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## Research Article

### OUTCOMES IN PATIENTS OF ACUTE LIMB ISCHEMIA WITH DELAYED PRESENTATION AN INSTITUTIONAL STUDY

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#### ABSTRACT

**Background:** Acute limb ischemia (ALI) is any sudden decrease in limb perfusion causing a potential threat to limb viability. It is generally accepted that in a patient without underlying arterial disease who develops an acute arterial blockage has approximately six hours for revascularisation before irreversible damage occurs. This study endeavoured to analyse and evaluate the causes and clinical outcome of acute lower limb ischemia.

**Methods:** 154 successive patients visiting INDIRA GANDHI MEDICAL COLLEGE AND HOSPITAL SHIMLA who were diagnosed to have ALI were included in this retrospective study. Thromboembolectomy was performed under regional anaesthesia in 90% of patients, 5% of patients were managed with anticoagulation ACITROM titrated to INR of 2-2.5. Primary amputation was inevitable in 30 patients of class III ischemia.

**Results:** All the ten patients who presented within the golden six hours survived and their limbs could be salvaged without any morbidity. Overall there were 81.52% patients with limb salvaged and 19.48% patients underwent amputation. There was a mortality rate of 3.84% in the study.

**Conclusions:** Overall there was 81.52% limb salvage and 19.48% patients underwent amputation. Revascularization within six hours is ideal (only 9.74% of patients in our study); however, in delayed presentation (90.25%), physiological state of the limb, rather than elapsed time from onset of occlusion will determine the operability. Late revascularization may thus be indicated and is often successful if limb still exhibits signs of viability.

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#### INTRODUCTION

Acute Limb Ischemia (ALI) can be the simplest vascular condition to diagnose and the most perplexing to manage resulting in variable outcomes.

The main etiological factors of this disorder are thrombosis in situ, usually seen in patients with underlying Peripheral Arterial Disease, Embolism frequently from cardiac source lodging at arterial bifurcations or acute occlusion of a functioning bypass graft. Other less common causes include peripheral arterial aneurysm, trauma or an acute aortic dissection.<sup>1</sup>

The extent of severity of this condition depends on the preexisting collaterals. Abrupt and complete blockage of main arterial supply leads to ischemia of distal tissue bed in the limb with energy metabolism shifting from aerobic to anaerobic process. Progressive ischemia leads to cell dysfunction and death.

Nerve tissue cells, skin, subcutaneous tissues are the most susceptible, followed by muscle cells in this condition which has no sexual predilection and constitutes a surgical emergency.

It is generally accepted that, in a patient without underlying vascular disease who develops an acute arterial blockage has approximately six hours for revascularization before irreversible damage occurs.

Clinical judgment is very important in the management of Acute Limb Ischemia. Although Rutherford's criteria is helpful in planning the treatment, Acute Limb Ischemia is challenging and taxing to the surgeon who may be required to employ various techniques ranging from a simple anticoagulation, thromboembolectomy to bypass and other endovascular procedures.

Although there is enough data is available about the morbidity and mortality of Acute Limb Ischemia from the west, Indian data is relatively scarce.

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Hence this study envisages evaluating the causes and outcome of limb and life in patients with Acute Lower Limb Ischemia managed by different approaches specifically keeping in mind the golden six hours concept.

The primary objective of the study was to evaluate and compare, ‘the outcomes of Limb and Life at the end of three months, in patients with acute lower limb ischemia presenting within and after the golden six hours.

The secondary objective of the study was to analyze the following factors; presentation from the time of acute event, evaluation of limb at the time of presentation with regard to its viability, the treatment plans and their variations, outcomes of intervention and systemic morbidity analysis.

## METHODS

Present study is a prospective study conducted at IGMC, Shimla, deptt. of CTVS. 154 consecutive patients involving limbs diagnosed to have acute limb ischemia, were included and a minimum follow up of the 2 months was carried out.

All patients with symptoms of acute lower limb ischemia from various causes excluding trauma, who presented to either our outpatient department or the emergency room were evaluated and immediately heparin dose was given. Relevant blood investigations including Complete blood count, blood sugar, blood urea, serum creatinine, serum electrolytes, urine routine, chest X ray, and Electrocardiogram and Transthoracic echocardiogram and CT angiography were done.

Patients were classified as per Rutherford criteria, and emergency arterial duplex was done. In delayed presentation cases, fasciotomy was done in selected cases and viability of muscles was assessed by electrical stimulation and future course of action planned appropriately. If the muscles were found to be non-viable (class III), then primary amputation was recommended. If the muscles were viable, then based on risk factors, management was planned.

For class I ischemia, anticoagulation was continued, later imaging was performed, and revascularization was considered in case of worsening ischemia.

In case of class IIA ischemia, Thromboembolectomy or bypass surgery was considered. Choice of therapy was decided based on patient’s risk factors.

In class II B ischemia, emergency revascularization was done by either thromboembolectomy or arterial bypass surgery. Procedure was followed by fasciotomy of anterior, peroneal and superficial posterior compartment of the leg, for selected cases presented after golden 6 hours, so as to reduce the risk of compartment syndrome following reperfusion.

Post operatively all the patients were maintained on heparin infusion with a PTT being checked every six hours. The dose of heparin was titrated appropriately. Patients were closely observed for any reperfusion injury and other systemic morbidities. Oral anticoagulation, and antiplatelets were started in immediate post-operative period.

When the patient attained therapeutic anticoagulation dose, they were discharged and were followed up on outpatient basis. Minimum follow up of 2 months was done and during follow up they were observed for their vascular status regarding any

worsening ischemia and also for their recovery from systemic morbidities like renal failure. They were also monitored for their oral vitamin K antagonist’s dosage, to maintain in therapeutic range and watch for any bleeding complications.

## RESULTS

Present study is a prospective study of 154 patients, conducted during January 2016 to July 2018 with a minimum follow up of 2 months.

**Table 1** Site of arterial occlusion.

Site of arterial occlusion	Frequency (%)
Brachial	16 (10.38)
Iliac artery	32(20.77)
Femoral artery	54(35.06)
Popliteal artery	16(10.38)
Graft	36(23.27)
Total	154 (100%)

In the present study majority (115) were males as compared to females (39). More than 50% of them belong to the age group of 40 to 60 years.

Only 15 (9.74%) patients presented before the golden six hours. Around 114 (74.02%) patients presented between 6 hours and 7 days. 25 (16.23%) patients have even presented after 14 days. Most of the patients who presented late were resident of hilly terrain. Few of them had no access by road.

Of 129(83.76%) patients of class II ischemia, 48 (31.16%) patients came in class IIA ischemia and 81(52.59%) patients in class II B ischemia. 20(12.98%) patients presented to us with class III ischemia.

Femoral artery in 35.06% patients was the commonest site for occlusion. Thrombosis of previous bypass graft was noted in 36 (23.27%) of patients.

**Table 2** Etiology

Etiology	Frequency (%)
Native artery Thrombosis	113(73.37%)
Embolus	10(6.49%)
Iatrogenic	5(3.24%)
Graft thrombosis	36(23.27%)

Native artery thrombosis 113(73.37%) was the commonest etiology.

Embolism was noted in only 10 (6.49%) patients. The cause is said to be embolism if the patient had any obvious source for emboli, like apical clot or vegetations in the heart. About 8 patients had Rheumatic heart disease with atrial fibrillation and 2 patients had dilated cardiomyopathy with ventricular apical clot. Iatrogenic cause in 5(3.24%), following coronary intervention from femoral approach leading to thrombosis at the access site and distal limb ischemia.

Thrombosis of bypass graft was diagnosed in 36(23.27%) patients. Most of the patients underwent aorto or axillo femoral bypass grafting.

Smoking as a risk factor was seen in 96(62.27%) of patients. 15 patients had renal dysfunction and 3 required dialysis and recovered well. 6 patients died of reperfusion injury.

**Procedure**

Primary amputation was done in 20 patients; all of them came with class III ischemia.

Secondary amputation was carried out in the remaining 10 patients after 3 weeks.

Bypass surgery was done in ten patients on an emergency basis as thrombectomy alone was not successful.

**Table 3** Morbidity analysis

Morbidity analysis	patients
Bleeding	1
Cardiac event (Post op)	5
Foot drop-persisting	10
Groin Infection	5
Renal dysfunction	15
Respiratory failure	1
Uneventful	114
Worsening ischemia	15

**DISCUSSION**

Acute limb ischemia from varied causes is a catastrophic event in any age group. It is well established that the duration of ischemia is directly related to the outcome of the patient. The complications progressively increase when the patient’s presents after the golden six hours.

All the patients in this study, diagnosis was made as per Rutherford criteria When compared to TASC II data, present study has only 9.74% in class I as against 45% in TASC II but 12.98% in class III, as against only 10% in TASCII. This difference is probably because of lack of awareness regarding symptoms among both patients and medical professionals and non-availability of vascular specialist at all the places. Majority of patients in our study who presented in class III ischemia reside in inaccessible hilly terrain. Only 15 patients presented before the golden six hours, all of them had limb salvage and were alive at 2 months.

Although embolic occlusions continue to occur, only 6.49% of patients in our study had embolism and 72.37% had ALI secondary to thrombosis of native artery.

Also, source of embolus from arch of aorta and thoracic aorta were not investigated in the present study. Thrombosis of previously bypassed grafts noted in 23.27% of patients, but strikingly incidence of iatrogenic cases in our series was 3.24%, as our centre is a tertiary care centre with high volume of coronary interventions as compared to BlaisdellFW, *et al* and Korn P *et al*.<sup>2,3</sup> Site of occlusion of our study is comparable to the study conducted by Dryjskimet *al*.<sup>4</sup>

Despite the signs and symptoms of acute arterial occlusion, irreversible ischemia may not have occurred. In these patients delayed thromboembolectomy is a practical concept. Most reports or large series of embolectomies have documented an increased amputation rate when the revascularization is delayed. In review of literature of delayed revascularization, Ammann and associates achieved a 61% limb salvage rate, Mac-Gowan and Mooneram noted a 50% limb salvage rates

and 16% mortality and Hammarsten and colleagues indicated an 80% limb salvage rate.<sup>5-7</sup> Thomson and co-workers reported 88% limb salvage.<sup>8</sup>

Results obtained in a review of literature of 241 patients reported upon in 12 articles underwent an embolectomy from 2 days to seven weeks following acute arterial occlusion.

Delayed embolectomy resulted in 172 viable limbs with or without palpable pulses; 48 amputations of the limb were reported upon. Thirty deaths were reported upon in ten series.<sup>9</sup>

In the present study even in patients with delayed presentation but viable limb (139 patients), functional limb salvage was possible in 109 patients (78%). This was achieved with an increased risk (25.97%) of morbidity and acceptable risk of mortality (3.89% in delayed presentation but viable cases).

Overall there was 81.52% limb salvage and 19.48% patients underwent amputation. There was a mortality rate of 3.89% in the study.

The primary clinical outcomes were comparable to the TASC II data.

**CONCLUSION**

Notwithstanding the fact that the sample size of 154 patients is relatively small, this study threw up some significant findings.

More than 70% of the patients belonged to the age group of 40-60 years, most of whom had thrombotic etiology when compared to embolism (6.49%).

Timing of presentation is related to severity of ischemia and access to health care. Except 15 patients, the remaining presented well beyond the golden six hours and delayed presentation has a significant risk of amputation (19.48% in our study).

Treatment modality has to be individualized based on class of ischemia and associated risk factors. Although few patients were treated with conservative procedures like anticoagulation alone (5%), Open surgical thromboembolectomy is the best approach to salvage the limb (90% patients who underwent the procedure).

Revascularization within six hours is ideal (only 9.74% of patients in our study); however, in delayed presentation (90.25%), physiological state of the limb, rather than elapsed time from onset of occlusion will determine the operability. Late revascularization may thus be indicated and is often successful if limb still exhibits signs of viability.

Even in patients with delayed presentation but viable limb (139 patients), functional limb salvage was possible in 119 patients (78.4%). This was significant, but achieved with an increased risk of morbidity (25.97%) and acceptable risk of mortality (3.89%).

Limitation of the study is that the sample size of patients who presented early was small (only 15 patients); hence this cannot be compared with patients who had delayed presentation (139 pts) and draw any statistically significant conclusions. Considering the Indian scenario of very few vascular specialists within the reach for early intervention, the importance must be given to the limb viability status rather than the criteria of golden six hours when considering the revascularization.

Finally, delayed presentation in this study warrants more awareness programmes not only for the general population but also for medical personnel in its prompt diagnosis and management.

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