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Original Article

A STUDY OF PROGNOSTIC FACTORS OF ACUTE LIMB ISCHEMIA.

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ABSTRACT

Background
Acute limb ischemia (ALI) is a sudden reduction in limb perfusion that threatens limb viability and requires urgent intervention.

Objectives
To evaluate prognostic factors influencing outcomes in patients with ALI undergoing surgical revascularization.

Materials and Methods
This prospective study was conducted over two years at JNMCH, AMU, Aligarh, involving 28 patients diagnosed with ALI. Clinical data, risk factors, etiology, Rutherford classification, surgical procedures, and postoperative outcomes were recorded and analyzed.

Results
The majority of patients were male (85.7%) with a mean age of 39.5 years. Thromboembolism (67.9%) was the most common cause, and Rutherford class IIa was the most frequent presentation (64.3%). Risk factors included diabetes (46.4%), smoking (42.9%), and hypertension (39.3%). Limb salvage was achieved in 85.7% of cases, while 14.3% required amputation. Early intervention was associated with better functional outcomes.

Conclusion
Prompt diagnosis and timely surgical management significantly improve limb salvage in ALI. Identification and control of modifiable risk factors are crucial for preventing disease progression and reducing the risk of amputation.

Keywords: *Acute limb ischemia, thromboembolectomy, Rutherford classification, limb salvage.*
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INTRODUCTION
If left untreated, acute limb ischemia (ALI), a vascular emergency marked by an abrupt reduction in arterial perfusion to a limb, can endanger patient survival as well as limb viability [1]. Acute arterial occlusion (ALI), which usually results from embolism, thrombosis, trauma, or graft failure, can quickly worsen into permanent tissue loss, frequently in a matter of hours. The "six Ps"—pain, pallor, paralysis, pulselessness, paresthesia, and poikilothermia—are part of the classic clinical presentation. According to estimates, there are 1–1.5 cases of ALI for every 10,000 people worldwide each year [2,3]. ALI is linked to high rates of morbidity, limb loss, and mortality, between 15 and 20 percent, despite improvements in surgical and endovascular revascularization procedures, especially in patients with coexisting cardiovascular comorbidities [4,5]. ALI has a variety of etiopathogeneses. The femoral artery is frequently the location of occlusion in embolic causes, which are mostly cardiogenic and frequently result from atrial fibrillation, valvular heart disease, or myocardial infarction. On the other hand, thrombotic episodes are more subtle because of collateral circulation and typically take place in the setting of pre-existing atherosclerotic stenosis [6,7,8].

A comprehensive clinical evaluation is necessary for the diagnosis, which is bolstered by imaging techniques including contrast-enhanced computed tomography angiography and Doppler ultrasonography [9]. The Rutherford classification, which ranks the degree of ischemia and directs choices about amputation or revascularization, determines the course of treatment. Catheter-directed thrombolysis, open surgical thromboembolectomy, and hybrid methods are among the management techniques [10,11]. There is still a dearth of information on prognostic factors from Indian populations, even though many foreign studies have examined the clinical outcomes of ALI [12]. By identifying clinical and perioperative factors influencing limb salvage and survival in ALI patients following surgical revascularization, this study, carried out at Jawaharlal Nehru Medical College, AMU, seeks to close this gap.

MATERIALS AND METHODS
This study was a prospective observational study conducted in the Department of General Surgery and

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Department of Cardiothoracic and Vascular Surgery, Jawaharlal Nehru Medical College and Hospital (JNMCH), Aligarh Muslim University (AMU), Aligarh. The study duration spanned two years, from November 2017 to November 2019.

A total of 28 patients diagnosed with acute limb ischemia (ALI) were enrolled based on the following inclusion and

Inclusion Criteria:

- Patients presenting with signs and symptoms of limb ischemia of ≤14 days duration.
- Angiographically confirmed arterial occlusion.
- Patients are able and willing to provide informed written consent.

Exclusion Criteria:

- Pregnant females.
- Children aged <10 years.
- History of recent gastrointestinal bleeding, major surgery, severe hepatic dysfunction, or multi-organ trauma.

Preoperative Assessment:

All patients had a thorough clinical assessment and history taking. Health risks like hypertension, diabetes, and smoking were noted. Electrocardiography was checked for atrial fibrillation and coronary artery disease. A 16-slice Siemens® Somatom Emotion® CT scanner was used to assess ischemia and confirm diagnosis with contrast-enhanced computed tomography angiography (CECT).

Intervention:

Everyone started with 5000 IU of intravenous unfractionated heparin. Arterial exploration and revascularization via thromboembolectomy, arterial repair, or autologous saphenous vein bypass grafting were performed. In compartment syndrome, fasciotomy was done. In irreversible ischemia (Rutherford class III), primary amputation was done.

Postoperative Care and Follow-up:

Intravenous heparin (20 IU/kg/hr) was given for 72 hours and oral low-dose aspirin (1.5 mg/kg) for six weeks after surgery. Standardized criteria were used to discharge patients and follow up at 1 week, 1 month, and 3 months postoperatively. At each follow-up, functional results, distal pulses, and persisting motor or sensory impairments were noted.

Statistical Analysis:

Data were compiled using Microsoft Excel and analyzed using IBM SPSS version 20. Statistical tests applied included unpaired t-tests, chi-square tests, and univariate logistic regression analysis. A p-value of <0.05 was considered statistically significant.

RESULTS

Over two years, 28 individuals with acute limb ischemia (ALI) were enrolled in this prospective analysis. The mean age of the patients was 39.5 ± 16.4 years (range: 16–75 years), and 85.7% of them were male. Ages 21 to 30 were the most frequently impacted (32.1%). In terms of risk factors, 46.4% of patients had diabetes mellitus, 42.9% smoked, and 39.3% had hypertension. The majority of ALI cases (679.9%) were caused by thromboembolism, whereas 32.1% were caused by traumatic injury. 64.3% of patients were categorized as having Stage IIa, 28.6% as having Stage IIb, and 7.1% as having Stage III (irreversible ischemia) based on the Rutherford classification. In Stage I, no patients showed up. At presentation, 28.57% of patients had motor or sensory impairments, and 100% of patients reported limb pain. Atrial fibrillation was seen in 14.28% of cases, and compartment syndrome in 25%.

Thromboembolectomy was the most frequently performed surgical procedure. 85.7% of patients had their legs salvaged, while 14.3% had their legs amputated due to permanent ischemia or unsuccessful revascularization. The study also evaluated postoperative recovery. Although 21.4% of patients experienced persistent motor impairments, 78.6% retained motor function. Additionally, 10.7% of individuals had mild to moderate functional limitations, while 17.9% had persistent sensory deficits. Throughout the study period, there were no reports of perioperative deaths.

Table 1: Gender Distribution

Gender	Number of Patients (n=28)	Percentage (%)
Male	24	85.7%
Female	4	14.3%

Table 2: Age Distribution

Age Group (Years)	Number of Patients (n=28)	Percentage (%)
10–20	3	10.7%
21–30	9	32.1%
31–40	4	14.3%
41–50	6	21.4%
51–60	3	10.7%
>60	3	10.7%

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Table 3: Risk Factors

Risk Factor	Number of Patients (n=28)	Percentage (%)
Diabetes Mellitus	13	46.4%
Smoking	12	42.9%
Hypertension	11	39.3%

Table 4: Causes of Ischemia

Cause	Number of Patients (n=28)	Percentage (%)
Thromboembolism	19	67.9%
Injury	9	32.1%

Table 5: Rutherford Classification

Rutherford Class	Number of Patients (n=28)	Percentage (%)
I	0	0.0%
IIa	18	64.3%
IIb	8	28.6%
III	2	7.1%

Table 6: Symptoms at Presentation

Symptom	Number of Patients (n=28)	Percentage (%)
Pain	28	100.0%
Motor/Sensory Deficit	8	28.57%
Compartment Syndrome	7	25.0%
Atrial Fibrillation	4	14.28%

Table 7: Outcomes

Outcome	Number of Patients (n=28)	Percentage (%)
Limb Salvage	24	85.7%
Amputation	4	14.3%
Preserved Motor Function	22	78.6%
Residual Motor Deficit	6	21.4%
Sensory Deficit	5	17.9%
Functional Limitation	3	10.7%

DISCUSSION

In this study, 28 patients in a tertiary care facility in North India had their prognostic variables for acute limb ischemia (ALI) examined. According to the results, thromboembolism was the leading cause of ALI, followed by trauma, and a sizable percentage of patients had established risk factors like diabetes, smoking, and high blood pressure. Pain is a common symptom, neurological impairments, and compartment syndrome is common, and the majority of patients arrived in Rutherford stages IIa or IIb. The incidence of limb salvage following surgical thromboembolectomy was high (85.7%), and functional results were typically positive. The primary causes of the amputation rate (14.3%) were advanced ischemia and delayed presentation. These findings are consistent with international evidence that highlights prompt revascularization, thorough risk factor treatment, and early diagnosis as key factors influencing positive outcomes in ALI. To lower the frequency of permanent ischemia and limb loss, the study emphasizes the necessity of greater awareness and timely referral in peripheral settings.

The present analysis is compared to several studies on acute limb ischemia (ALI) prognostic variables and treatment outcomes. In a cohort study of 83 Brazilian patients, Fagundes et al. (2005) found that prolonged ischemia duration (>24 hours) and comorbidities like diabetes predicted death or amputation, which matches the poorer outcomes in late-presenting cases in the current study. Liao et al. (2008) examined 154 ALI cases and found that embolism had better limb salvage results than thrombosis, a tendency also shown in our analysis, where thromboembolic causes predominated but had a lower amputation rate [13]. Turel et al. (2008) found smoking to be a major risk factor for limb loss, supporting the present study's findings [14]. Kuoppala et al. (2008) found a 26% amputation rate and 35% mortality over 32 months in ALI patients receiving thrombolysis, highlighting the severity of the illness despite sophisticated treatments [15]. Yangni-Angate et al. (2006) likewise found high amputation and fatality rates in late-presenting patients, emphasizing the necessity of early diagnosis and care [16]. These comparative studies emphasize timely action and risk factor assessment for ALI outcomes.

While useful in revealing significant prognostic markers of acute limb ischemia (ALI) in the Indian population, this study's small sample size of 28 patients may restrict its generalizability. The study was conducted at a single tertiary care center, which may cause selection bias by not reflecting patient presentations and outcomes in rural or peripheral healthcare settings. The three-month follow-up may not reflect long-term problems, re-intervention rates, or functional outcomes. Biochemical and inflammatory indicators that may affect prognosis were excluded. To confirm these findings, multicentric investigations with larger sample sizes and longer follow-ups are needed. Advanced imaging and endovascular procedures complementing conventional surgery may help optimize treatment methods. Patient-reported outcomes and quality-of-life assessments will help explain functional recovery after revascularization.

CONCLUSION

This study shows that acute limb ischemia benefits from early diagnosis and surgery. Diabetes, smoking, and hypertension were substantial risk factors for thromboembolism, the most prevalent cause. Most patients were Rutherford class IIa and IIb, and prompt thromboembolectomy gave 85.7% limb salvage. However, delayed presentation and extensive ischemia increased amputation risk. To reduce morbidity and improve prognosis in ALI patients, early identification, good perioperative care, and focused risk factor reduction are crucial.

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Conflict of interest.

No conflict of interest was declared.

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