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### Prospective study of clinicoepidemiology, presentation and treatment outcome of lower extremity peripheral artery disease (LE-PAD)

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#### Abstract

**Background:** Peripheral arterial disease is one among three major cardiovascular diseases and is an important contributor of death and disabilities in low and middle income countries. Symptoms of peripheral arterial disease depend upon the severity of narrowing of artery. Based on severity of disease there are various modalities of treatment is available to prevent the progress of disease and save the limb.

**Method:** This is a prospective, observational, cross sectional study conducted in the department of general surgery. Detailed chronological clinical history is taken, after that patient was evaluated clinically for vascular abnormalities of lower extremities. All patients were followed for minimum 6 month for the evaluation of course of disease and at each visit detail examination was repeated.

**Result:** Dorsalis pedis artery was more commonly involved in thromboangitis obliterans patients then peripheral artery disease (37.5% vs 4.34%). Regarding mode of treatment all patients in both group received medical treatment and life style modification. Lumber sympathectomy was done in 4(8.6%) patients in PAD group and 1(6.25%) in TAO group. Amputation of leg was done in 18(39.10%) in PAD group.

**Discussion and Conclusion:** Diabetes and hypertension was common comorbid condition associated with PAD. Most of the patients have habit of tobacco use. Gangrene and ulcer are common presentation of patients and most of the patients required amputation and disarticulation. Some symptoms improved by life style modification and medical management. The mean duration of stay in hospital was longer in PAD patients then TAO patients.

**Keywords:** Peripheral artery disease, thromboangitis obliterans, treatment outcome, presentation

#### Introduction

Peripheral arterial disease is one among three major cardiovascular diseases and is an important contributor of death and disabilities in low and middle income countries. As per Global Burden of Disease of 2017, the world wide number of incident cases was 10.8 million and most of them were asymptomatic<sup>[1, 2]</sup>. It is debilitating atherosclerotic occlusion of arteries in the lower extremities present as intermittent claudication, atypical leg pain, critical limb ischemia and occasionally acute limb ischemia depending upon the severity of diseases<sup>[3]</sup>. It is the manifestation of atherosclerosis of the arteries of leg and management of atherosclerosis is important concern in medical management of lower extremity peripheral artery disease. Various non atherosclerotic conditions like thromboangitis obliterans (TAO), arterial fibro dysplasia, takayasu arteritis and emboli can also cause symptoms like intermittent claudication. Risk to involve limb is greater in TAO then in other arteriosclerosis diseases. Symptoms of peripheral arterial disease depend upon the severity of narrowing of artery. Based on severity of disease there are various modalities of treatment is available to prevent the progress of disease and save the limb. Management of patient with chronic limb ischemia is complex, it include medical management, surgical management and combination of both. In addition to risk factor modification medical therapy includes antiplatelet agents like aspirin and clopidogrel, vasodilators like calcium channel blocker, neftidofuryl, cilastazol and pentoxifylline, exercise rehabilitation, surgical therapy like endovascular interventions, or surgical bypass<sup>[4, 5]</sup>. Various studies have been conducted to evaluate treatment outcome, Gardner AW, Afaq A *et al.* have concluded that conservative and medical management is effective for patient with asymptomatic PAD and patients with intermittent claudication but

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patient with severe PAD typically require revascularization of the lower extremities [4]. Firnhaber JM, Powell CS *et al.* has concluded that Surgical revascularization should be reserved for patients with severe claudication who have an inadequate response to medical therapy [6]. Based on previous studies present study is designed to evaluate the clinicoepidemiology and presentation of lower extremity peripheral artery disease (LE-PAD) in our patient. To study the mode of treatment and its outcome in various patient with LA PAD admitted in our hospital.

### Material and Method

This is a prospective, observational, cross sectional study conducted in the department of general surgery Konaseema institute of medical science Amalapuram Andhra Pradesh from January 2017 to April 2020.

Selection of patient:-

Patients with clinical feature of lower extremity peripheral artery disease were selected for this study based on following inclusion and exclusion criteria.

**Table:** Exclusion and inclusion criteria

Inclusion criteria	Exclusion criteria
Both sex	History of trauma
All ages	Involving other region of body
Patient with feature of lower extremity peripheral artery disease like intermittent claudication, rest pain gangrene	Pain of lower extremities neurological in nature
Evidence based on Doppler study	

Sample size: - Based on exclusion and inclusion criteria sixty two patients with clinical feature of lower extremity peripheral artery disease were enrolled for this study.

**Ethics:** Present study is approved by institutional ethics committee. A written informed consent was obtained from all patients before enrolling them for study.

### Method

Once patient has been admitted in general surgery department detailed chronological clinical history is taken, after that patient was evaluated clinically for vascular abnormalities of lower extremities. Extent of disease severity was evaluated by assessment of vascular insufficiency, distribution and type of pain, extent of colour change, gangrene and absence of peripheral pulses. All essential laboratory investigation was done for atherosclerosis and patients were further evaluated for level and degree of obstruction by Doppler scanning. As per the severity of disease treatment of patient was individualised with an aim to save the limb. All patients were followed for minimum 6 month for the evaluation of course of disease and at each visit detail examination was repeated. For maintenance of record a predesigned structured Performa was used every patient.

Statistical analysis: - Data was collected on Microsoft excel sheet and analysis was done by using mean and proportion.

### Result

In present study of two years and 10 month duration 62 patients were enrolled as per selection criteria.

**Table 2:** Clinicoepidemiology of patients

variables		PAD (peripheral artery disease)	TAO (thromboangitis obliterans)
Number of patients		46	16
Age in years(Mean± SD)		64.30 ± 10.90	47.06±11.94
Sex(M/F)		30/16	14/2
Associated co-morbid conditions	Diabetes	22(47.82%)	4(25%)
	Hypertension	16(34.78%)	2(12.5%)
	Renal disorder	3(6.52%)	1(6.25%)
	Hepatic disorder	1(2.17%)	0
Habits	Smoking (past)	24(52.17%)	14(87.5%)
	Smoking (present)	14(30.435%)	12(75%)
	Type of smocking	Cigarette	16(34.78%)
		Traditional	8(17.39%)
	Tobacco chewing	12(26.08%)	10(62.5%)
alcoholic		14(30.34%)	6(37.5%)

As per table 2 out of 62 patient lower extremity peripheral artery disease (LE-PAD) 46 patients have peripheral artery disease and 16 have TAO (thromboangitis obliterans). The mean age of patient in PAD group was 64.30 ± 10.90 years and in TAO (thromboangitis obliterans) group was 47.06±11.94 years. In PAD group 30 were male and 16 were female in TAO group 14 were male and 2 were female. Out of 46 patients, 22(47.82%) have diabetes in PAD group and 4(25%) patients in TAO group have diabetes. Regarding associated comorbid conditions diabetes was present in 22 (47.82%) patients in PAD and 4(25%) in TAO patients. Hypertension was present in 16(34.78%) patients in PAD and 2(12.5%) in TAO patients. Renal disorder was present in 3(6.52%) patients in PAD and 1(6.25%) in TAO patients. Hepatic disorder was present in

1(2.17%) patients in PAD and absent in TAO patients. Past history of smocking was present in 24(52.17%) patients in PAD and 14(87.5%) patients in TAO group. In PAD patients 14(30.435%) patients were smoker at time of enrolment and in TAO group 12(75%) patients were smoker at time of enrolment. Regarding type of smocking practice 16(34.78%) use to have cigarette and 6(37.5%) used to have traditional smocking method in PAD group. In TAO group 6(37.5%) have habit of cigarette smoking and 8(50%) patients have habit of traditional way of smocking. Tobacco chewing was present in 12(26.08%) patients in PAD and 10(62.5%) in TAO patients. In PAD group 14(30.34%) patients were alcoholic and in TAO group 6(37.5%) patients were alcoholic.



**Fig 1:** Gangrene of finger and toe in lower extremities peripheral artery disease

**Table 3:** Clinical presentation and extent of involvement of limb

Variables	PAD(peripheral artery disease)	TAO (thromboangitis obliterans)
Atypical pain syndrome	1(2.17%)	1(6.25%)
Claudication(ICl)	4(8.6%)	1(6.25%)
Rest pain(RP)	4(8.6%)	2(12.5%)
ICl +RP	2(4.34%)	2(12.5%)
ICl +RP+ Gangrene	23(50%)	8(50%)
ICl +RP + ulcer	12(26.08%)	2(12.5%)
Gangrene of toe	6(13.04%)	6(37.5%)
Gangrene of foot	8(17.39%)	2(12.5%)
Gangrene of foot and leg	6(13.04%)	0
Gangrene above knee	3(6.52%)	0

As per table 3 atypical pain syndromes was clinical presentation in 1(2.17%) patient in PAD group and 1(6.25%) patients in TAO group. Claudication was clinical presentation in 4(8.6%) patients in PAD group and 1(6.25%) patients TAO group. Rest pain was clinical presentation in 4(8.6%) patients in PAD group and 2(12.5%) patients TAO group. Claudication and rest pain both was clinical presentation in 2(4.34%) patients in PAD group and 2(12.5%) patients in TAO group. In PAD group 23(50%) patients were presented with gangrene and 8(50%) patients in TAO group presented with gangrene. Ulcer was presented in

12(26.08%) patients in peripheral artery disease group and 2(12.5%) patients in thromboangitis obliterans group.

Regarding site of gangrene 6(13.04%) patients in PAD group has gangrene in toe, 8(17.39%) have gangrene in foot, 6(13.04%) have gangrene in foot and leg and 3(6.52%) have gangrene above knee. Similarly in TAO patients 8(50%) have gangrene in toe and 2(12.5%) have gangrene in foot.

**Table 4:** Site of involvement of arteries in lower extremities

Site of involvement	PAD(peripheral artery disease)	TAO (thromboangitis obliterans)
Dorsalis pedis artery	2(4.34%)	6(37.5%)
Infra popliteal artery	8(17.39%)	10(62.5%)
Popliteal artery	28(60.86%)	0
Femoral artery	8(17.39%)	0

Dorsalis pedis artery was more commonly involved in thromboangitis obliterans patients then peripheral artery disease (37.5% vs 4.34%). Infra popliteal artery was also more commonly involved in thromboangitis obliterans patients then peripheral artery disease (62.5% vs 17.39%). Popliteal artery was involved in 28(60.86%) patients in PAD group and absent in TAO patients. femoral artery was involved in 8(17.39%) patients in PAD group and absent in TAO patients.

**Table 5:** Treatment modalities and outcome of treatment

Variables	PAD(peripheral artery disease)	TAO (thromboangitis obliterans)
Medical treatment and life style modification	46	16
Lumber sympathectomy	4(8.6%)	1(6.25%)
Amputation	18(39.10%)	0
Disarticulation	8(17.40%)	0
<b>Outcome of medical management</b>		
Symptoms	relieved	Not relieved
Atypical pain syndrome	1	1
Claudication(ICl)	6	2
Healing of ulcer	3	3
<b>Outcome of lumber sympathectomy</b>		
Atypical pain syndrome	1	1
Claudication(ICl)	3	1
Healing of ulcer	3	1
<b>Outcome of operative procedure</b>		
Variables	PAD(peripheral artery disease)	TAO (thromboangitis obliterans)
Uneventful	12	0
Infection	2	0
Secondary suturing	1	0
Duration of stay in hospital(days)	10.43±7.9	6.35±2.8

Regarding mode of treatment all patients in both group received medical treatment and life style modification. Lumber sympathectomy was done in 4(8.6%) patients in PAD group and

1(6.25%) in TAO group. Amputation of leg was done in 18(39.10%) in PAD group but in TAO group no patient required amputation. Disarticulation was done in 8(17.40%) patients in

## TAO group.

Regarding outcome of medical management atypical pain was relieved in one patient, claudication was relieved in 6 patients and ulcer was healed in 3 patients. After lumbar sympathectomy atypical pain was relieved in one patient, claudication was relieved in 3 patients and ulcer was healed in 3 patients. Regarding outcome of operative procedure in 12 patients it was not associated with any complication, two patients developed infection and duration of hospitalisation delayed and in one patients secondary suturing was done.

Duration of stay in hospital was  $10.43 \pm 7.9$  days in PAD group and  $6.35 \pm 2.8$  days in TAO group.

## Discussion

In present observational study sixty two patients with lower extremities peripheral artery disease were evaluated for clinicoepidemiology, presentation and treatment outcome. Mean age of patients with PAD was  $64.30 \pm 10.90$  years and TAO was  $47.06 \pm 11.94$  years, there was male predominance in both group. Which is supported by the work of Edward J. Boyko, Jessie H. Ahroni, Denise Davignon<sup>1</sup> *et al.* and Shammas NW *et al.* [7, 8] Diabetes and hypertension was common comorbid condition for peripheral artery diseases. Most of the patients in TAO group and many patients in PAD group were smoker. Traditional way of smoking and tobacco chewing was common in TAO patients. This finding corroborates with finding of Bailey MA, Griffin KJ, Scott DJ *et al.* and Shu J, Santulli G. *et al.* [9, 10].

Most of the patients with PAD were presented with gangrene (50%) and ulcer as our centre is tertiary care centre. Atypical pain syndrome, intermittent claudication, rest pain and combination of these was less common clinical presentation. This finding is supported by the work of Shu J, Santulli G. *et al.* and Lyden SP, Joseph D. *et al.* [11, 12] ROSE GA and Mary McGrae McDermott *et al.* has concluded that most of the patient of PAD are not presenting with intermittent claudication, this statement corroborate with our finding. [13, 14] dorsal pedis artery and infra popliteal artery are commonly involved in TAO and popliteal and femoral was commonly involved in PAD. Sasaki S, Sakuma M, Kuniyama T, Yasuda K *et al.* has reported that tibial artery is commonly involved in TAO which support our finding [15]. Chen, Q., Shi, Y., Wang, Y., & Li, X *et al.* has concluded from his study that Peripheral arterial disease involves the arteries distal to the aortic bifurcation in a nonuniform manner which support our study [16]. Most of the patients with gangrene or non healing ulcer required amputation or disarticulation. Patients with TAO responded better to medical and life style modification management. After medical management intermittent claudication was relieved better than rest pain. After lumbar sympathectomy ulcer healed and claudication get relieved in few patients. This is supported by study of Gardner AW, Afaq A *et al.*, and ) Dormandy JA, Rutherford RB *et al.* [14, 17] The mean duration of stay in hospital was longer in PAD patients than TAO patients that is ( $10.43 \pm 7.9$  days vs  $6.35 \pm 2.8$  days). Todd R. Vogel MD, MPH *et al.* has reported that duration of stay in hospital in most of the patients in his study was more than 7 days which support our study. [18]

## Conclusion

From present study we can conclude that TAO was more common in younger age than PAD. There was male predominance in patients with lower extremity peripheral artery disease (LE-PAD). Diabetes and hypertension was common comorbid condition associated with PAD. Most of the patients have habit of tobacco use. Gangrene and ulcer are common

presentation of patients and most of the patients required amputation and disarticulation. Some symptoms improved by life style modification and medical management. The mean duration of stay in hospital was longer in PAD patients than TAO patients.

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