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To Evaluate the Perioperative Outcome of First Episode of Acute Arterial Occlusion of Lower Limbs

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ABSTRACT:
Aim: To evaluate the perioperative outcome of first episode of acute arterial occlusion of lower limbs.
Materials and Methods: Patients with acute ischemia of lower limbs classified by Rutherford's classification who underwent procedures were studied prospectively between 2012 and 2015.
Results: 41 acute limb ischemia patients had undergone surgery. Pre-operatively, 70% had embolism and 30% had thrombosis. Emergency revascularisation was done in all patients. The overall limb salvage rate and major amputation rate, following both primary and secondary procedure were 58.5% and 22%, respectively. Overall mortality rate was 19.5%.
Conclusion: The benefit of limb salvage surgery weighed against the risk of increased mortality, should determine the choice of treatment keeping in mind the influence of relevant factors on survival rates and amputation.

Keywords: Acute Limb Ischemia (ALI), Limb salvage, Major Amputation, Rutherford

I. INTRODUCTION

Acute limb ischemia defined as sudden decrease in limb perfusion that causes a potential threat to limb viability. The management of acute arterial occlusion remains a challenge for vascular surgeons. Surgical thromboembolectomy and bypass grafting is the mainstay of treatment for many years[2]. Early diagnosis and rapid initiation of therapy can save the ischemic extremity and this is possible by prompt initiation of heparin. Depending on the response to heparin and viability of the extremity, revascularisation is recommended in those with persistent ischemia. In presence of a nonviable extremity, prompt amputation is lifesaving. Delay in amputation can result in infection, myoglobinuria, acute renal failure, hyperkalemia and eventually death. Surgical embolectomy and/or Thrombectomy is considered as relatively a simple operation. However, perioperative mortality remains high due to serious underlying cardiac disease or due to reperfusion of the ischemic limb. Most studies report a 30 day mortality exceeding 20% and amputation rates above 10% following arterial embolectomy[3, 4, & 5]. The present study was undertaken to evaluate the perioperative outcome in patients presenting with first episode of an acute arterial occlusion of lower extremity.

II. MATERIALS AND METHODS:

A multicentre prospective study was undertaken between 2012 and 2015 . All patients admitted with a confirmed acute lower limb ischemia were included in the study. All patients had a preoperative echocardiography and those with a viable extremity had an arteriography. Based on the extent of ischemic damage, patients were classified according to the Rutherford's classification.

Inclusion criteria: Patients presenting with an acute ischemic limb for the first time and required surgical intervention in view of life and limb threatening ischemia.

Exclusion criteria: Patients managed conservatively with oral anticoagulants or thrombolytic agents, recurrent thrombosis, bypass graft thrombosis, and septic arterial occlusion.

Management strategy:

Patients with threatening ischemia were taken up immediately for surgery with minimal investigations. Patients with threatening ischemia had an emergency embolectomy while those with non-threatening ischemia had elective bypass procedures after a baseline angiogram. Fasciotomy was done as and when indicated. Patients with non salvageable ischemia required amputation. Patients with advanced ischemia had a secondary major and minor amputation post revascularisation. Routine anticoagulation measures were followed for all the patients in the peri-operative period. The outcome of surgery was estimated by noting the limb salvage rate with or without disability, the need for primary or secondary amputation and mortality during the postoperative period. Chi-square test used to compare the duration, level, aetiology and severity of ischemia and mortality.

Observation and Results:

41 patients were admitted with acute lower limb ischemia that required surgical intervention. The male female ratio was 34:7. The median age of presentation was 40 years (range 23 to 70 years); majority were smokers (78%).The median duration of ischemia from the time of onset of symptom to admission was 4 days (range 0.5 day to 25 days). Five (12.2%) patients had past history of claudication, of which only one had an embolic aetiology with an earlier onset of 20 days pre –operative. Eighteen (43.9%) patients had right lower limb involvement, 13 (31.7%) left and 10 (24.4%) both lower limbs (14 – 34.1% patients) had iliac artery, nine (22.0%) popliteal artery and eight (19.5%) femoropopliteal artery occlusion. Of the 10 (24.4%) patients with bilateral limb involvement, 7 (70.0%) had aortoiliac occlusion and among those with aortoiliac occlusion, five of the seven had saddle embolism. 35 patients (60%) detected to have no flow in the hand held Doppler at the time of presentation, four had decreased Ankle Brachial Index and one had only venous flow. Six of our patients showed intracardiac clot as the source of embolism, out of which four were associated with RHD and two with CAD and one also with ascending aortic aneurysm. Most of our patients (n = 29, 70%) had embolism and other 30%(12 patients) were having thrombosis due to arteriosclerosis in 9 patients, thromboangiitis obliterans in two and hypercoagulable in one patients.

Risk factors:

Out of 41 patients, 19(46%) patients were associated with Diabetes, two patients have CAD and another two patients have Hypertension. Ten patients (24%) had a previous history of rheumatic heart disease (RHD) with severe mitral stenosis .Transthoracic echocardiography (TTE) confirmed the findings. Based on the Rutherford's classification, 16 patients had class III ischemia, 11 had class IIb, four patients class IIa and seven class I. Three patients had both classes of IIa and IIb in two different limbs. Out of the 10 bilateral limb involvements, seven of them underwent emergency femoral embolectomy; others underwent femoral thrombectomy, aortoiliac artery bypass and primary above knee amputation in one limb with other limb salvaged in each of the three patients. Unilateral popliteal artery embolectomy was done in four patients and thrombectomy in two patients. Bypass procedures were performed in five patients, out of which AortobiIliac in one patient for class I ischemia due to aortoiliac artery thrombosis, AortoUnifemoral artery bypass grafting done in one patient for left iliac artery thrombosis presented as class IIa and Infrainguinal bypasses done in three patients(CFA to mid SFA -1, CFA to PTA – 1, proximal to distal popliteal artery – 1) for class I ischemia. Two of them were due to embolism. Primary amputations were done in six patients, five for unilateral limb ischemia (above knee in four and below knee in one patients) and in one patient for bilateral limb ischemia where right above knee amputation was done. Majority of the patients underwent leg fasciotomy following embolectomy or thrombectomy. In our study, both iliac (41.7%) and popliteal (25%) arterial level of occlusion had favourable outcome compared to other levels of occlusion for limb salvage. At the same time the rate of amputation was higher in both these levels (33.3% each). The reason for the higher rate was all of them were in class III ischemia. This difference is not statistically significant. We observed that, majority (70.7%) of the patients presented within week duration of ischemic symptoms. And also all the patients died were in the less a week group. Out of which 75% were in embolism group and in class III ischemia. The reason of this higher mortality could be due to the associated cardiac morbidity as well as the severity of ischemia. At the same time, all of them presented after one week underwent surgery were survived. In this majority were in embolism group (8 out of 12 patients). This was statistically significant. The side of ischemia and preoperative Doppler audio signals do not have any influence in the outcome. Although, there is 40% mortality in the bilateral limb ischemia patients. This difference is not statistically significant (P = 0.5212). Iliac and popliteal arterial level of occlusions were having better survival rate (> 90%) when compared to that of aortoiliac and femoropopliteal arterial occlusions. Although the level of occlusion was not statistically significant (P=0.09202) to that of the mortality, we found that 42% of the saddle aortoiliac occlusions were died. Conversely, 37% of mortality rate was found in lower level occlusions including femoro popliteal segment. In our study, the overall limb salvage rate and major amputation rate both primary and secondary were 58.5% and 22%, respectively and the major amputation was also nearly equal for both the groups (Embolism - 20.7%, Thrombosis - 25%). The outcome of

patients according to the Rutherford class were analysed, we found that all patients presented with class I, IIa and IIb were having 100% limb salvagibility, whereas only one patient of class III ischemia limb was salvaged. But the only difference between class IIa and IIb, the limb salvage with disability was higher, 62.5% compared to that of class IIa (12.5%). Other patients of class III ischemia (n=9), had undergone either a primary or secondary major amputation and six patients were died. All patients who underwent major amputation both primary and secondary were in class III ischemia. This difference was statistically significant ($p<0.001$). The rate of limb salvage without disability, limb salvage with disability and major amputation was 39%, 19.5% and 22% respectively. This difference was statistically significant ($p < 0.001$). The causes of mortality were associated cardiac illness in three patients, sepsis and rhabdomyolysis in each of two patients. The overall mortality rate was 19.5%. The overall mortality rate of bilateral lower limb ischemia was 40% and that of the saddle aortoiliac occlusion was 42%.

III. DISCUSSION:

Our study demonstrates that embolism is still one of the most common causes of acute lower limb ischemia and also the serious vascular emergencies. Iliac artery occlusion is the most frequent site of occlusion as compared to that of femoral artery bifurcation in many studies[6, 7, 8] and femoral artery stands as the second most frequent site of occlusion and aortoiliac constitutes around 18% which is comparable to other studies. The overall mortality rate in our study was 19.5%, Mills and Porter[9] found that the overall mortality was 12.5% in their series but higher rates ranging from 25 to 48% were noted in earlier reports[10, 11 &12]. Patients are in the middle age and the mean age was 40 years. 75% of the mortality was in males. The operative outcome depends on many risk factors. In 1984, a study done by Richard et al[13] at Massachussets General Hospital and Harvard Medical School, Boston, the mortality was higher in patients with embolic occlusion (20%) and it was 8% in thrombosis. Even in our study, the embolic group had higher mortality (20.6%) when compared to the thrombotic group (16.6%). On the contrary, their rate of limb salvage was superior in patients with thrombosis compared to our study where both the groups had nearly equal rates. The presumed origins of cardiac emboli were evident in 48% and rest of 52% could not be accurately determined. In a France study done by Jean- Pierre Becquemin and Stephane Kovarsky[14] from the data collected from 24 centres showed that 33% did not show the origin of embolism. Also, they found that in 6% of patients echocardiography revealed the presence of intracardiac thrombus in patients with heart disease compared to that of 42% in our study revealed intracardiac thrombus. Several studies have shown that older patients have a higher mortality than younger and the mortality is higher in the proximal occlusions compared with distal occlusions[15,16,17]. But in our study, the mean age of patients died was 37 years and 62.5% of patients had above iliac level occlusion. The higher the mortality could be because of associated rheumatic heart disease in 50% (four) of our patients and 75% were males. Even in the past reports have shown that patients presenting with acute peripheral arterial occlusion were often in the 5th decade of life[18,19,20]. This represented the era of rheumatic heart disease associated with mitral valve deformity and resultant distal embolization were the most common causes of ischemia. Susequent data demonstrated that the mean age of patients with acute peripheral arterial occlusion was 70 years, reflected a shift in etiology from rheumatic to atherosclerotic heart disease and the increased frequency of peripheral atherosclerosis as an inciting cause for occlusion. Surprisingly, in our study also it is going back to the past. Majority of our patients were in 4th decade and represented the rheumatic heart disease as the most common cause of acute ischemia. Atherosclerotic heart disease and peripheral atherosclerosis the second cause of our study both in embolism and thrombosis. Dregelidet al[21] patients with severe ischemia secondary to a proximal iliac occlusion had worst prognosis, with a 20% mortality and 40% amputation rate. Conversely, in our study iliac artery level occlusions were having better survival rate, limb salvage as well as higher amputation rates, 92.8%, 41.7%, 33.3%, respectively. A short duration of symptoms prior to embolectomy has been reported to increase mortality[22, 23] while others have found no effect on mortality[17,18,19,24]. In our study too all patients died were presented less than a week duration prior to surgery. Probable explanation would be those patients delayed in presentation would have had time to improve the general condition and taken time for the development collateral circulation prior to surgery. Hence, there was no time for stabilizing these patients before surgery was undertaken. In our study the overall amputation was 22% as comparable to that of studies by Ljungman and Mills et al were amputation rates were ranged from 20 to 40%[9,10]. Like Kendrick et al[25], McPhail et al [26] and Elliot et al[27], our findings also correlate well and indicate that the duration ischemia before treatment was a risk factor for death. According to Levy et al[11], severe ischemia did not increase the mortality whereas, Balas et al[28] reached the opposite conclusion. In our study, 75% were in class III and rest of 25% were having bilateral limb involvement. According to Richard et al, it is the preexisting disease largely determines prognosis regardless of the severity of ischemia[29,30]and contradicts the notion that most of the deaths are caused by revascularization of the ischemic limb[31]. It is acknowledged that the severity of ischemia may be equally important as the amount of ischemic tissue concerning limb survival[53]. In our study, bilateral lower limb presentation, 75% had aortoiliac occlusion,

out of this the mortality rate was 42%. This is nearly comparable with a retrospective study of acute aortic occlusion by sateeshet al[32] where the mortality rate was 52%.

IV. CONCLUSION:

- Embolism is still the commonest causes of acute lower limb ischemia and cardiac disease is the commonest source. Though rheumatic heart disease is seemingly decreasing, it is still more prevalent in our population, this study emphasize that the need of penicillin prophylaxis for rheumatic fever should be encouraged in the lower socioeconomic groups and also in developing countries. The severity of ischemia carries a very high risk of mortality and limb loss even with aggressive revascularization. Hence, class III ischemia should be advised primary amputation as a life saving measure. Patients with bilateral ischemia, though with class IIa/IIb have significant mortality. This may be due to the extent of tissue damage contributing to increased ischemic metabolites. The mortality may be reduced by intensive perioperative monitoring, postoperative ventilator support and correction of acidosis. Sequential decamping and intermittent reperfusion of limbs are mandatory.
- Lack of awareness in the public and scarcity of expertise made them to present in the late stage. Class III ischemia defined by Rutherford's classification is based on paralysis with absence of venous signal by hand held Doppler. But however, the patients fulfilling the above criteria extend from the total insensate limb and skin changes. Should we give a chance for revascularising in those patients with sensory motor deficit without skin changes? In limbs with paralysis with absence of venous signal which are seemingly salvageable, the decision should be made in the operation theatre. The benefit of limb salvage surgery must be weighed against the risk of increased mortality and the choice of treatment should be based on the influence of relevant factors on survival rates and amputation.
- Duration and type of ischemia are the only factors increasing death rate.

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