Original Research Article

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Clinical study of peripheral arterial occlusive disease of lower extremities

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ABSTRACT

Background: 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. Peripheral arterial disease is an important manifestation of atherosclerosis involving the arteries of legs. Vascular surgeons continue to encounter complications of atherosclerosis as their most common clinical challenge. Objective of this study was to know the various etiologies and different clinical presentation 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 January 2013 to June 2014 among the Patients with Peripheral Arterial disease of the lower extremities admitted to surgical wards of SCBMCH, Cuttack.

Results: All the cases in the present study fall under the category of chronic lower limb ischemia and no cases of acute limb ischemia. Majority of the cases in atherosclerosis were above the age of 50 years, while in the TAO group majority belong to the age group between 31 to 50 years. TAO was usually limited to the distal part of the limb. All patients with TAO had a history of smoking and 61% of atherosclerotic patients gave history of smoking.

Conclusions: TAO and Atherosclerosis are the etiologies for ischemia in these cases, with atherosclerosis being more common of the two. TAO presented at a younger age group whereas atherosclerosis presented in the older age group.

Keywords: Acute limb ischemia, Atherosclerosis, Peripheral arterial disease, Vascular 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

The symptoms of lower extremity arterial occlusive disease are classified into two large categories: Acute

Limb Ischemia (ALI) and chronic limb ischemia. 90% of acute ischemia's are either thrombotic or embolic. Chronic ischemia is largely due to atherosclerotic changes that manifest from asymptomatic to limb-threatening gangrene.

Peripheral arterial disease is an important manifestation of atherosclerosis involving the arteries of legs.² Vascular surgeons continue to encounter complications of atherosclerosis as their most common clinical challenge.³

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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 yrs.⁴

Vascular disease is a leading cause of morbidity and mortality in people with diabetes. Diabetic foot problems are due to combination of ischemia and neuropathy often complicated by infection.⁵

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.⁶

Intermittent claudication, heralded by pain in leg muscles during ambulation is the earliest and the most classic symptom among patients with Peripheral arterial disease. As the severity of arterial occlusion progresses, symptoms occur even at rest and may culminate in lower limb ulceration and gangrene.⁷

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 these patients.⁴

Major amputation is eventually required in more than a third of patients once limb threatening symptoms and signs occur. Never the less, the cause of death in patients with Peripheral arterial disease is seldom direct result of lower limb ischemia, most patients die from complications of coronary artery or cerebrovascular disease.

Objective of this study was to study the pattern of clinical presentation and various etiologies of Peripheral arterial occlusive disease.

METHODS

This study was conducted by random selection of 50 cases with Peripheral Arterial disease of the lower extremities admitted to surgical wards of SCBMCH, Cuttack. This was a cross sectional observational study of 50 cases diagnosed with Peripheral Arterial disease of the lower extremities, done during the period from January 2013 to June 2014.

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 color 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

Total number of patients in the present study were fifty. (n=50). All the cases in the present study fall under the category of chronic lower limb ischemia and no cases of

acute limb ischemia of non-traumatic origin were encountered during the study period.

Table 1: Sex distribution of patients with PAD.

Sex	Atherosclerosis	TAO
Male	33	14
Female	3	0
Total	36 (72%)	14 (28%)

TAO and Atherosclerosis are the etiologies for PAD in these cases, with atherosclerosis being more common of the two. All TAO cases were males and in the atherosclerosis group there were three females. The diagnosis was done based on history, examination and relevant investigations.

Table 2: Age distribution of patients with PAD.

Age group (years)	Atherosclerosis	TAO
21-30	0	2 (14%)
31-40	0	8 (57%)
41-50	4 (11%)	4 (29%)
51-60	14 (39%)	0
>61	18 (50%)	0
Total	36 (72%)	14 (28%)

Table 2 shows the age distribution of the cases in the study. Majority of the cases in atherosclerosis were above the age of 50 years, while in the TAO group majority belong to the age group between 31 to 50 yrs.

Table 3: 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%)

Table 3 shows the distribution of clinical presentation in our study. 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 10 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 4 shows the other associated diseases in the study. 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 this study 2 patients had hypercholesterolemia and were also diabetic.

Table 4: Associated diseases in patients with PAD.

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

In this study all patients with TAO had a history of smoking and 61% of atherosclerotic patients gave history of smoking. Beedi smoking being the most common form of addiction. In the atherosclerosis group, eight patients had no history of any addiction to smoking or alcohol.

Table 5: 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%)

Above table shows the Doppler findings in the 50 patients that were subjected to Doppler study. 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 6: Modalities of treatment adopted.

Modalities of treatment	No. of patients
Medical / conservative	50
Lumbar sympathectomy (LS) only	2
Amputations	36
Disarticulation and LS	6
Disarticulation only	6

All the patients in this study were initially started on medical management, and eventually underwent different modalities of surgical management as shown in Table 6. Majority of the patients in this 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.

After the lumbar sympathectomy in terms of improvement in symptoms. Improvement of rest pain noted in 62.5% of cases, healing of ulcer in 50% of cases and improvement in claudication pain in 12.5% of patients who underwent lumbar sympathectomy.

The events in post-operative period during hospital stay. 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 from National Health and Nutrition Examination Survey (NHANES) conducted from 1999 to 2000 in the United States, that the overall prevalence of PAD (defined as an ABI < 0.90) was 4.3% (95% confidence interval [CI], 3.1% to 5.5%).8 The prevalence of Peripheral arterial disease in the general population is essentially unknown, primarily because of the lack of data on asymptomatic PAD.

A recent study conducted by Sigvant B et al, for evaluating prevalence of PAD, found that 18% of the population suffered from PAD, with 0.5% having CLI.⁹

The study done by Nigam R had a higher incidence of TAO, accounting for 63% of the cases and atherosclerosis, only 15% and the rest being miscellaneous causes. ¹⁰

In a study done by Selvin E and Erlinger TP on the prevalence of and risk factors for peripheral arterial disease in the Unites States, it was found that although there was a slightly higher prevalence in men than in women, the prevalence dramatically increased with age, rising from 0.9% in those younger than 50 years to 14.5% in those 70 years or older which is comparable to our study.⁸

The study done by Nigam R., reported that 56% of the atherosclerosis cases belonged to the age group 60-70 yrs, oldest being 78 yrs. ¹⁰ The age distribution pattern is similar in my study, with 50% of the atherosclerosis cases were in the age group of above 60 years. Nigam R, reported in his study that 88% of the TAO cases were aged between 31-50 years, similar to the findings in this study. ¹⁰

A study on the clinical profile of TAO and Arteriosclerosis obliterans done by Nigam R reported that claudication was the commonest presentation in TAO and ulcer or gangrene with claudication was common mode of presentation in Atherosclerosis. ¹⁰ The commonest site of involvement in the form of critical limb ischemia was foot in both groups.

Bilateral lower limb ischemia was seen in 12% patients, and all belonged to the TAO group. None of the patients with atherosclerosis had bilateral disease.

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.¹¹

At the Cleveland Clinic Foundation, Intermittent claudication occurred in 70 patients (63%). 12 46% of patients had ischemic ulcerations of the lower limb at the time of presentation. Rest pain occurred in 81% of patients. In a study done by Nigam R, the incidence of smoking in TAO and atherosclerosis was reported to be 98% and 72% respectively. 10

In the Framingham study, after 16 years follow-up, it was estimated that nearly 80% of the cases of intermittent claudication could be attributable to smoking.¹³

Hill et al. found that all the TAO patients in their study were cigarette smokers and patients who smoked more than 10 cigarettes per day had a much worse prognosis than those who smoked less than that.¹⁴

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. 10

In the Framingham Heart Study, diabetes increased the risk of intermittent claudication by 3.5- and 8.6-fold in men and women, respectively.¹⁵

The risk of developing lower extremity peripheral arterial disease is proportional to the severity and duration of diabetes. ¹⁶

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 $2\cdot5$ -fold increase in the risk of PAD in men with hypertension and a $3\cdot9$ -fold increase in women with hypertension. ¹⁵

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. ¹⁰

In a study from the Cleveland Clinic, some degree of coronary atherosclerosis was present in 90% of patients undergoing routine coronary angiography before elective peripheral vascular surgery and 28% of the patients had severe, three-vessel coronary disease.¹⁷

In this 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.¹⁵

A combination of DM and hypertension was seen in 6 cases among the atherosclerosis group, and all these patients were above the age of 60 yrs. None of the patients in our study gave history of stroke or any other cerebro- vascular event in the past.

A study from Japan determined the distribution of arterial involvement in TAO on the basis of a nationwide survey carried out in 1993.¹⁸ The most frequently affected arteries in the lower extremities were the anterior (41.4%) or posterior (40.4%) tibial arteries.

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 non-smokers. However, patients who are able to stop smoking are less likely to develop critical limb ischemia and have improved survival.¹⁹

Majority of the patients (72%) 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. Twelve per cent of the patients underwent disarticulation of the involved toes.

A recently published study states that the public is poorly informed about peripheral arterial disease, this leads to delay in presentation and diagnosis. Hence poor outcome of any intervention, the patient ultimately requiring amputation in some form. In a prospective study from Italy, the risk of major amputation was 12.2% after only 3 months in patients with rest pain or ischaemic ulceration.²⁰

The best results of lumbar sympathectomy were reported by Perssonand Co-workers who performed sympathectomy 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.²¹

CONCLUSION

TAO and Atherosclerosis are the etiologies for ischemia in these cases, with atherosclerosis being more common of the two. TAO presented at a younger age group whereas atherosclerosis presented in the older age group. All the cases of PAD presented with ischemic claudication and rest pain as common symptoms, while gangrene and ischemic ulcer were the other predominant symptoms.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

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