

CAUSES OF ACUTE LIMB ISCHEMIA AND IT'S IN HOSPITAL OUTCOME

Ikramullah¹, Muhammad Ilyas², Abdul Malik³,
Farooq Ahmad⁴, Umair Ali⁵

¹ Department of Cardiology, Nowshera Medical College, Nowshera, Pakistan

² District Head Quarter Hospital, Timergara, Pakistan

³ Department of Cardiovascular, Lady Reading Hospital, Peshawar, Pakistan

⁴ Gajju Khan Medical College, Swabi, Pakistan

⁵ Department of Cardiology, Lady Reading Hospital, Peshawar, Pakistan

Address for Correspondence:

Ikramullah,

Department of Cardiology, Nowshera Medical College, Nowshera, Pakistan

E-Mail: ikrmcardio@yahoo.com.

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Contribution

IK, MI and AM conceived the idea, planned the study, drafted and critically review the manuscript. FA and UA helped in acquisition of data and did statical analysis. All authors contributed significantly to the submitted manuscript.

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ABSTRACT

Objective: To find different causes of acute limb ischemia and it's in hospital outcomes

Methodology: This was descriptive cross sectional study performed in Cardiovascular Unit of Lady Reading Hospital Peshawar. Data was collected for a period of one year from 1st September 2014 to 31st August 2015. Sampling technique was non probability consecutive. Acute limb ischemia was defined as, sudden and severe pain in limb with bluish discoloration or gangrenous changes in affected limb with or without absent pulses, depending upon the site of ischemia within two weeks of symptoms onset and Doppler ultrasound evidence of absent flow in any artery.

Results: About 200 patients were included in the study. Mean age of the study population was 48.3 ± 18.8 years. Male patients were 96 (48%). Mitral stenosis (MS) was found to be the most common cause responsible for acute limb ischemia, due to peripheral thrombo embolism (37.5%). Other causes were PVD (18.5%), CCF either with or without AF (10%), isolated AF (4%) and other causes were 26.5%. Regarding in hospital outcome, amputation was done in 26.5% of patients and mortality was 7.5%.

Conclusion: Acute limb ischemia is multifactorial in nature associated with higher in hospital mortality and limb amputation. Mitral stenosis and AF is the most common cause leading to this condition.

Key Words: Atrial Fibrillation, Mitral Stenosis, Peripheral Vascular Disease

INTRODUCTION

Acute limb ischemia is defined as a sudden decrease in limb perfusion that threatens the viability of the limb.¹ The incidence of this condition is approximately 1.5 cases per 10,000 persons per year. The clinical presentation is considered to be acute if it occurs within 2 weeks after symptom onset. Symptoms may develop abruptly or over hours from worsening claudication to acute severe rest pain with paresthesias, muscle weakness, and paralysis of the affected limb. Physical findings may include an absence of pulses distal to the occlusion, cool and pale or mottled skin, reduced sensation, and decreased strength.²

Acute limb ischemia (ALI) should be distinguished from critical limb ischemia (CLI) caused by chronic disorders in which the duration of ischemia exceeds 2 weeks and is usually much longer. Chronic critical limb ischemia is manifested by pain at rest, non healing wounds and gangrene. Ischemic rest pain is usually worse on lying flat than in sitting position. CLI is diagnosed by an ankle-brachial index (ABI) of 0.4 or less, an ankle systolic pressure of 50 mm Hg or less, or a toe systolic pressure of 30 mm Hg or less.³ CLI is usually the end result of arterial occlusive disease, most commonly atherosclerosis, in association with hypertension, hypercholesterolemia, cigarette smoking and diabetes.^{4,5} Less frequent causes of CLI include, Burger's disease, or thromboangiitis obliterans, and some forms of arteritis.⁶

ALI presents in the upper limb much less commonly than in the lower limb and affects females more than males. Disability is common but limb loss is rare.⁷ Acute limb ischemia is most of the time secondary to cardiac embolization.² Other causes of limb ischemia include vasospasm, the compartment syndrome, phlegmasia cerulea dolens (deep vein thrombosis with severe leg swelling compromising limb perfusion). Vascular complications may develop in 10-20% of patients with thoracic outlet syndrome, which is often caused by cervical rib.⁸ Accidental intraarterial drug injections can occur as an iatrogenic complication or as a result of attempted intravenous injections in drug abusers.^{9,10} Most of the cases encountered in the upper extremity due to easier accessibility of its veins and their proximity to major arteries.^{11,12}

Patients are usually treated with unfractionated heparin through peripheral intravenous cannula or the arterial sheath, at the access site.¹³ Catheter-directed thrombolysis is as effective as surgical revascularization in preventing limb-loss and mortality as suggested by several randomized controlled clinical trials.¹⁴⁻¹⁸ Despite urgent revascularization with thrombolytic agents or surgery, amputation occurs in 10 to 15% of patients during hospitalization and 15 to 20% of patients die within 1 year.¹⁹

This study will provide local data on this disorder and its multifactorial origin to help the physicians to consider all possible causes of this condition while treating such patients and to intervene timely as there is high risk of limb loss and mortality and specially to adopt preventive measures in high risk patients.

The aim of this study is to find various causes of acute limb ischemia and its in hospital outcomes in patients admitted to tertiary care hospital of Khyber Pakhtunkhwa.

METHODOLOGY

This was descriptive cross sectional study performed in Cardiovascular Unit of Lady Reading Hospital Peshawar. Data was collected from 1st September 2014 to 31st August 2015, for a period of one year. Sampling technique was non probability consecutive. All patients who were presented to cardiovascular unit either through outpatient or emergency department for limb ischemia were included in the study. After permission from hospital ethical committee study was initiated. Informed consent was taken from all patients before enrollment into the study. All patients with acute limb ischemia of any age and sex were included in the study. Patients whose ischemia was secondary to fire arm injury (FAI); road traffic accident (RTA) and trauma were excluded from the study. Detailed history was taken regarding time and mode of onset, co-morbidities like hypertension, diabetes, cardiac problems, intra venous injection and other system illnesses which can lead to limb ischemia. Patients were examined in detail to look for conditions which can lead to limb ischemia like atrial fibrillation, valvular heart disease and sign of heart failure etc. ECG, Echocardiography, X-ray cervical spine and Doppler ultrasound of the effected limb was done in each case. When appropriate other investigations were carried out for systemic illnesses leading to limb ischemia.

Acute limb ischemia was defined as, sudden and severe pain in limb with bluish discoloration or gangrenous changes in affected limb with or without absent pulses, with in two weeks of symptoms onset and Doppler ultrasound evidence of absent flow in any artery. Peripheral vascular disease (PVD) was defined as patient having history of claudication and now acute limb ischemia with ultrasound evidence of focal or generalized vessel intimal thickening with or without calcification. Congestive heart failure (CCF) was defined as history of dyspnea with Echocardiographic findings of Ejection Fraction (EF) less than 50%.

Data was collected on pre specified proforma. Data was analyzed using SPSS version 20. Frequency and percentage was calculated for categorical variables like gender while Means \pm SD was calculated for numerical variable like age. All results were presented in tabulated form.

RESULTS

Data of 200 patients was collected in a period of 1 year. Mean age of the study population was 48.3 ± 18.8 years. Male patients were 96 (48 %). Base line characteristics of study population are shown in Table 1.

Various causes responsible for acute limb ischemia were noted. It was found that Mitral stenosis (MS) was the most common cause responsible for acute limb ischemia by throwing peripheral emboli (37.5%). Second most important cause was PVD (18.5 %) which usually involved lower limb more often than upper limb. CCF with or without AF was the next common cause of acute limb ischemia, (10% cases) (Table 2). In 26.5 % cases, other less common and comparatively rare causes were noted (Table 3). Lower limb was more often affected than upper limb in our patients (Table 4).

Regarding in hospital outcome it was noted that acute limb ischemia is associated with high rates of amputation and mortality. Amputation was done in 26.5 % of patients and mortality was 7.5 % (Table 5).

DISCUSSION

This study was an attempt to find causes leading to acute limb ischemia. Due to high rates of trauma either due to fire arm injuries or road traffic accidents we excluded these cases from our study, so as to focus on causes which can be prevented or treated timely. Most of our cases (60 %) were secondary to cardiac conditions especially Rheumatic heart disease and its sequel. Due to the fact that rheumatic heart disease is much more common in this area, our results may be different from studies around the world. Furthermore we excluded trauma cases which may also influence the results.

Table 1: Demographic Characteristics of Study Population

Variables	Number (n)	Percent (%)
Age (mean \pm SD)	48.3 ± 18.8	
Sex (M)	96	48
Diabetes	41	20.5
Hypertension	34	17
Smoking	28	14
EF < 50 %	3	15
CAD	42	21

Table 2 : Frequent Causes of Acute Limb Ischemia in Study Population

Causes	Frequency (n)	Percentage (%)
AF	8	4
MS with AF	45	22.5
CCF with AF	12	6.0
OTHER	53	26.5
CCF	8	4.0
PVD	37	18.5
MS	30	15
IE	7	3.5
Total	200	100.0

AF = Atrial Fibrillation, MS = Mitral Stenosis,
PVD = Peripheral Vascular Disease, IE = Infective Endocarditis

In our study 60 % limb ischemia was cardio embolic in nature. This fact is already found in many studies like one did by Creager MA et al who even noted that 80 % patients was having cardiac source for acute limb ischemia.² Majority of our patients were having involvement of lower limb than upper limb. Only 18% patients were having upper limb ischemia. Bae M et al even reported that upper limb is

Table 3: Less Common Causes of Acute Limb Ischemia in Study Population

Causes	Number (n)	Percentage (%)
Aortic dissection	3	1.5
Accidental intra arterial injection	8	4
Arterial line	1	0.5
Post angiography	2	1
Scleroderma	2	1
Frost bite	1	0.5
Ulcerative colitis	1	0.5
Cervical rib	4	2
Abdominal aneurysm	4	2
Idiopathic	13	6.5
Dehydration	1	0.5
Meningococccemia	1	0.5
DVT	2	1
CRF	2	1
Fistula for Dialysis	3	1.5
ACS	5	2.5
Total	53	26.5

Table 4: Limbs Affected by Different Causes of Acute Limb Ischemia

	Causes of Limb Ischemia											Total (n)	Percent (%)
	AF	AF+VHD	AF+CCF	Other	CCF	Injection	PVD	Dissection	Cervical Rib	MS	IE		
Upper Limb	0	5	2	7	0	8	3	3	4	2	2	36	18
Lower Limb	5	15	7	43	6	0	24	0	0	26	3	129	64.5
Bilateral Lower Limbs	3	8	3	3	2	0	8	0	0	2	0	29	14.5
Upper And Lower Limb	0	2	0	0	0	0	2	0	0	0	2	6	3
TOTAL	8	30	12	53	8	8	37	3	4	30	7	200	100

involved in only 5 % cases.²⁰ In our case involvement of upper limb is higher because we had more cases of accidental intra arterial injections and cervical rib which usually involve upper limb. PVD accounts for 19.5 % cases in our study which may be secondary to many illnesses specially smoking and diabetes mellitus. Similar findings were also noted by Degura J et al who reported 18 % cases of PVD.²¹

As already mentioned upper limb ischemia is less common than lower limb ischemia and in fact its etiology is also somewhat different from lower limb ischemia. We noted higher percentage of iatrogenic cases usually secondary to accidental intra arterial injections, points out the fact that most of the patients in periphery are treated by non trained even an educated quacks who give un necessary injections. This might be the reason of 22 % patients having upper limb ischemia . Only one case was secondary to arterial line in post CABG patient. Contrary to our results Degura J et al reported only 4.8 % cases of iatrogenic upper limb ischemia.²¹

Regarding upper limb ischemia we found 8 % cases secondary to each aortic dissection and thoracic outlet syndrome in the form of cervical rib. Bae M et al reported only 3% cases of dissection of aorta.²⁰ Regarding thoracic outlet syndrome data exist which are very close to our findings of 8 %. William SJ reported 10 %, Quraishi MS et al (7 %), Bae M et al (5.7 %) and Degura j et al (5 %) cases of thoracic outlet syndrome.^{8,20-23}

PVD accounting for upper limb ischemia is less common than lower limb and we only found 8.3% cases accounting for it. This finding is supported by other studies like performed by Quraishi MS et al (10.5 %) and Bae M et al

Table 5: In Hospital Outcome of Acute Limb Ischemia

Outcome	Frequency (n)	Total	Percentage (%)
Amputation	53	200	26.5
Death	15	200	7.5

(5.7 %).^{20,22} AF was found in 20 % of upper limb cases which is similar to Quraishi MS et al who noted 17.5 % cases of AF.²²

Regarding in hospital outcomes we noted that 26.5% patients has gone through amputation of some part of limb and 7.5% patient died. This bad prognosis of acute limb ischemia is noted in many studies around the world. Eliason JL reported 9 % mortality and 25 % amputation rate which is very close to our findings.¹⁹ Dormandy J reported 15 % mortality and 30 % amputation rate of acute limb ischemia, where as Norgren L et al reported 25 % amputation rate.^{1,3} These findings are similar to ours which show that acute limb ischemia is associated with higher rates of amputation and mortality.

LIMITATION

Acute limb ischemia is caused by many disorders, most of them are covered in this article but still several causes are not enlisted due to limited period of study. Moreover in this part of the world Trauma, RTA and FAI are very common and large number of patients have this as sole cause of limb ischemia. Results might be different as compared to other data if these causes are excluded. Furthermore, large numbers of patients are not presented to our unit which is the only cardiovascular unit in this province and there might be higher mortality and amputation rate.

CONCLUSION

Acute limb ischemia is multifactorial in nature associated with higher in hospital mortality and limb amputation. Mitral stenosis and AF is the most common cause leading to this condition, so immediate treatment should be given to reduce acute limb ischemia burden

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