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A CRITICAL ANALYSIS TO EVALUATE OUTCOMES IN ACUTE LIMB ISCHEMIA

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ABSTRACT

Introduction: Acute limb ischemia occurs when an extremity is deprived of adequate blood flow. **Aim:** To study the modes of presentation, investigation and treatment modalities in cases of acute limb ischemia to evaluate the outcomes of management. **Methods:** This prospective study is conducted on 40 patients aged between 12 to 70 years at a tertiary care hospital from june 2018 to January 2021. All patients of acute limb ischemia presenting to a tertiary care hospital for the first time were taken into study. **Results:** half of the patients in the study group presented in their 5th and 6th decade of life. 32 patients presented with lower limb ischemia compared to 8 patients of upper limb ischemia. Management was planned as per clinical and imaging findings 58% (n=23) patients underwent thromboembolectomy. **Conclusion:** Acute ischemia often presents in a patient with multiple medical co-morbidities. Therefore, careful clinical assessment of the individual is as important as assessment of the limb.

Keywords: Critical Analysis, limb ischemia, Thromboembolectomy,

INTRODUCTION

Acute limb ischemia occurs when an extremity is deprived of adequate blood flow. Although there is little information on the incidence of acute limb ischemia (ALI) in the general population, it is estimated to be 14 per 100,000 and compose 10% to 16% of the vascular workload[1].

The mortality associated with acute peripheral arterial occlusion remains high, averaging 10% to 25%.[2] In the past, patients presenting with acute peripheral arterial occlusion were most often in the 5th decade of life[3]. More recent data demonstrate that the mean age of patients with acute peripheral arterial occlusion is 70 years, reflecting a shift in etiology from rheumatic to atherosclerotic heart disease and the increased frequency of peripheral atherosclerosis as an inciting cause for occlusion[2].

Acute limb ischemia may occur as the result of embolization or in-situ thrombosis. Emboli originate from the heart in more than 90% of cases Embolic problems result in a greater degree of ischemia than thrombosis, as the embolus characteristically lodges in a virgin vascular bed with no prior collaterals development. On the contrary, as in situ thrombosis occurs in vessels with prior, gradual atherosclerotic narrowing that has stimulated the formation of collateral channels[4].

Vascular trauma and iatrogenic injury are other well recognized common causes of acute limb ischemia. Irrespective of the etiology of ischemia, the end result is the build-up of toxic byproducts within the ischemic tissue bed.[5]

The management of acute limb ischemia remains a major surgical challenge. Most patients with acute limb ischemia require urgent revascularization, but some selected cases can be managed successfully by an endovascular approach. The purpose of this study was to review a single center's experience of managing acute limb ischemia. The varied presentations, co-morbidities, investigations and treatment options were studied. The outcome of conservative and surgical intervention were studied and compared with published series of acute limb ischemia.

AIM

To study the modes of presentation, investigation and treatment modalities in cases of acute limb ischemia to evaluate the outcomes of management.

METHOD

This prospective study is conducted on 40 patients aged between 12 to 70 years at a tertiary care hospital from june 2018 to January 2021. All patients of acute limb ischemia presenting to a tertiary care hospital for the first time were taken into study. Patients with concomitant venous disease, Diagnosed cases of diabetic foot, Known cases of vasculitis, Previously

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operated cases of acute limb ischemia were ruled out from study. A detailed history was obtained from all patients. Patients were divided in 3 groups on the basis of presentation. Routine investigations were performed. Patient outcomes were recorded in terms of limb salvage, restoration of function, return of distal pulses and mortality. Outcomes were compared with various factors to see for any correlation between these.

RESULT

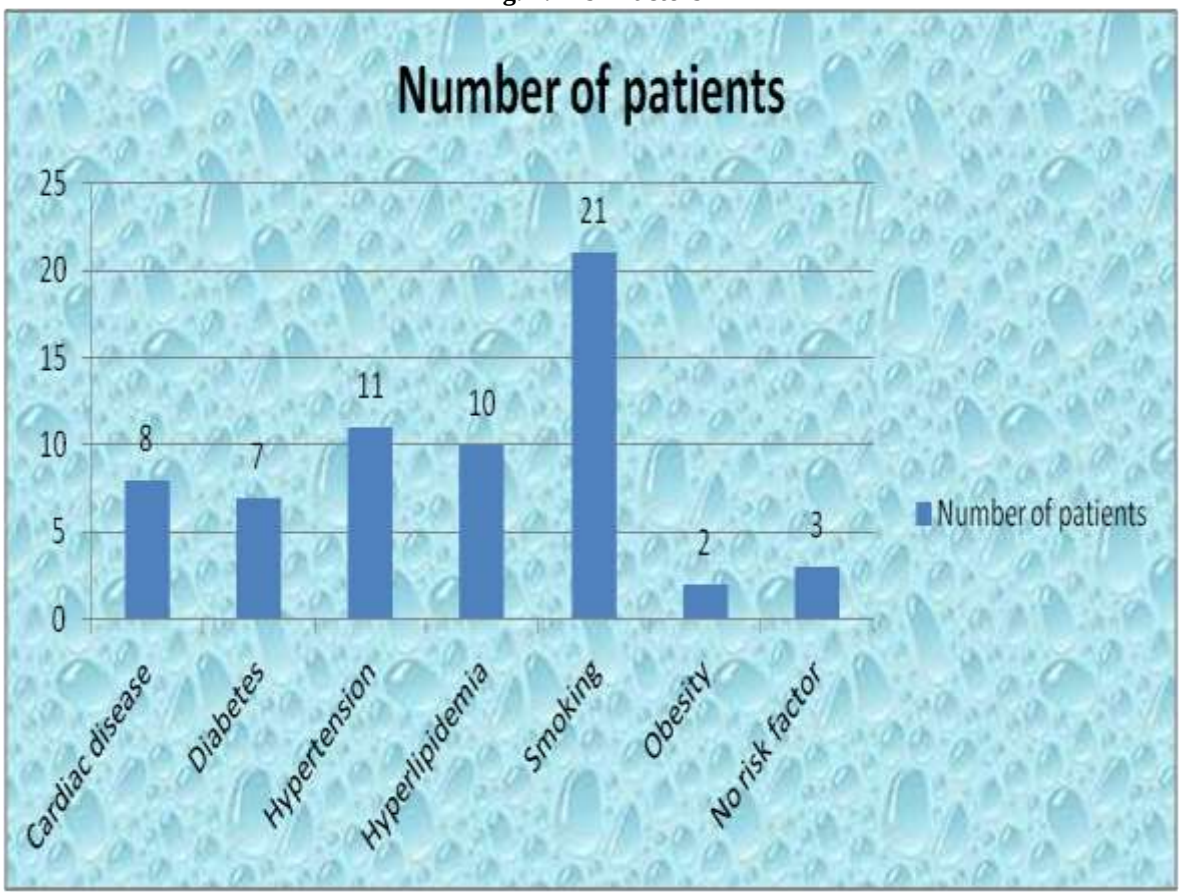
A total of 40 patients presented with features of acute limb ischemia in the period of study. Almost half of the patients in the study group presented in their 5^{th} and 6^{th} decade of life. The mean age was 48 years and the median age was 48years. 34 males and 6 females comprised the study group.

Table- 1: Distribution of patients with respect to age (years)

Age group	Number of patients	Percentage (%)
≤ 30	4	10
31 – 40	9	22.5
41 – 50	11	27.5
51 – 60	12	30
61 – 70	4	10
Gender		
Male	34	85
Female	6	15

52% (n=21) of these patients consumed tobacco in some form. In addition most of the older patients had associated co-morbidities, mostly Hypertension and Diabetes.

Fig. 1: Risk Factors



32 patients presented with lower limb ischemia compared to 8 patients of upper limb ischemia. 26 patients had involvement of left side while 14 patients had right side involvement.

Patients who reported after 72 hours of onset of symptoms were grouped as Delayed presentation. The patients who had previous history of arterial occlusive disease were grouped as Acute on chronic presentation.

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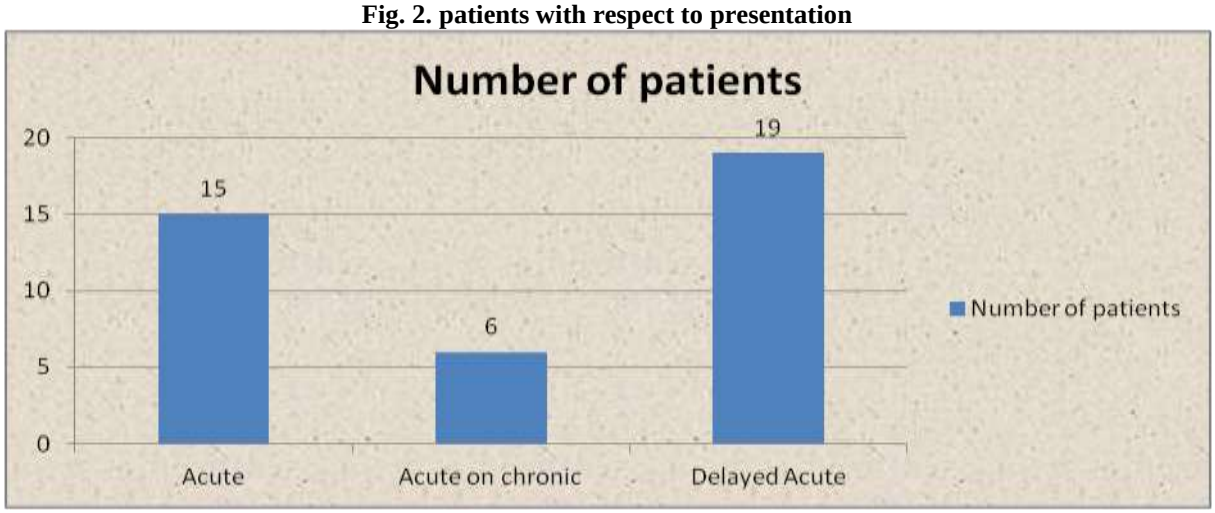
Fig. 2. patients with respect to presentation



Out of 11 patients who had 2D Echo abnormality, 2 patients had findings suggestive of IHD, 2 patients had findings suggestive of valvular heart disease, 4 patients had nonspecific diastolic dysfunction, and 3 had nonspecific LVH.

Table- 3: Distribution of patients with respect to management

Management	Number of patients	Percentage (%)
Thromboembolectomy	23	57.5
Omentoplasty	1	2.5
Medical management	5	12.5
Amputation	11	27.5

Management was planned as per clinical and imaging findings 58% (n=23) patients underwent thromboembolectomy. Out of these 23, fasiotomy was also done in 5 patients. Thromboembolectomy with fasiotomy was done later due to development of compartment syndrome. 5 patients of digital ischemia were managed medically by antithrombotic therapy. Omentoplasty was done in 1 patient. Upfront amputation of the gangrenous limb was done in 11 patients.

Table- 4: Distribution of patients with respect to presentation and outcome.

Presentation	Outcome			Total	p-value
	Good	Fair	Poor		
Acute	9	2	4	15	< 0.001
Acute on chronic	1	4	1	6	
Delayed Acute	2	10	7	19	

Final outcome was assessed during follow-up visit in OPD after 1 month. The affected limb was salvaged in 68% (n=28). Outcome was assessed by clinical examination of limb. Full recovery was considered as good outcome. Persistence of gangrene/pre gangrene or absence of distal pulses was considered as fair outcome. Amputation and death were considered as poor outcome.

We compared mode of presentation with outcome to see any correlation between these. The relation between these two variables are highly significant (‘p’=<0.001).

Table- 5: Distribution of patients with respect to management and outcome

Management	Outcome			Total	p-value
	Good	Fair	Poor		
Thromboembolectomy	10	13	0	23	< 0.001
Omentoplasty	0	1	0	1	
Medical Management	2	2	1	5	
Amputation	0	0	11	11	

Finally outcome was compared with management done to see any correlation between these. Results were statically highly significant (‘p’=<0.001).

DISCUSSION

A total of 40 patients presented with features of acute limb ischemia in the period of study.

The youngest patient was of 12 years of age and the oldest was 70 years. The maximum of patients were in the age group of 40-60 years. The mean age of the patients was 48 years with a standard deviation of 10.31 years which compares with

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the mean age of 58.7 ± 7.5 years in a study of 822 patients.[6] Out of the 40 patients, male patients constituted 34 (85%) and female 6 (15%). Incidentally mean age for male and female patients was same.

Out of 40 patients, 8 patients had cardiac disease. Among these patients 3 patients had Rheumatic heart disease and 5 patients had Atherosclerotic (ischemic) heart disease. Presently, atherosclerotic heart disease has been implicated as a causative factor in 60% to 70% of all cases of embolus, with rheumatic mitral valve disease and associated atrial fibrillation in the remaining 30% to 40%.[2]

Although most hypercoagulable states are associated with venous thrombotic events, arterial thrombosis occurs most notably with malignancy. In our study 3 patients had no known risk factor at the time of presentation.

Distribution of patients according to involved site shows that 32 patients (80%) presented with lower limb ischemia compared to 8 patients (20%) of upper limb ischemia which compares with a study of 547 thrombo-embolectomies over a period of 26 years in which the portion of upper limb ischaemia was 17.7%.[7] In our study 26 (65%) patients had involvement of left side and 14 (35%) patients had right side involvement.

Acute pain, pallor, coldness and pulselessness were present in all of our patients. Variable degree of paresthesia was present in 61% (n=25) patients. Variable degree of paralysis was present in 31.7% (n=13) patients. In 15 (36.58%) patients pre gangrene or gangrene was present. 6 patients gave history of claudication pain in past. 19 (47.5%) patients in our study reported after 72 hours of onset of symptoms.

Cardiac workup was done routinely in all the patients either preoperatively or postoperatively. This included ECG and 2D Echocardiography. Out of 40 patients, echocardiographic changes were present in 11 (27.5%). Electrocardiographic changes were present in 9 (22.5%) of our patients. In a study electrocardiographic changes were noted in 64% of all patients presenting with acute extremity ischemia requiring surgical intervention.[8]

The most common site of occlusion was femoral artery, which was involved in 18 (45%) which compares with previous literature.[9]

Management of patients was decided on the basis of stage of ischemia and duration of ischemia. Upfront amputation was done in 11 (27.5%) patients. All these patients had stage III ischemia. Blaisdell *et al* recommended amputation for such patients in view of reperfusion injury.[10]

5 patients had digital ischemia which was managed medically by Heparin and anticoagulants. two of these patients had complete recovery while other patient had partial recovery.

The advent of the Fogarty catheter simplified the surgical management and improved the results of operative intervention. These developments have been responsible for a limb salvage rate of between 75% and 90%. In our study 23(57.5%) patients underwent thromboembolectomy. Most of these patients had stage IIa or IIb ischemia.

Out of total, 5 patients also received fasciotomy with thromboembolectomy due to compartment syndrome.

Eliot *et al* showed that for patients with arterial emboli, a delay of more than 8 hours increases ischemic complications, but when the delay exceeds 7 days, the occurrence of complications decreases.[11] On the other hand, Blaisdell *et al* findings contradict those of Eliot.

Another study at Turkey showed that late embolectomies of acute late leg ischemia increases blood flow in the extremity and reduces the number of amputations required.[12] In our study total 19 (47.5%) patients had delayed presentation. Among these upfront amputation was done in only 7 patients. Limb was salvaged in 63% (n=12) patients.

In 2 patients intra arterial thrombolysis was started however embolectomy was done later due to development of compartment syndrome.

Final outcome was assessed during follow-up visit in OPD after 1 month.
While this study has albeit a small sample population and some conclusions could be arrived at, further data needs to accrued.

CONCLUSION

Acute ischemia often presents in a patient with multiple medical co-morbidities. Therefore, careful clinical assessment of the individual is as important as assessment of the limb. Due to inaccuracy of pulse palpation and physical examination,

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all patients with suspected ALI should have Doppler assessment of peripheral pulses immediately at presentation to determine if a flow signal is present. Immediate parenteral anticoagulant therapy is indicated in all patients with Acute Limb Ischemia. Presence of co-morbidities, severity of ischemia, and interval for medical care and attention are important prognostic factors.

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