

ORIGINAL ARTICLE

OUTCOME OF EMBOLECTOMY IN PATIENTS PRESENTING LATE WITH ACUTE LIMB ISCHEMIA

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Background: The aim of this study is to share our experience regarding outcome of embolectomy in the patients presenting late with acute limb ischemia. It was a cross sectional descriptive study, conducted at CMH Rawalpindi from January 2016 to December 2017. **Methods:** All those patients having non-traumatic acute limb ischemia presenting between 6 to 72 hours of the onset of symptoms with viable affected limb were included. Their data was analysed for demography, involved limb, time of embolectomy, fasciotomy, re embolectomy, amputations, reperfusion injuries and death. The patients presenting later than 72 hours, irreversible Ischemia and limb ischemia secondary to trauma or graft occlusion of previous Bypass surgery were excluded from the study. **Results:** A total of 49 (36 males and 13 females) patients were included in the study. Thirty-three (67.3%) patients underwent embolectomy for lower while 16 (32.6%) for upper limb ischemia. Ten (20.4%) patients had fasciotomy while 7 (14.2%) patients underwent re embolectomy. In 5 (10.2%) patients vascular bypass had to be done. Seven (14.2%) patients underwent minor amputations while 5 (10.2%) had major limb amputations. Two (4%) patients died of reperfusion injury. Overall 42 (85.7%) limbs were salvaged. **Conclusion:** Embolectomy is effective in late presenting acute limb ischemia with viable extremity and should be offered to these patients.

Keywords: Acute Limb Ischemia; Fasciotomy; Embolectomy

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INTRODUCTION

Acute limb ischemia (ALI) is caused by sudden cessation of blood flow to a limb. It is a challenging emergency as miscalculation of time in restoration of blood flow can result either in amputation of the affected limb or death of the patient due to reperfusion injury. Incidence of ALI is approximately 1.5 cases per 10,000 persons per year.¹ ALI has two major aetiologies; embolism and thrombosis. Embolism is the most frequent cause of ALI. In 75% of cases heart is the source of embolism.² Thrombotic occlusion generally presents in the context of peripheral vascular disease secondary to atherosclerosis. ALI secondary to embolism causes severe ischemia while it is less pronounced in thrombotic occlusion due to presence of pre-existing collaterals.³

Depending upon the type of occlusion and viability of the limb, surgical management of ALI include thrombo-embolectomy with balloon catheter with or without fasciotomy, bypass surgery with adjuncts like endarterectomy, patch angioplasty, or intraoperative thrombolysis.⁴ Traditionally, revascularization within 6 hours of the onset of the symptoms of ALI is considered to be the best in terms of limb salvage and to avoid reperfusion injury.⁵ Despite that quite a big number of the patients with ALI don't reach to the vascular surgeon in this critical window of 6

hours. This makes the decision making very challenging for the vascular surgeon to opt between embolectomy and conservative management. However, many studies carried out recently, suggest that embolectomy is still a limb saving option in the patients presenting later than 6 hours with ALI and viable limb.⁶

The aim of this study is to see the results of embolectomy in late presenting ALI with viable limbs in our setup. The results will help us to offer a limb saving procedure to those many late presenting ALI patients who can still benefit from embolectomy.

MATERIAL AND METHOD

This cross-sectional descriptive study was conducted at combined military hospital Rawalpindi from January 2016 to December 2017. All patients of acute limb presenting between 6 to 72 hours of the onset of their symptoms falling in categories IIa or IIb (threatened limb) of Rutherford SVS/ISCVS Classification of Acute Limb Ischemia (Table-1) were included in the study.⁷ Patients presenting later than 72 hours, category III (irreversible Ischemia) and limb ischemia secondary to trauma or graft occlusion of previous bypass surgery were excluded from the study. All the patients were initially assessed by a vascular surgeon. After establishing the diagnosis of acute limb ischemia, all necessary baseline labs and an ECG was performed. Each patient was given intra venous stat dose of Heparin

5000 units. Urine output was monitored. Written informed consent was obtained from every patient explaining the embolectomy procedure, possible need of fasciotomy or bypass to improve the inflow of affected limb, re embolectomy in case of re blockade, amputation, reperfusion injury and death. All the embolectomies were performed in local anaesthesia. General anaesthesia was used in the cases requiring bypass surgery or the patients who could not tolerate fasciotomy under local anaesthesia. Five Fr balloon Fogarty catheter was used for lower while 4 Fr catheter was used for upper limb. Below knee leg used to be examined immediately after revascularization to assess the need for fasciotomy. If calf gave tense and turgid feel, surgeon proceeded with standard four compartment fasciotomy. Bypass was considered in the cases of failed negotiation of wire mounted Fogarty catheter and failed establishment of blood flow on either proximal or distal side of Arteriotomy during embolectomy. Post embolectomy every patient would be started with continuous Heparin infusion for 48 hours. Patients were nursed in High Dependency Units after the surgery where oxygen saturation, Vital signs, neurological status of the patient, volume and colour of urine, Distal pulses, temperature difference, movements of distal joints and Doppler arterial sound assessment of distal vessels would be done for 72 hours by doctor on duty 8 hourly and would be recorded on pre designed proforma. Re embolectomy would be considered in the cases of re blocked of artery in the same admission. Gangrene would determine the need of amputation. Each patient was regularly followed up for 90 days. Descriptive statistics were done with the help of SPSS version 19.00.

RESULTS

A total of 49 patients (36 males, mean age 46.2±14 years and 13 females, mean age 43.6±12 years) fulfilling the inclusion criteria underwent embolectomy for acute limb ischemia. Percentages of the patients against their time of presentation in hospital are shown in figure-1. Percentages of associated co morbidities are shown in figure-2. Thirty-three (67.3%) patients had embolectomy for lower limb ischemia while sixteen (32.6%) patients had it for upper limb ischemia. Mean time for embolectomy after reaching in hospital was 4±1.5 hours. Ten (20.4%) patients had fasciotomy along with embolectomy. Seven (14.2%) patients underwent re embolectomy within same admission. In five (10.2%) patients additional revascularization procedure like bypass had to be done. All these passes were performed in lower limb ischaemia patients. Seven (14.2%) patients underwent minor amputations of toes or digits while five (10.2%) had major limb amputations including below knee, above knee, below elbow or above elbow amputations after embolectomy. Two (4%) patients had reperfusion injury despite intensive care

management, both of them (4%) died. Patients were kept in periodic follow up for 90 days to assess amputation free salvage of limb. Predictors of 90 days amputation were fasciotomy and re do embolectomy. Overall, 42 (85.7%) limbs were salvaged.

Table-1: Rutherford SVS/ISCVS classification of Acute Limb Ischemia

Category	Description/prognosis	Findings		Doppler signals	
		Sensory loss	Muscle weakness	Arterial	Venous
I. Viable	Not immediately threatened	None	None	Audible	Audible
II. Threatened					
a. Marginally	Salvageable if promptly treated	Minimal (toes) or none	None	Inaudible	Audible
b. Immediately	Salvageable with immediate revascularization	More than toes, associated with rest pain	Mild, moderate	Inaudible	Audible
III. Irreversible	Major tissue loss or permanent nerve damage inevitable	Profound, anesthetic	Profound, paralysis (rigor)	Inaudible	Inaudible

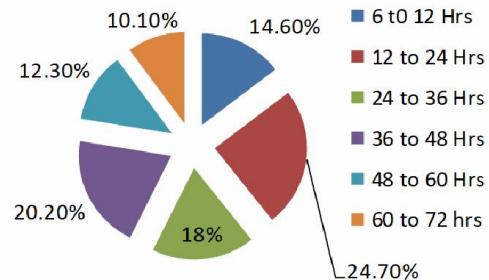


Figure-1: Percentage of patients against their time of presentation.

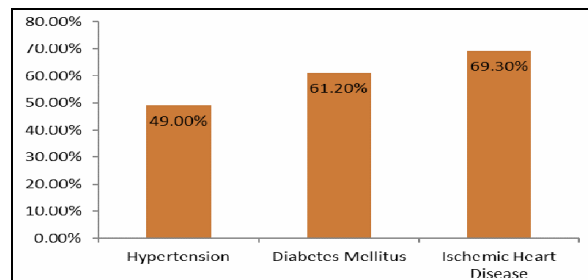


Figure-2: Associated co-morbidities

DISCUSSION

Acute limb ischemia is such an emergency that if not treated in time patient might end up losing his limb. The ideal time to treat an acute limb ischemia is within 6 hours of onset of symptoms but majority of patients fail to reach the hospital within this golden window period. Here comes the grey area where different practices exist. Some people are of the opinion not to intervene beyond the critical 6 hours period. Others think that if the limb is viable and patient has tolerated the ischemic insult then why not to give him a chance of embolectomy and save his limb. To find the optimum time for intervention in ALI, many studies have been carried out in different parts of the world. Searching the medical literature revealed a local study by Khan MI *et al* published in 2016 concluding that revascularization is beneficial in limb saving in late presenting ALI. It can be done even

in a week-old ALI. Fasciotomy of affected limb further reduces the chances of morbidity and mortality. Total of 206 patients (117 male + 89 females) were included in this study. Femoral embolectomy was the commonest procedure. Fasciotomy was performed in 45.6% cases, amputation in 13.1% and death occurred in 5.8% cases. 5-year amputation freedom was 80% in this study⁶.

Another study in the favour of intervention in late presenting ALI was published by Kempe K *et al* in 2014. They recruited 170 patients in the study. More than 83% cases were later than 6 hours. Femoral embolectomy was the commonest procedure and 6% patients required bypass surgery for revascularization. 39% cases underwent fasciotomy in addition to embolectomy. 5 years amputation freedom was 80% and survival estimate was 41%.⁸

Ender Topal A *et al* published a study in 2011 on predictors of outcome in 270 non traumatic ischemic limbs undergoing embolectomies. 57.8% cases underwent embolectomies later than 72 hours. Re embolectomy was performed in 21.1% while bypass surgery in 25.2% cases. Rates of amputation and mortality were 7.4% and 8.5% respectively. They concluded that embolectomy is beneficial in ALI even after 1 week in the absence of clinical tissue necrosis, as it provides partial limb salvage. They further go to the extent in their conclusion that stage III patients should also be given a chance of embolectomy.⁹

In the search of the answer to the question that should embolectomy be performed in cases of ALI presenting late, Iyem H *et al* in 2009, concluded that embolectomy increases blood flow in affected limb and reduces the number of amputations. 122 patients were operated for late ALI. Thirty-one (25.40%) had additional procedure, 14 (11.47%) underwent embolectomy while 9 (7.37%) had amputations. mortality was observed in 11 patients (9.01%).¹⁰

Murali Krishna Nekkanti *et al*¹¹ shared their experience of managing 80 patients of ALI. Only 5 patients presented within 6 hours of onset of symptoms of limb ischemia in their series. Majority of the patients (47) were late presenting. They intervened in the late presenting cases as well and limb salvage was possible in 39 out of 47 patients (82.9%). Overall there was 72.73% limb salvage. They concluded that revascularization, if carried out within six hours, is ideal but only little number of patients reported in this golden window period (6.25% of patients in their study). They added that in delayed presenting cases (93.75% of their

patients), physiological state of the limb, rather than elapsed time from onset of symptoms will determine the operability. Late intervention with embolectomy to revascularize the limb may thus be indicated and is successful most of the time if limb still exhibits signs of viability.

CONCLUSION

Embolectomy is limb saving in the patients of acute limb ischaemia with viable affected limb even presenting later than 6 hours as it reduces the morbidity by decreasing the number of amputations.

AUTHORS' CONTRIBUTION

AS: Concept, Data Collection. NI: Data analysis. HKP: Literature review. KA: Data Collection. RA: Concept, Final review. FH: Proof reading

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