Original Article

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PATTERNS OF PRESENTATION AND OUTCOME IN CRITICAL LIMB ISCHEMIA

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ABSTRACT

Introduction: The threatened limb due to peripheral occlusive arterial disease, embolism or trauma requires early recognition and urgent treatment if the limb is to be saved.

Objective: To determine the pattern of presentation and outcome of surgery in cases of critical limb ischemia.

Study Design: Descriptive study.

Place and Duration of Study: This study was conducted at surgical ward, Combined Military Hospital, Rawalpindi, from Dec 2006 to Dec 2007.

Subject and Methods: A sample size of 30 patients was taken by convenience sampling. Informed written consent was obtained from all patients. Patients suffering from rest pain with ischemia features, trophic lesions, extensive gangrene , ulcers and demonstrable presence of occlusive arterial disease were included in the study. Moribund patients, extensive cardiopulmonary disease or advanced malignancy were not included in the study.

Results: Thirty patients were included in the study. The mean age was 56 ±13. There were 28 males (93.3%) and 2 females (6.7%). They were all married and belonged to middle and low middle social economic class. Out of 30, there were 2 (6.7%) cases of trauma while 28 (93.3%) had peripheral vascular involvement secondary to thromboembolism. Vessels involved were femoral artery in 9 (30%) cases, popliteal artery in 18 (60%) cases and brachial artery in 2 (6.7%) cases. Rest pain was present as a primary feature in all the patients (100%), while tissue loss or gangrene was seen in 22 (73.33%) cases. A total of 14 (46.7%) amputations, 6 (20%) bypass procedures, 4 (13.3%) lumbar sympathectomies, and 2 (6.7 %) embolectomies, were carried out, whereas 4 (13.3%) patients were managed conservatively. Of the patients having rest pain 46.7 % were amputated, whereas of patients having ischemic tissue loss 73.3% were amputated. 13 patients who underwent primary amputation had ankle brachial pressure index (ABPI less than 0.4 (86.7%). ABPI was more than 0.4 in 4 (13.3%) patients whereas it was less than 0.4 in 26 (86.7%) patients.

Conclusion: Overall, critical leg ischemia has a very poor prognosis. If surgical, or endovascular, improvement of the blood supply to the leg is not provided in due course; half of the legs will be amputated within a year. One of the main goals of vascular surgery is to prevent major amputations.

Keywords: Amputation, Peripheral vascular disease.

INTRODUCTION

Critical limb ischemia occurs when the arterial blood flow is insufficient to meet the metabolic demands of resting muscles or tissues. It is the most common indication for lower extremity arterial reconstruction[1]. Affected patients presents with imminent or actual tissue loss in form of ischemic ulcers or gangrene.

The natural history of limb threatening ischemia usually involves inexorable progression to amputation unless there is an intervention that results in improvement of arterial perfusion. Major manifestations of limb threatening ischemia are rest pain, ischemic ulcers and gangrene[2].

The vascular evaluation of a patient with limb threatening ischemia begins with a detailed history and careful physical examination Almost all such patients have evidence of an underlying medical disease including heart disease, diabetes, kidney disease, hypertension and chronic pulmonary disease[3].

Over the past decades, the use of vascular techniques has been introduced in the management of patients with peripheral occlusive arterial disease. The overall outcome

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of critical limb ischemia patients remains poorly documented.

In this study we analyzed the mode of presentation, time of presentation and differences in initial and medium term mortality and limb salvages rates associated with the use of various interventional procedures and the effects of preoperative risk factors on outcome to identify subgroups of patients at high risk.

METHODOLOGY

A study was carried out at Department of Surgery, Combined Military Hospital Rawalpindi from December 2006 till December 2007 after taking permission from hospital ethical committee. A total of 30 patients was included in the study by convenience sampling and after taking informed written consent. The study design was a descriptive case study. Patients including in the study were those with rest pain with ischemia features, trophic lesions, extensive gangrene and ulcers and those demonstrating presence of occlusive arterial disease.Moribund patients and those with extensive cardio-pulmonary disease or advanced malignancy were not included in the study.

Data was collected using a study proforma. A review of all patients admitted to the vascular surgery department with critical limb ischemia was performed during the period. Epidemiological data, vascular risk factors, clinical symptoms, region of affectation, treatment used and early results were recorded in terms of limb salvage, relief of pain and survival. Patients were also investigated for concomitant cardiac disease. Ankle brachial pressure index was performed using a hand held Doppler. Preoperative arteriography was routinely performed in all cases except in those whom the diagnosis was obvious like patients with acute critical limb ischemia due to embolism. Distribution of treatment was divided into following categories:

1. Revascularization
    - Endarterectomy
    - Bypass
    - Primary repair
    - Interposition grafts
2. Primary amputation
3. Conservative

Data thus collected was analysed using SPSS version 12.0. Frequencies/percentages were calculated for gender, risk factors, clinical presentation (rest pain, tissues necrosis, trauma) bypass procedures (femoropopliteal, femorodistal) and Ankle brachial pressure index.

RESULTS

Thirty patients were included in the study. The mean age 56±13 years. There were 28 males (93.3%) and 2 females (6.7%). They were all married and belonged to the middle and lower middle social economic class. Time of presentation is given in table 1.

There were 2 (6.7%) cases of trauma while 28 (93.3%) had peripheral vascular involvement secondary to thromboembolism. Rest pain was present as a primary feature in all the patients. (100%), while tissue loss or gangrene was seen in 22 (73.33%) cases. APBI was less than 0.4 in 26 (86.7%) cases while in 4 (13.3%) cases it was more than 0.4. Vessels involved were femoral artery in 9 (30%) cases, popliteal artery in 18 (60%) cases and brachial artery in 2 (6.7%) cases.

Out of 30 patients 16 (53.3%) were smokers, 7 (23.3%) had hypertension, 6 (20%) had diabetes mellitus, 11 (36.7%) had dyslipidaemia, 12 (40%) had ischemic heart disease, 7 (23.3%) had chronic obstructive pulmonary disease and 1 (3.3%) had renal failure. 4 (13,3%) patients underwent surgeries previously.

Of the patients having rest pain 46.7% were amputated, whereas of patients having ischemic tissue loss 73.3% were amputated. Only 14 patients who underwent primary amputation had tissue necrosis. In 1 patient, tissue necrosis was managed conservatively, 5 underwent bypass procedure and lumbar sympathectomy was done in 2 of them.

One primary amputation was done in a trauma case and the bypass procedure was

performed in another presenting with trauma. Description of ABPI is given in table 3.

The involvement of different vessels is given in table 4.

DISCUSSION

Critical leg ischemia (CLI) is not a single disease with a uniform outcome for all patients, but rather the result of advanced atherosclerosis caused by different risk factors, which influence the prognosis to a major extent. A wide range of symptoms and underlying arterial lesions is included in the definitions of critical leg ischemia[6].This causes the patient group to be heterogeneous. Although the classification of critical leg ischemia implies a threat to the viability of the involved tissue, the amputation risk is very different in different subgroups of critical leg ischemia. Not all patients with CLI require amputation[7]. Suggestions to divide critical leg ischemia into two categories have been put forward: those with rest pain only and those with ischemic tissue loss[8]. The outcome of CLI patients is influenced by both local factors and systemic factors. The mean age is higher today, the overall treatment of the underlying cardiovascular disease bears more possibilities and additional influence can be directed towards the treatment of different risk factors[9]. On the other hand surgical and endovascular treatment has undergone an evolution influencing the overall outcome in CLI.

Different risk factor profiles may affect the outcome. Diabetes may be the most obvious risk factor with a reported 10-fold mortality rate and a 5-fold amputation rate compared to other PAD-patients[10]. In a recent British study the proportion of revascularizations was similar in diabetics and non diabetics, but the major amputation rate at follow-up was 26% in diabetics and 8% in non-diabetics[11]. Apart from diabetes, other risk factors may contribute to differing results as well[9,12].

The outcome as such may also be influenced by referral practices, as diagnostic difficulties and referral patterns can delay the treatment. Patients with CLI often have symptoms for many weeks before being seen by a specialist: the duration of symptoms ranged between 2 weeks to 1,5 years in a British study[11], which is in discordance with the recommendation on the referral of CLI patients[13]. Similarly, socioeconomic factors can influence the outcome in PAD, as has been seen in cardiovascular diseases[14]. Finally the reporting of results can influence the outcome figures, making results from different series not comparable. Especially the time frame and carrying out of follow-up, influences the results reported.

A number of guidelines on how to classify

Table -1: Time of presentation of symptoms (n=30).

Duration (Months)	Frequency (%)
1	14(46.7)
2	6(20.0)
3	4(13.3)
4	2(6.7)
12	2(6.7)
48	2(6.7)

Table- 2: Distribution of ankle brachial pressure indices (n=30).

Ankle Brachial Pressure Index	Frequency(%)
More than 0.4	4(13.3)
Less than 0.4	26 (86.7)

Table-3: Pattern of involvement in all cases and treatment instituted (n=30).

Management	Region of affectation			
	Popliteal Artery	Femoral Artery	Brachial	Artery others
Primary amputation	10	2	2	
Conservative bypass	3	1		
Lumbar sympathectomy	4	1		1
Embolectomy	1	3		

and diagnose CLI are available[13]. The identification of ischemic legs is, however, far more complicated. Generally defined rules do not necessarily fit into everyday clinical practice. This is particularly true in critical leg ischemia. Ankle pressure measurements using a Doppler-probe are recognized as the basic method of measurement for vascular surgical patients as they are non-invasive, easy to perform and as no elaborate equipment is needed. They are recommended as a basic tool even for general practitioners[15,16]and most institutions have the equipment needed readily available.

The adoption of an aggressive reconstruction policy has been shown to reduce amputation rates by 25-63%[17,18] which is bound to influence the overall outcome of the patients. In most studies the reductions are reported in absolute major amputation rates without taking into consideration the increasing risk due to ageing of the population. Despite that, an overall decrease in amputation incidence of 41% has been observed from 1984 to 2000[18]. Compared to the estimates made by Pohjolainen, the overall decrease achieved by vascular reconstructive procedures was 52%[18]. As to the influence of successful bypass surgery: the patency of a bypass graft has been seen to correlate well with the overall clinical outcome of the leg, but exceptions may occur [19]. Some critically ischemic legs end up being amputated in spite of a patent graft. This is typically observed in patients with large, deeply infected tissue lesions[20]. On the other hand not all graft occlusions necessitate amputation[19]. Especially in cases in which the bypass flow has enabled the lesion to heal, later graft occlusion may be well tolerated[21].

This study investigated the problems involved in the detection and recognition of CLI. To be able to refer patients to vascular surgical assessment and treatment in time, the suspicion of ischemic etiology of rest pain or ulcers has to rise in primary health care at an early stage. The presence of preliminary symptoms can be helpful and the aim was to assess the occurrence of such symptoms. The threshold to suspect vascular involvement should be low and whenever suspicion arises, objective methods to determine the existence of haemodynamically significant impairment of the blood supply are needed.An additional aim of the study was to investigate the fate of critical ischemic patients, and once a critical leg ischemia is diagnosed, as well as the outcome of treatment in different clinical settings. To accomplish this, the outcome of patients receiving reconstructive surgery, revascularization, lumbar sympathectomy was assessed. Specific therapeutic approaches are well studied and not within the scope of this study.

Although pressure values have been seen to be associated with leg outcome[22], single pressure measurements proved to be inadequate for predicting the leg outcome in the present study. Likewise, it has been impossible to predict amputation stump healing with pressure measurements. Pressure measurements may give only supplementary information to clinical judgment[16,23]. In our study we had performed 6 bypass procedures which worked well after one year follow up. These patients were monitored with duplex ultrasound, arteriography and subjective assessment in terms of wound healing and relief of pain. Patients, who had poor distal vessel runoff due to long standing disease with subsequent collateral circulation development, were subjected to lumbar sympathectomy for relief of rest pain. Those cases with rest pain, without tissue loss, multisegmental disease causing narrowing of the vascular tree (on arteriography), were instituted therapeutic management with regular follow up. Preoperative arteriography was routinely performed in all the cases. It was the major determining factor for vascular intervention. All the patients were followed up after one year of institution of treatment.

CONCLUSION

Overall, critical leg ischemia has a very poor prognosis. If surgical, or endovascular, improvement of the blood supply to the leg is not provided in due course; half of the legs will be amputated within a year.

One of the main goals of vascular surgery is to prevent major amputations in order to enable the patients to keep their independence and mobility for their remaining lifetime. In order to avoid unnecessary amputations, it is important to direct sufficient vascular treatment on time to those patients potentially benefiting from reconstructive measures.

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