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Original Research Article

Clinical study of peripheral arterial occlusive disease of lower extremities

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ABSTRACT

Background: Diagnosing PAD is important in order to implement appropriate therapies for preventing cardiovascular morbidity and mortality, improving functional impairment, and preventing further functional decline. The objective was to study the pattern of clinical presentation and etiology of peripheral arterial occlusive disease.
Methods: This was a cross sectional observational study of 50 cases diagnosed with peripheral arterial disease of the lower extremities. History was taken as soon as the patient was admitted. A thorough clinical examination was carried out personally to find out and establish clinically first, the presence of vascular obstruction. Detailed vascular system examination was done as per the proforma provided.
Results: TAO and atherosclerosis are the etiologies for ischemia in these cases, with atherosclerosis being more common of the two. All the cases of PAD presented with ischemic claudication and rest pain as common symptoms, while gangrene (80% of cases) and ischemic ulcer (20% of cases) were the other predominant symptoms. Doppler findings correlated with the disease presentation, TAO having a more infra-popliteal obstruction and atherosclerosis showing more proximal obstruction. All the cases were managed with some form of surgery and majority of them had limb loss. The level of amputation was below knee in 42% and above knee in 58% cases. Improvement of rest pain noted in 62.5% of cases, healing of ulcer in 50% of cases and improvement in claudication pain in 37.5% of patients who underwent lumbar sympathectomy.
Conclusions: Post operatively most of the patients recovered uneventfully and some patients required secondary suturing of the surgical site. Three patients required a revision amputation at a higher level. At first month follow-up, many patients were ambulatory with the use of crutches.

Keywords: Coronary, Lower extremity, Obstruction, Peripheral arterial disease

INTRODUCTION

Peripheral arterial occlusive disease or commonly known as peripheral arterial disease (PAD) comprises those entities which result in obstruction to blood flow in the arteries, exclusive of the coronary and intracranial vessels and the term is usually applied to disease involving the arteries of lower extremity.[1] Management of atherosclerosis plays an important role in adult medical care. Although only 1-2% of people younger than 50 years of age suffer from symptoms of intermittent claudication, this figure rises to 5% in those aged 50 to 70 years and to 10% in those older than 70 years.[2] Ischemia inhibits the ability of the wound to heal, further

complicated by development of infection and gangrene. When associated with significant ischemia, diabetic foot ulcers require arterial revascularization to achieve wound healing.[3] Thrombo-angitis obliterans is an inflammatory occlusive disease primarily involving the medium sized muscular and smaller arteries in extremities, with smoking as the strong associated causative factor. In the lower limb, the disease commences in the digital arteries and small arteries of the foot and then proceeds to involve the crural arteries.[4]

Currently the appropriate management of patients with chronic lower limb ischemia is a complex clinical issue. Despite the advance in technical issues of revascularization, there remains much that can be done regarding education, risk factor modification and non-operative therapy for this patients.[2]

Major amputation is eventually required in more than a third of patients once limb threatening symptoms and signs occur.[5]

PAD is debilitating, persons with PAD have substantial functional impairment and increased rates of functional decline compared with their counterparts without PAD. Diagnosing PAD is important in order to implement appropriate therapies for preventing cardiovascular morbidity and mortality, improving functional impairment and preventing further functional decline. Hence present study was undertaken to study the pattern of clinical presentation and etiology of peripheral arterial occlusive disease.

METHODS

This was a cross sectional observational study of 50 cases diagnosed with peripheral arterial disease of the lower extremities, done during the period from December 2013 to September 2015.

The method of the study consisted of taking a good clinical history in a chronological order as soon as the patient was admitted. A thorough clinical examination was carried out personally to find out and establish clinically first, the presence of vascular obstruction. Detailed vascular system examination was done as per the proforma provided.

The degree of vascular inadequacy and extent of the spread of the disease was assessed clinically by noting the colour change, extent and spread of gangrene and absence of peripheral pulses in the affected limbs. This together with history of the patient regarding the distribution and type of pain gave in a fairly good number of cases studied, an idea of the state of patient's vascular condition.

Later after clinical scrutiny, essential laboratory investigations were done as per the proforma provided to look for the presence of atherosclerotic risk factors. Patients were further evaluated objectively by Doppler scanning whenever feasible to assess the level and degree of obstruction objectively.

The treatment of each patient was individualized with the aim to achieve foot salvage wherever feasible. A record of patient's progress and response to various modalities of treatment was made.

Patients who returned for follow up were followed up for minimum of six months and during each follow up detailed history was taken and progress of the disease was assessed. In all cases, a structural proforma was used to collect the information of an individual patient. Cases were collected as and when they presented with the following inclusion and exclusion criteria.

Inclusion criteria

- Patients presenting with signs and symptoms of peripheral arterial disease of the lower extremities like intermittent claudication, rest pain, ulceration and gangrene.
- Patients with evidence of lower limb arterial occlusive disease on Doppler study.

Exclusion criteria

- Patients with peripheral arterial disease of regions other than the lower extremities.
- Patients with history of trauma to the lower extremities were excluded.
- Patients presenting with pain of skeletal or neurologic origin of lower limbs with no evidence of vascular damage.
- Patients presenting with ulcers of traumatic or infective origin with no evidence of ischemia.

These cases were analyzed in detail with reference to age, sex incidence, and duration of clinical presentation, clinical manifestations and various investigations they underwent during the period of hospital stay.

RESULTS

Table 1: Clinical presentation of patients with pad.

Symptoms	Atherosclerosis	TAO
Intermittent claudication (IC) only	00	00
IC + rest pain	00	00
IC + rest pain + gangrene	29 (81%)	11(79%)
IC + rest pain + ulcer	07 (19%)	03 (21%)
Total	**36 (72%)**	**14 (28%)**

Majority of the patients presented with gangrenous changes. The incidence of gangrene is almost equal in

both the groups. All patients had dry gangrene. Ischemic ulceration was present in ten patients.

TAO was usually limited to the distal part of the limb, whereas atherosclerosis was seen extending proximally. Three cases due to atherosclerosis had gangrene extending up to the leg. No cases had gangrene extending to the thigh.

Table 2: Extent of gangrenous changes in lower limbs.

Site	Atherosclerosis		TAO
Toes only	12	(33%)	12 (86%)
Toes and foot	21	(59%)	2 (14%)
Toes, foot and leg	3	(8%)	0
Upto thigh		0	0
Total	**36**	**(72%)**	**14 (28%)**

Table 3: Associated diseases in patients with PAD.

Associated diseases	Atherosclerosis		TAO
Diabetes mellitus (DM)	19	(53%)	0
Hypertension	9	(25%)	0
Ischemic heart disease	6	(17%)	0
Hypercholes	2	(5%)	0

DM was the commonest associated disease among the atherosclerosis group, other conditions being hypertension and ischemic heart disease. In the atherosclerosis group, 6 cases had DM along with hypertension. In our study 2 patients had hypercholesterolemia and were also diabetic.

Table 4: Doppler findings in the affected limbs.

Site of obstruction	Atherosclerosis	TAO
Ankle	0	4 (29%)
Infra-popliteal	13 (36%)	10 (71%)
Popliteal	18 (50%)	0
Superficial femoral	5 (14%)	0
Total	**36 (72%)**	**14 (28%)**

Majority of the patients had popliteal disease in the atherosclerosis group, with TAO affecting more distal vessels and Atherosclerosis involving the more proximal arteries.

Table 5: Modalities of treatment adopted.

Modalities of treatment	Number of patients
Medical / Conservative	50
Lumbar sympathectomy (LS) only	2
Amputations	36
Disarticulation and LS	6
Disarticulation only	6

Majority of the patients in my study underwent amputation of affected limb. The level of amputation was below knee in 42% and above knee in 58% cases. Lumbar sympathectomy was done in 8 cases, and among these cases disarticulation was done in 6 cases. 12% of the patients underwent disarticulation of the involved toes. Improvement of rest pain noted in 62.5% of cases, healing of ulcer in 50% of cases and improvement in claudication pain in 37.5% of patients who underwent lumbar sympathectomy.

Table 6: Results of lumbar sympathectomy.

Signs and symptoms	No. of patients	Relieved		Not relieved	
		No.	%	No.	%
Rest pain	8	5	62.5	3	37.5
Ulcer	2	1	50	1	50
Claudication	8	3	37.5	5	62.5

Table 7: Postoperative recovery.

Postoperative events	Atherosclerosis		TAO
Uneventful recovery	16	(44%)	8 (57%)
Revision amputation	2	(6%)	1 (7%)
Secondary suturing	18	(50%)	5 (36%)
Death		0	0
Total	**36**	**(72%)**	**14 (28%)**

Majority of the patients had an uneventful recovery, with complication rates being higher among the atherosclerosis group. In atherosclerosis group, 50% required secondary suturing of the surgical wound and two cases underwent revision amputation.

DISCUSSION

Out of the total 50 cases, 36 (72%) cases were due to Atherosclerosis and 14 (28%) were due to thrombo angiitis obliterans. Atherosclerosis was a more common presentation in this study. None of the cases in this study were due to any rare causes of lower limb ischemia like popliteal entrapment syndrome or cystic medial necrosis of the popliteal artery. Selvin E and Erlinger TP reported that the overall prevalence of PAD (defined as an ABI < 0.90) was 4.3% (95% confidence interval (CI), 3.1% to 5.5%).[6]

Criqui MH et al found a prevalence of ischemic claudication to be 2.2%, but on non-invasive testing, it was found that 11.7% of the population had large vessel PAD, 5.2% had both large and small disease.[7]

In the present study, all the cases of PAD presented with intermittent claudication and rest pain as common symptoms, while gangrene (80% of cases) and ischemic ulcer (20% of cases) were the other predominant symptoms.

Nigam R reported that claudication was the commonest presentation in TAO and ulcer or gangrene with claudication was common mode of presentation in atherosclerosis.[8] Mills JL and Porter JM reported in their study of TAO that, 50% had isolated lower limb involvement, 40% had both upper and lower limb involvement and only 10% had isolated upper limb disease due to TAO.[9]

In the present study diabetes mellitus (DM) was present in 53% of the cases with atherosclerosis and none of the patients with TAO had DM. A study conducted on the clinical profile of TAO and Arteriosclerosis obliterans had 40% cases of atherosclerosis with associated DM and no TAO cases with DM.[8] In the Framingham heart study, diabetes increased the risk of intermittent claudication by 3.5- and 8.6- fold in men and women, respectively.[10]

Hypertension was seen in 25% of the cases with atherosclerosis, whereas none of the TAO patients had associated hypertension. Hypertension has been linked with an increased risk of peripheral arterial occlusive disease in some studies. The Framingham data documented a 2.5-fold increase in the risk of PAD in men with hypertension and a 3•9-fold increase in women with hypertension.[11]

In the present study 6 (17%) patients with atherosclerotic PAD gave a history of ischemic heart disease or had ECG changes suggestive of myocardial ischemia. No patients with TAO had any form of myocardial episode. These findings correlate with another study where 20% of atherosclerosis cases and only 1% of TAO cases had some evidence of cardiovascular disease.[8]

In our study 2 patients had hypercholesterolemia and were also diabetic. In the Framingham study, an elevated cholesterol level was associated with a 2-fold increased risk of claudication.[12]

Doppler examination of the ischemic lower limb was undertaken for all the cases in this study. The commonest site of obstruction in atherosclerosis group was found to be popliteal and infra-popliteal vessels involvement. Femoral block was seen in 5 cases and all these patients had no distal collaterals. None of the atherosclerotic patients had disease limited to the ankle. In a study, ilio-femoral site of block was commonest in atherosclerosis and infra- popliteal was commonest in TAO.[8]

All the patients in this study were initially started on conservative management, and eventually underwent different modalities of surgical management. Complete cessation of smoking was strongly advised as it is the mainstay of therapy. Jonason T and Bergstrom R reported in their study that smokers have poorer survival rates, a greater likelihood of progression to critical limb ischemia and amputation, and decreased artery bypass graft patency rates when compared with nonsmokers. However, patients who are able to stop smoking are less likely to develop critical limb ischemia and have improved survival.[13]

Total of 8 patients (16%) were subjected to LS out of them 5 patients with RP at presentation showed improvement (62.5%). In my study 1 patient out of 2 patients with ulceration showed improvement in healing (50%). The best results of lumbar sympathectomy were reported by Persson and co- workers who performed sympathetectomy on 22 limbs with adequate inflow but importantly with no evidence of neuropathy. Following are the results. 87% demonstrated complete ulcer healing whereas only 12% required amputation.[14]

Most of the patients had uneventful recovery in the postoperative period. In the TAO group, 57% cases had an uneventful recovery and in the atherosclerosis group, 44% had uneventful recovery. Revision amputation at a proximal level was required in 2 cases in atherosclerosis group. Secondary suturing of the surgical site was required post operatively in 50% cases of atherosclerosis and in 5 cases of TAO. There were no deaths in the study.

CONCLUSION

Post operatively most of the patients recovered uneventfully and some patients required secondary suturing of the surgical site. Three patients required a revision amputation at a higher level. At first month follow-up, many patients were ambulatory with the use of crutches.

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