of group I was 8.10±6.33 days (p-value 0.003). Patients who presented later (group I) were more likely to undergo a major amputation within 30 days.

Table 2: Differences in length of hospital stay and incidence of amputation between the two groups

Variables	Group I (Late)	Group II (Early)	P-value
Hospital stay	8.10±6.33	5.8±4.10	0.003
Amputation	15 (42.9%)	3 (12%)	0.021

A substantial difference was seen in the limb salvage rate between the two groups (p-value 0.05), with group I having 22 (62.9%) patients with limb salvage and group II having 21 (84%) patients with limb salvage. (Table 3)

Table 3: Analyzing the difference in the rate of limb salvage between the two populations

Variables	Group I (Late)	Group II (Early)	P-value
Limb Salvage			0.001
Yes	22 (62.9%)	21 (84%)	
No	13 (37.1)	4 (16)	

When compared to group II, mortality was higher in group I (delayed presentation) (17.1% Vs 0%) with a p-value <0.05. (Table-4)

Table-4: Mortality between both groups

Variables	Group I (Late)	Group II (Early)	P-value
Limb Salvage			0.005
Yes	6 (17.1%)	0( %)	
No	29 (82.9)	25 (100%)	

**DISCUSSION**

Higher rates of morbidity and mortality are related with the vascular condition known as acute lower limb ischemia, which is widespread worldwide. Complications and death from ALI can be mitigated with early presentation and correct diagnosis. Treatment with revascularization is preferred for the therapy of acute lower extremity ischemia because of its greater limb salvage rate and lower risk of complications [11]. This research aimed to evaluate the differences in limb salvage rates between patients who presented early and late for revascularization for Rutherford class IIB acute lower limb ischemia. Sixty people were included in the study. There were a total of 65 individuals, 35 of whom presented late and 25 who did so early. In our analysis, 66.7% of participants were male and 33.3% were female. The results were consistent with those of other research [12], which found that male patients made up 65–75% of the patient population.

Results from the current study show that diabetes mellitus is the most frequently occurring comorbidity among both early and late presented patients, followed by obesity, smoking, hypertension, ischemic heart disease, and arterial fibrillation. The most common co-morbidity in ALI patients was diabetes mellitus, followed by hypertension and smoking, according to a prior study on the results of lower extremities bypass for acute lower limb ischemia.[13]

It was statistically significant that the mean hospitalization duration for group II was just 5.8±4.10 days, whereas that of group I was 8.10±6.33 days (p-value 0.003). Patients who presented later (group I) were more likely to undergo a major amputation within 30 days. There have been studies showing that patients who present late for revascularization for acute limb ischemia end up staying in the hospital for over a week longer than those who present early (median 5 days) [14, 15].

In our study A substantial difference was seen in the limb salvage rate between the two groups (p-value 0.05), with group I having 22 (62.9%) patients with limb salvage and group II having 21 (84%) patients with limb salvage. There was no statistically significant difference in limb salvage rates between patients who presented early and those who presented late with acute lower limb ischemia who underwent revascularization, as reported by the team of Chaudhary HK et al [15].

When compared to group II, mortality was higher in group I (delayed presentation) (17.1% Vs 0%) with a p-value <0.05. Previous research involving 170 patients with acute lower extremity ischemia found a limb salvage rate of 85% at 3 months; the majority (83% of patients) presented after 6 hours.[16] Rutherford Class IIB patients accounted for 52% of the study population, with a 1-day median time to amputation and a 30% mortality rate after 30 days. A higher mortality rate was seen in patients who were presented late (after more than 72 hours and up

to 15 days) compared to those who were presented sooner [17,18].

## CONCLUSION

Early revascularization for acute lower limb ischemia had better results than late revascularization. Early-presented patients had a higher limb salvage rate. Delayed patients also had higher hospital stays, 30 day death, and amputation rates.

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