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ACUTE ON CHRONIC LIMB ISCHEMIA MANAGEMENT- A SINGLE INSTITUTIONEXPERIENCE

Dr Benedicta Coelho
Associate Professor, Department: CTVS
Corresponding Author: Dr Benedicta Coelho
Institute: Super Specialty Hospital, Government Medical College, Ananthapuramu, A.P Institutional Address: JNTu Road, Ananthapuramu-515001, A.P State, India
Mail ID:coelhobenedicta@gmail.com Mobile No: 8106836907 ORCID:0009-0003-2070-1429

Dr Sunil Kalyan dev
Associate professor CTVS
Institute: Super Specialty Hospital, Government Medical College, Ananthapuramu, A.P

ABSTRACT

BACKGROUND

Acute on chronic limb ischaemia is an urgent situation characterized by an abrupt interruption in a persistently compromised limb artery. The primary cause is an embolus originating from the heart or the acute creation of a thrombus resulting from the rupture of a pre-existing atheromatous plaque. This may also result from acute thrombosis as seen in TAO, hyperhomocysteinemia, Raynaud's phenomenon, high altitudes, sickle cell phenomenon, hyperpyrexia, heat stroke, severe dehydration and hemoconcentration, hyperhemoglobinemia, polycythaemia, and trauma with a precipitating component.

CASE HISTORY

In the present study, 11 cases were considered; 4 cases were of upper limb ischemia and the remaining 7 cases were of lower limb ischemia. All 7 lower limb cases had a history of intermittent claudication of various degrees and were on standard medical management, while

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two female patients were totally asymptomatic and without any medical or treatment history and were newly detected with type-2 diabetes mellites. Of them, one female had an acute left upper limb ischemia, and the other had acute lower limb ischemia.

In the other patient population, one male patient had right upper limb ischemia due to the cervical rib causing classical thoracic outlet syndrome. In contrast, the other was a young female with a bilateral cervical rib causing thoracic outlet syndrome. The remaining 7 were male patients, all with a history of chronic smoking, and one of them is a post-PTCA {8 months ago} and not on any medication for the past 45 days.

Nine cases were subjected to CT peripheral angiography, except 2 cases where limb jeopardy was most eminent with borderline renal parameters. Angiography showed total occlusion of external iliac and superficial femoral arteries in lower limbs among 6 cases and occlusion of the right popliteal artery in a 40-year-old male diabetic, and that of distal subclavian and axillary and brachial arteries in the upper limbs, respectively.

CONCLUSION

Patients with acute on chronic limb ischemia need to be addressed on emergent basis and may need combined modality of medical and minimally invasive treatment so as to achieve optimal limb revascularization and limb salvage.

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KEY WORDS: PAOD-Peripheral arterial occlusive disease, Fogartys,Embolectomy, thrombolysis CLI-Chronic Limb Ischemia, ACLI-Acute on Chronic limb ischemia,TASC-Trans-Atlantic Inter-Society Consensus,IC-Intermittent Claudication GSV-Great Saphenous Vein

INTRODUCTION

Acute lower extremity ischaemia is a prevalent vascular condition that results in significant morbidity and death. In India, although research on the specific epidemiology of acute on chronic limb ischaemia (AoCLI) is few, it is recognised as a substantial issue, with atherosclerosis and thromboangiitis obliterans (TAO, or Buerger's disease) as contributory causes. The illness results from a sudden disturbance in chronic vascular disease, frequently caused by peripheral artery disease or embolism. An Indian research indicated a rate of 380 per 100,000 in mid-2000 AD. 1 The hospitalisation expenses for treating an individual patient vary from $6,000 to $45,000. [2-4]

In a progressive era of less invasive treatments, many randomized controlled clinical trials have indicated that catheter-directed thrombolysis is equally efficacious as surgical revascularisation in averting limb loss and mortality in these patients. [4-8] Regrettably, the majority of these trials encompassed individuals with ischaemic events lasting from 7 to 14 days. These individuals may experience subacute, rather than critical, limb ischaemia, allowing for an extended period to restore blood flow and resulting in less reperfusion damage. Furthermore, several patients in these studies possessed a history of chronic occlusive illness, and some had undergone earlier artery bypass procedures as the target for thrombolytic treatment. The differentiation between subacute ischaemia (SVS Class I) and actual limb-threatening ischaemia

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(SVS Classes IIa, Iib, and III) is pertinent to the urgency of treatment and the danger of limb loss. 9

MATERIALS AND METHODS

This was a prospective case series of all acute and chronic limb ischaemia cases admitted and operated on between March 2023 and March 2025. The study included patients of both genders, aged between 19 and 65, belonging to ASA grades 3 and 4, with acute or chronic limb ischaemia. Additionally, we restricted the study to include only Femoropopliteal lesions [TASC II]. Those patients with TASC II D aortoiliac lesions, belonging to ASA grade 5,6, and those with vasculitis were excluded from the study.

EMERGENT TREATMENT ON ADMISSION INSTITUTIONAL PROTOCOL

The following protocol was followed to minimize the limb jeopardy and maximize limb saving

1. **HEPARINIZATION**: Intravenous Heparinization with unfractionated Heparin 100 IU per kg body weight was initiated at once and maintenance with 10 IU/kg body weight with target aPTT of 1.5- 2.5 times the normal value.
2. Intravenous analgesia was administered ,injection Tramadol 100mg in 100ml NS
3. Tablet Apaxiban 2.5 mg twice daily
4. Tablets Clopidogrel 75mg and Ecosprin 150mg
5. Tablet Cilastazole 100mg twice daily
6. Tablet Pentoxyfylline 400mg twice daily
7. Broad spectrum Antibiotic Injection,Cef-Salbactum 1.5 gm iv twice daily

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8. Injection Metrogyl 100cc iv thrice daily

   For all and injection Human Actrapid Insulin {HAI} subcutaneously sliding according to the Glycemic levels for those who were denovo detected diabetics

Once the emergent treatment was started, we subjected all the patients to the following battery of investigations: CBP, CRP, blood group and type, viral screening, RFT, LFT, BT, CT, APTT, X-ray chest PA View, ECG, and 2D ECHO.

Multiple treatment modalities, like endovascular, are minimally invasive and highly suitable for the elderly under conscious sedation. We planned a HYBRID modality of treatment for all our cases. Treatment included exposure of the Common Femoral Artery under liberal infiltration of plain 2% Lignocaine. Double looping and securing of the CFA, securing the Profunda and saving all the visible collaterals followed by a distal thrombectomy by passing a heparin-dipped Fogarty 3F under systemic heparinisation. Fogarty was passed proximally as well, but in almost all cases, ended up with resistance on passing for minimal lengths, and withdrawal of the Fogarty was done. Thus, distal thrombectomy was the first modality of treatment.

Next was proximal angioplasty with DCB,5F, first heparin-dipped balloon angioplasty followed by Tenecteplase-dipped balloon angioplasty until proximal pulsatile flow was restored.

The third and last part of the Hybrid treatment was catheter-directed distal injection of a thrombolytic agent like 40 mg Tenecteplase.Finally, the arteriotomy was closed by 6 “o” prolene, and the groin incision was closed in 2 layers.

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Fasciotomy of the lower limb was done in both cases due to imminent compartment syndrome. A young CAD patient, post-PTCA, experienced acute ischaemia in the left upper limb. Our technique involved accessing the left cubital fossa to expose the brachial artery, adhering to all three procedural stages accordingly. This was an acute embolism originating from a cardiac cause. A fasciotomy of the forearm and dorsum of the hand was also performed for this patient.

A young guy with diabetes experienced full thrombosis of the popliteal artery up to the bifurcation; we accessed the popliteal artery 10 centimetres below the tibial tuberosity. The popliteal artery was located, looped, and all three hybrid operations were conducted, using a 2F Fogarty catheter.

Two of our cases were diagnosed with thoracic outlet syndrome, confirmed by CT/MRI, and underwent open excision of the extra rib via a supraclavicular approach. Both patients experienced symptomatic relief and clinical restoration of distal pulses, with no pallor observed when elevating the corresponding limb beyond 90 degrees. Further confirmation was achieved through repeat duplex examinations during follow-ups.

RESULTS

The mean age of the 11 cases selected for this study was 47.18 ± 28.18 years. The majority of the study participants were males, with an insignificant difference in the age distribution. (p 0.931)

	n	Mean	Std. Deviation	Std. Error Mean

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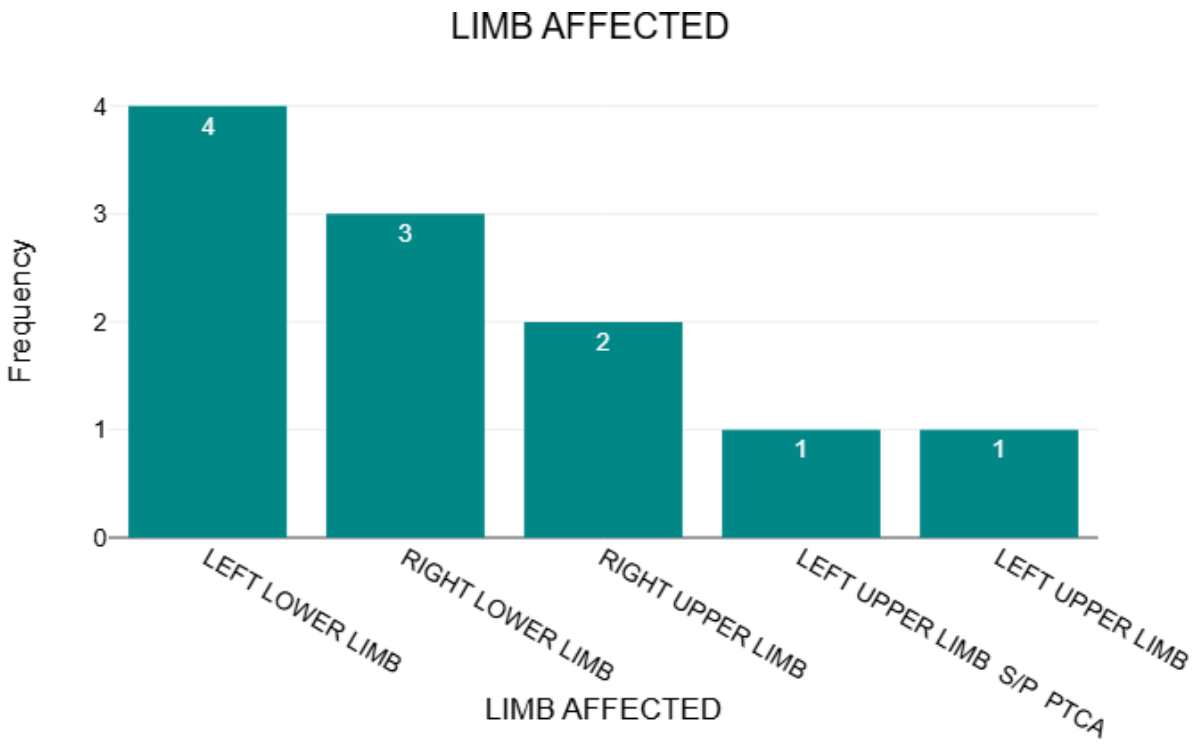
AGE{YEARS}	M	8	50.75	16.26	5.75
	F	3	37.67	16.2	9.35

The left lower limb was most commonly affected, seen in 33.33% of the cases in the present series.



Symptoms were myriad in the study population, and was mostly commonly Rutherford 3 type, in 3 patients.

SYMPTOMS	Frequency	%
Rutherford 3 Fontaine IIb	2	18.18%
Rutherford 5 Fontaine IV	2	18.18%

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Rutherford 6 Fontaine IV	2	18.18%
SUDDEN PAIN	2	18.18%
PAIN 2 WEEKS Cervical rib	1	9.09%
PAIN 10 DAYS Cervical rib	1	9.09%
Rutherford 3 Fontaine III	1	9.09%
Total	11	100%
Invalid	0	0%
Total	11	100%

2/3rd of the population was observed to be smokers. Amongst the 11 patients, two patients had been newly diagnosed with T2DM, while one was on medications for the same.

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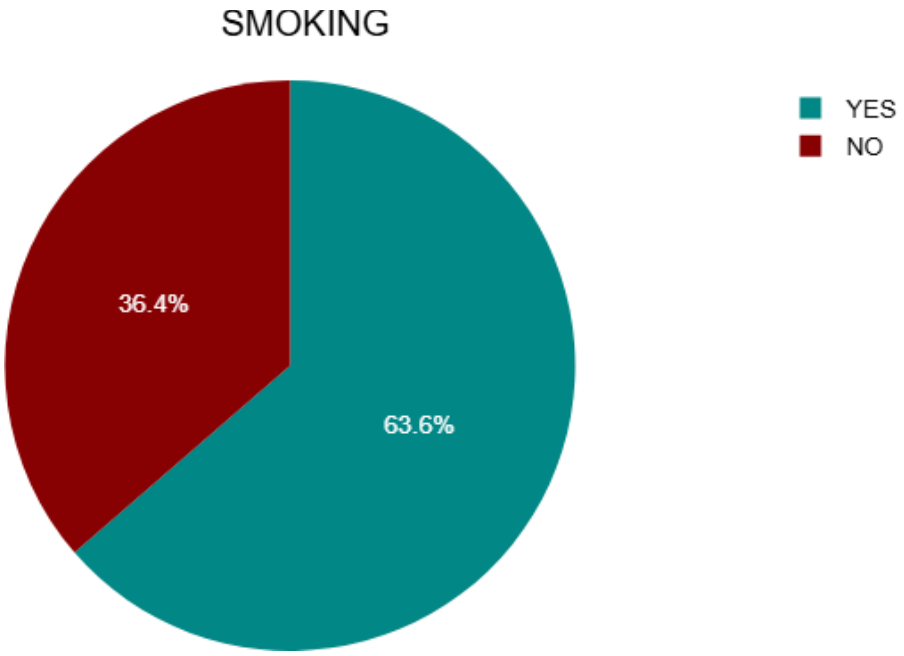

All ten out of 11 showed promising results, indicated by the reappearance of warmth in the affected limb, gradual change of colour from dusky to normal skin in comparison to the opposite limb, disappearance of tingling and numbness, regain of good functional movements, gradual reappearance of the peripheral pulses, improved Pulse oximeter index, and plethysmogram, further confirmed by post-operative doppler study.

In one of the cases, de-novo detected a female 48-year-old diabetic with ALI of the right lower limb. There was sub-optimal restoration of the vascularity. A fasciotomy [bilateral] was also performed for the affected limb soon after our Hybrid treatment intra-operatively, as there was impending compartment and eminent limb jeopardy on presentation. In this case, CT Peripheral angiography was also not done for the same reason of dire emergency to save the limb was the priority, and warmth appeared only up to the level of just beyond the calf. Hence, the patient was referred for below-knee amputation.

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In another case, 66-year-old male Rutherford-6 and Fontaines-4 type of ALI at presentation had persistent discolouration of the lateral 2 toes and gradual demarcation and were referred for disarticulation.

DISCUSSION:

Acute arterial occlusion, or acute limb ischaemia, is a critical vascular disorder that poses a significant hazard to life. Acute limb ischaemia is characterised by a rapid cessation of limb perfusion lasting up to two weeks post-triggering event, impacting any peripheral artery in the upper or lower limbs. Acute arterial occlusion is a critical situation that, if not promptly addressed, can rapidly result in gangrene and the loss of a limb or critical infarction. The specific artery and the patient's medical history dictate the diagnostic methods, treatment options, and care strategies. Acute artery occlusion correlates with heightened morbidity, considerable impairment, and urgent surgical intervention in high-risk patients [1,2].

The primary clinical manifestations of acute ischaemia consist of the six Ps: pain, pallor, poikilothermia, pulselessness, paraesthesia, and paralysis. Pain linked to acute artery occlusion is usually situated distally in the limb, intensifies progressively, and advances proximally as the extent of ischaemia extends. [3]

The majority of patients experience chronic limb ischaemia, which clinically manifests as varying degrees of intermittent claudication that progressively worsens, resulting in a reduced claudication distance and ultimately leading to rest discomfort. The acute event may be initiated by a thrombotic blockage or an embolic occurrence, originating either from cardiac sources,

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particularly in individuals with pre-existing coronary artery disease, or from distal embolisation resulting from post-stenotic dilation, as observed in thoracic outlet syndrome. Significant benefits will be attained for thoracic outlet syndrome upon the excision of the causative component, the cervical rib. [4,8]

The rise in life expectancy has led to an expanding older demographic and a higher incidence of ACLIs. Multidisciplinary intervention is essential to avert limb loss, enhance quality of life, and extend survival. Many of these individuals need prompt intervention and limb revascularisation.

The BASIL study advocates for bypass surgery when life expectancy exceeds two years and a viable vein is available, since it offers superior long-term patency of the great saphenous vein (GSV). If life expectancy is less than 2 years, those without sufficient venous access should undergo EVT, as they are unlikely to benefit from the long-term advantages of the procedure.

Ellison et al. [11] observed a thirteenfold increase in limb loss and a twentyfold increase in death. The cohort of 22 patients with unsuccessful thrombolysis represented 60% of the amputations and 41.7% of the deaths in this analysis.

Historically, three pivotal multicenter randomised studies examined the role of thrombolysis compared to open surgery in acute limb ischaemia (ALI). In the Rochester research, 114 patients were randomly assigned to receive either thrombolysis with urokinase or surgical revascularisation [4]. The one-year amputation-free survival percentage post-intervention was substantially higher with thrombolysis (75%) than with surgery (52%).

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The second experiment was the Surgery versus Thrombolysis for Ischaemia of the Lower Extremity (STILE) research. with those with short-duration symptoms (<14 days), the amputation rate following surgery was considerably elevated at 30%, in contrast to 11% with thrombolysis. [5]

The TOPAS study indicated significant hemorrhagic complications in 12.5% of patients following thrombolysis, in contrast to 5.5% after surgical intervention [6,8]. This involved significant intra-cranial bleeding in four individuals, one of which resulted in death.

Nonetheless, our approach to Hybrid therapy in ACLI is insufficient to formulate precise or definite therapeutic guidelines for ACLI. In our case series, hybrid treatment had favourable short-term outcomes [83%], whereas long-term follow-up was not assessed, representing a limitation of our investigation.

CONCLUSION

Revascularization treatment, whether by open bypass or endovascular therapy (EVT), should be selected for critical limb ischaemia (CLI) in conjunction with timely medical management to prevent an acute occurrence of acute critical limb ischaemia (ACLI)

FIGURE

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Distal Thrombectomy

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