Outcome of Surgical Management In Early Versus Late Presenters With Acute Limb Ischemia

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ABSTRACT

Objective — *To compare the results of surgical intervention in early versus late presenters with acute limb ischemia.*

Study design — *Cross sectional study.*

Place & Duration of study — *Study was conducted in surgical units of Bahawal Victoria Hospital Bahawalpur, from February 2020 to February 2022.*

Methodology — *All patients who presented with acute limb ischemia were included. Those with established gangrene of the limb were excluded. Patients were divided into two groups; Early (Group A) who presented within 24-hours of onset of symptoms and Late (Group B) who presented after 24-hours of initial symptoms. Surgical embolectomy / thrombectomy were done in all patients. Data were recorded on a pre designed form and analysed by using SPSS version 20.*

Results — *Total of 55 patients were included, 19 in early and 36 in late group. All patients included in the study underwent a surgical procedure. The number of additional surgeries and reoperation was more common in late group but there was no statistical significant difference between the two. Hospitals stay in group A was 8.47±3.1 days and in group B 12.6±5.69 days. This was statistically significant (p=0.028). Postoperative complications were more common in group B but there was no statistical significance.*

Conclusion — *Patient presenting with acute limb ischemia before established gangrene are benefitted by intervention (embolectomy).*

Key words — *Embolectomy, Fasciotomy, Gangrene, Amputation, Acute limb ischemia.*

INTRODUCTION:

Acute limb ischemia (ALI), a limb and life threatening condition, is not a common presentation in surgical practice, thus few studies on the subject are found in literature. These patients, for a good outcome, must be treated urgently and efficiently. The European Society for Vascular Surgery (ESVS)' guidelines has mentioned that patient management will depend on feasibility, local expertise and resources.[1] Rutherford classification is the most widely used for grading and is a useful guideline for treating acute limb ischemia.[2]

Patient presenting early are treated by thromboembolecomy. Patient presenting late with developed gangrene are treated by amputation. The treatment for the patient presenting late without established irreversible limb injury is demanding. These patients have varied presentation thus treatment has to be tailored accordingly. Intervention on one hand can save the limb and life but on other hand may increase morbidity and mortality due to complications like reperfusion injury. Embolectomy

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can be safely performed under local anesthesia but availability of anesthetist is always advised for any contingency.[3]

Surgical bypass can also be done in acute limb ischemia but technique is more demanding and the outcome is poor in terms of complications and survival.[4] Such cases are to be treated in specialized centres but availability of the resources is the main constraint. A combined (open and endovascular) therapy is done for complex type of occlusion at different levels or with associated chronic disease.[5] Catheter directed thrombolysis has been used as an alternative but significant haemorrhage related complication limits the use of this technique.[6]

The onset of symptoms and treatment duration is a very important factor in the management of acute limb ischemia. If treatment is accomplished well in time (within six hours) results are much satisfactory with fewer complications. Patients presenting late or where treatment is delayed due to any reason will have less satisfactory outcome and escalated complication rate.[7] The purpose of this study was to compare the results of management in early versus late presenters with acute limb ischemia.

METHODOLOGY:

This was a cross sectional study conducted in Surgical Units of Bahawal Victoria Hospital Bahawalpur, from February 2020 to February 2022. Acute limb ischemia was defined as sudden decrease in limb perfusion that threatens limb viability (within two weeks of presentation).[8] All patients presenting with acute limb ischemia of any duration were included in the study. Patient with established gangrene at presentation, those who refused for intervention (embolectomy), with previous surgical bypass and history of traumatic limb ischemia, were excluded. Ethical clearance was taken from the institution and informed consent was obtained from each patient.

All patients were divided in two groups. In Group A patients presented early within 24-hours of cut-off time limit and in Group B patients presented late after 24-hours of onset symptoms. A consecutive sampling technique was used for enrolment of patients. Variables entered into data base included age, gender, presenting complaints, duration of symptoms, type according to Rutherford classification, and comorbid factors. Operative details were recorded including site, pathology, additional procedures performed and the duration. Postoperative hospital stay, complications (infection, pain, gangrene) and 30-days mortality were recorded. The important outcome variables were reoperation, amputations (minor and major), complications and mortality. The outcome in delayed presenters was assessed by limb salvage and mortality.

Diagnosis was confirmed by history, clinical examination and color Doppler ultrasound. After confirmation of diagnosis patient was counselled for surgery. All patients were operated under local anesthesia in the presence of anesthetist. After assessment of cardiac comorbid condition by physician, good hydration status and furosemide (optional) was used to avoid reperfusion renal injury. Limb was painted and draped and in case of lower limb, the opposite limb was also prepared. Preoperative heparin 5000 IU loading dose was given. A longitudinal incision was made at the selected area and vessel (superficial femoral and brachial) was identified and isolated. A control for proximal, distal and profunda was taken. A longitudinal arteriotomy was made. The sequence for clot removal was at the site of incision, proximal and then distal. In case of lower limb after removal of proximal clot opposite femoral was palpated to assess any dislodged thrombus. Proximal and distal vessel was washed with heparinized saline. Arteriotomy was closed with interrupted 5/0 polypropylene suture on round body needle. The proximal control was released before distal one. Minor ooze was controlled with packing of saline soaked gauze. A bleeding point was controlled by an additional suture. Suction drain at the site of operation was optional in selected cases. Patient was closely monitored for any bleed.

The data was entered into SPSS 20 for further analysis. The results in both groups were compared. Categorical data was analysed for statistical significance by Chi-square test and continuous data by student t-test. A p value <0.05 was considered as significant.

RESULTS:

A total 55 patients were included in the study. They were divided in two groups. Mean age in group A was 53.42±8.22 years and in group B 58.9±8.56 years. Duration of presentation for early group A was minimum 7-hours and maximum 24-hours and mean was 16.79±4.6 hours. For late group B duration of presentation was from 25-hours to 71-hours. Mean duration of presentation for late group was 38.53±10.54 hours. Most of the patients in this study were in late group with ratio of 19:36. Most of the patient of acute limb ischemia presented with classical symptoms as given in table I. Two patients who presented with superficial skin necrosis, one in each group, were also included. Patients were categorized according to Rutherford classification (table II).

Table I: Clinical Presentation

Symptoms	Early Presenters (A)		Late Presenters (B)		Pearson Chi-Square
	Number (n) 19	Percentage (%)	Number (n) 36	Percentage (%)	
Pain	19	100	35	97.2	.463
Paraesthesia	13	68.4	35	97.2	.002
Pulseless	15	78.9	33	91.7	.178
Anesthesia	4	21.1	16	44.4	.086
Mottling	2	10.5	12	33.3	.065
Perishing cold	16	84.2	33	91.7	.399
Paralysis	1	5.3	3	8.3	.677
Impending gangrene	1	5.3	1	2.8	.644

Table II: Rutherford Classification Pattern

Groups	Rutherford Classification		Total (n %)
	IIA (n %)	IIB (n %)	
Group A (Early)	17 (89.47%)	2 (10.53%)	19 (100%)
Group B (Late)	26 (72.22%)	10 (27.78%)	36 (100%)
Total	43 (78.18%)	12 (21.82%)	55 (100%)

Table III: Surgical Procedures Performed

Groups	Primary Surgery		Additional Procedure		Reoperation		
	Embolectomy (n %)	Thrombectomy (n %)	Fasciotomy (n %)	None (n %)	Fasciotomy (n %)	Re-embolectomy (n %)	None (n %)
Group A	18 (94.74%)	1 (5.26%)	6 (31.57%)	13 (68.42%)	2 (10.52%)	1 (5.26%)	16 (84.21%)
Group B	33 (91.67%)	3 (8.33%)	16 (44.44%)	20 (55.55%)	5 (13.88%)	3 (8.33%)	28 (77.77%)
Total	51 (92.73%)	4 (7.27%)	22 (40%)	33 (60%)	7 (12.72%)	4 (7.27%)	44 (80%)

Table IV: Postoperative Morbidity and Mortality

Group	Gangrene (n %)	Pain (n %)	Infection (n %)	Amputation			30-days Mortality
				Major (n %)	Minor (n %)	None (n %)	
Group A (Early)	4 (21.05%)	5 (26.31%)	1 (5.26%)	1 (5.26%)	1 (5.26%)	17 (89.47%)	1 (5.26%)
Group B (Late)	11 (30.55%)	18 (50%)	8 (22.22%)	3 (8.33%)	5 (13.89%)	28 (77.78%)	3 (8.33%)
Total	15 (27.27%)	23 (41.82%)	9 (16.36%)	4 (7.27%)	6 (10.91%)	45 (81.82%)	4 (7.27%)
Pearson Chi-Square P-value	.452	.106	.090		.544		.677

All patients included in the study underwent a surgical procedure. The details of the procedure are given in table III. The number of additional surgical procedures and reoperation were more common in late group but there was no statistical significant difference between the groups.

The risk factors identified in all these patient were smoking 61%, diabetes mellitus 40%, hypertension (HTN) and ischemic heart disease (IHD) 34.5%, atrial fibrillation 27.3%, Valvular and rheumatic heart disease 10.5%, congestive cardiac failure (CCF) 7.3% and COVID-19 positive 16.4% (n=9).

There was no statistically significant difference between the two groups except for hypertension and IHD that were more common in late group.

Postoperative outcome of the two groups is given in table IV. Pain, infection, gangrene and amputation (major and minor) were more common in late group. In all these cases no statistical significance was noted. Hospital stay in group A was 8.47±3.1 days and in group B 12.6±5.69 days. On applying student t-test there was statistically significant difference between the two groups (p=.028). Mortality was recorded in 4 (7.3%) cases, one in group A and three in group B. Cardiac causes were responsible for mortality in two patients in group B, followed by sepsis and reperfusion injury in one case each, while COVID-19 pneumonia resulted in only death in group A.

DISCUSSION:

The management of acute limb ischemia should not be delayed. Intervention in first six hours, the golden hours, is most important for limb salvage.[8] This fact is known and evidence based. In our setup, few patients present within six hours of onset of symptoms. In this study 36 (65.46%) patients presented after 24-hours of onset of symptoms. Over all range of presentation in both groups was between 9 to 71 hours with mean of 31.02±13.71 hours as compared to other studies.[9] Another prospective study from Pakistan reported the causes of delayed presentation and concluded that main reason was the poor referral system.[10]

We relied on Rutherford classification because it is a useful, simple and practical. TASV II and Wifi classification are also used in some studies in different contexts.[11,12] Mostly patients in both groups were in type IIA as compared to other studies.[13] Clinically we found more patients in type IIB in late group (27.78%) as compared to early group (10.53%) but it was not statistically significant. Few patients denied any intervention at initial presentation. These patients were not included in the study. Symptoms of ALI were more profound in late group but without statistical significance except in paraesthesia. Mottling was found more in late group.

All patients of either group who did not develop an established gangrene underwent embolectomy and thrombectomy. Fasciotomy decision was based on the development of compartment syndrome. Patients who underwent embolectomy-only were kept under close monitoring. If compartment syndrome developed, fasciotomy was done without delay (five in late and two in early group). This strategy has been adopted by other workers and found helpful.[8,14] It has been mentioned in studies from Pakistan that embolectomy benefits in late presenting cases of ALI, if limb is viable.[15] In this study the reoperation and amputations (major and minor) were more common in late group but without statistical significance. The hospital stay was significantly increased in late group. Mortality within 30-days was 7.3% in group B as compared to 5.2% in group A. It is evidence based and safe that all patients with ALI presenting late or early with IIA and IIB, must undergo surgical intervention.[15] A close monitoring is needed in all patients for better outcome.[16]

We have not done a comparison for intervention and non-intervention in late group which is the main limitation of our study.

CONCLUSION:

Any patient presenting with ALI before established gangrene is a candidate for intervention after taking all precautions. The morbidity followed by the intervention is acceptable, manageable and can be minimized. Benefits of intervention should be given to all patients.

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