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Original Research Article

Clinical evaluation of chronic lower limb ischaemia and their management

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ABSTRACT

Background: Chronic lower limb ischaemia is a clinical entity comprising of etiologies such as atherosclerosis, thromboangitis obliterans and other rare forms of non-specific and specific arteritis like SLE, Rheumatoid arteritis etc. In western countries atherosclerosis predominates, but in Indian subcontinent, TAO is much more common.
Methods: A good clinical history and detailed clinical examination was done with the presumptive diagnosis of either TAO or Atherosclerosis. The degree of the vascular insufficiency and the extent of the disease were assessed clinically by noting the severity of the symptoms, ankle brachial index, temperature changes and assessment of pulsations. Doppler study was done in all patients. After a presumptive diagnosis, an essential laboratory investigation was done. Some of the patients were managed conservatively and others underwent surgery. The operative treatment was based on the symptoms and patient's condition, with lumbar sympathectomy and amputations.
Results: Chronic lower limb ischaemia accounts for 1.12% of all surgical admissions in a period of one year. Only two diagnosis were found in our study, namely Atherosclerosis obliterens (8 cases) and TAO (42) cases. Out of the 50 cases, 40 patients underwent some form of surgical treatment. Four patients were managed conservatively and 6 patients refused surgery. Both subjective improvements in pain relief and temperature were noted in 23 patients. Three patients did not show any changes, and 2 patients had progression of the disease and underwent below knee amputation later in the same study period.
Conclusions: Though the role of lumbar sympathectomy had been debated in the recent past as a treatment modality for chronic lower limb ischaemia, it still remained an important interventional measure in limb salvage with good results.

Keywords: Amputations, Burgers disease, Lumbar sympathectomy, Peripheral arterial disease

INTRODUCTION

Chronic lower limb ischaemia is a clinical entity comprising of etiologies such as atherosclerosis, thromboangitis obliterans and other rare forms of non-specific and specific arteritis like SLE, Rheumatoid arteritis etc. which are rare. Though in western countries atherosclerosis predominates, in Indian subcontinent, thromboangitis obliterans is much more common.[1] The peculiarities of chronic lower limb ischaemia seen in our country is its incapacitating nature, morbidity being high, mortality very low, the etiopathology still unresolved and the treatment modalities unsatisfactory. When the etiology of a disease is one, the treatment is also one. When the etiology is unknown or at dispute the treatment becomes difficult. A useful and workable definition of chronic lower limb ischaemia will be to include all diseases affecting arteries of lower extremities which are

not the direct branches of aorta and resulting in gradual arterial obstruction and narrowing. Peripheral vascular disease of the lower extremity is an important cause of morbidity and affects 10 million people in India.[2]

It is a relatively common disorder in the rural Indian population. Many of them present at an advanced stage, when the possibilities of a successful treatment becomes narrowed, sometimes even becoming restricted to sympathectomy and amputations. Advances in radiological techniques and interventional radiology have helped to define the arterial pathologic anatomy more precisely and some of the treatment modalities.

The objective of this study was to see the etiological factors, age and sex distribution, the extent of involvement of the lower limb and the natural history of the disease. It also assessed the treatment option available at our set up with the peculiarities of the disease in the Indian scenario.

METHODS

This is a prospective descriptive study of 50 cases admitted in KIMS hospital between April 2001 and March 2002.

Inclusion criteria

- Patients with symptoms of chronic lower limb ischaemia of more than 6 weeks
- Patients between 20-60 years of age
- Patients with or without upper limb involvement
- Patients with recurrence after treatment
- Patients with or without diabetes

Exclusion criteria

- Patients with acute arterial occlusion
- Patients with any form of heart disease or cerebrovascular accidents
- Patients with post traumatic chronic ischaemia
- Patients presenting with frank gangrene requiring emergency major amputations.

A good clinical history and detailed clinical examination was done with the presumptive diagnosis of either TAO (thromboangiitis obliterans) or atherosclerosis. In a few cases diagnosis was done by a Doppler study and histopathology of the vessels obtained after the amputation. The degree of the vascular insufficiency and the extent of the disease were assessed clinically by noting the severity of the symptoms, ankle brachial index, temperature changes and assessment of pulsations.

Doppler study was done in all patients. After a presumptive diagnosis, essential laboratory investigations within the scope of the hospital were done. Some of the patients were managed conservatively and others underwent surgery. The operative treatment was based on the symptoms and patient's condition, with lumbar sympathectomy and amputations.

RESULTS

A total of 50 cases of chronic lower limb ischaemia were admitted during April 2001 to March 2002.Total surgical admissions were 4443 during that period, thus chronic lower limb ischaemia accounts for 1.12% of all surgical admissions.

Age and sex distribution

Majority of the cases were male patients. Only two diagnosis were found in our study, namely Atherosclerosis obliterens (8 cases) and thromboangitis obliterens (42) cases. Cases of TAO were aged between 23 to 50 years and cases of atherosclerosis were aged between 50 to 60 years. In the present study, the age of youngest patient was 23 years and that of oldest was 60 years (Figure 1). Highest distribution of cases was seen in the 3rd and 4th decades of life (Figure 2). Male preponderance was seen with 48 patients and only two cases were females with a male female ratio of 24:1.

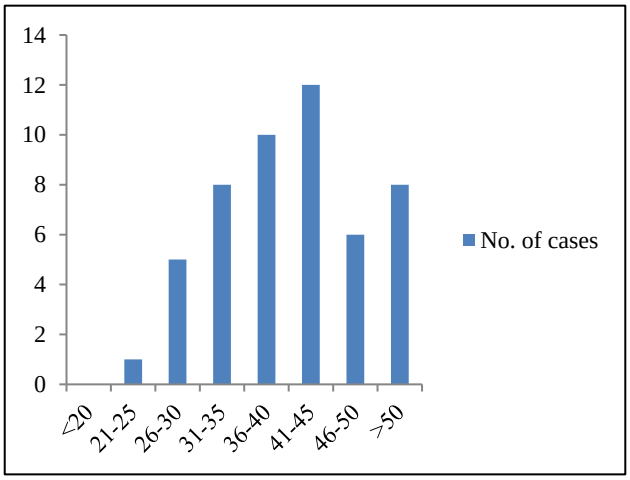

Figure 1: Age distribution.

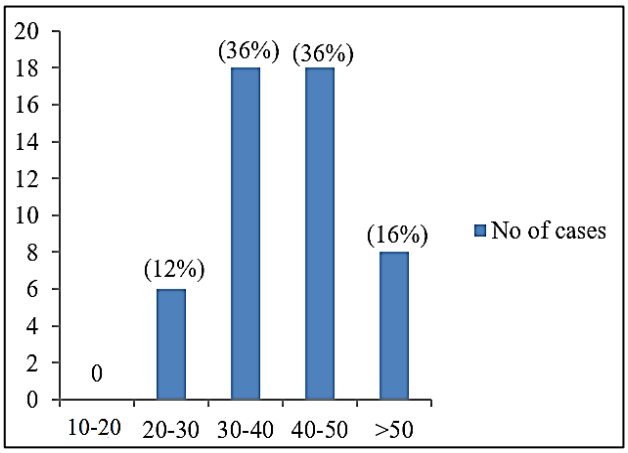

Figure 2: Percentage distribution in decades.

Occupational distribution

Unskilled workers (coolies, mason, farmers etc.) constituted the highest number of cases (42-cases), followed by semi-skilled workers (technicians, tailors etc.) accounting for 6-cases and skilled workers (educated persons, clerks etc.) accounting for 2-cases (Figure 3).

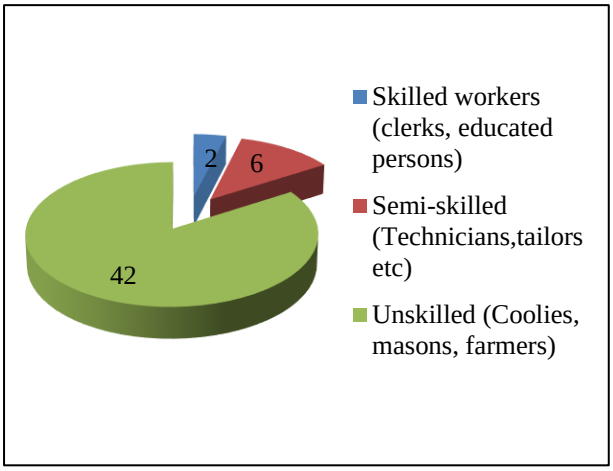

Figure 3: Occupational distribution.

Type of presenting features

The majority of the patients presented with intermittent claudication and only one patient had rest pain as a presentation whereas one patient of TAO manifested as intermittent claudication in addition (Figure 4). The duration of symptoms in ASO patients ranged from 5-months to 4-years and in TAO patients it ranged from 2-months to 1.5-years. Thus, the symptom duration was longer in patients with ASO than in patients with TAO. Because of dark complexion of our patients, the skin colour changes were not appreciated much. The only findings were of hyperpigmentation with mottling in 36-patients.

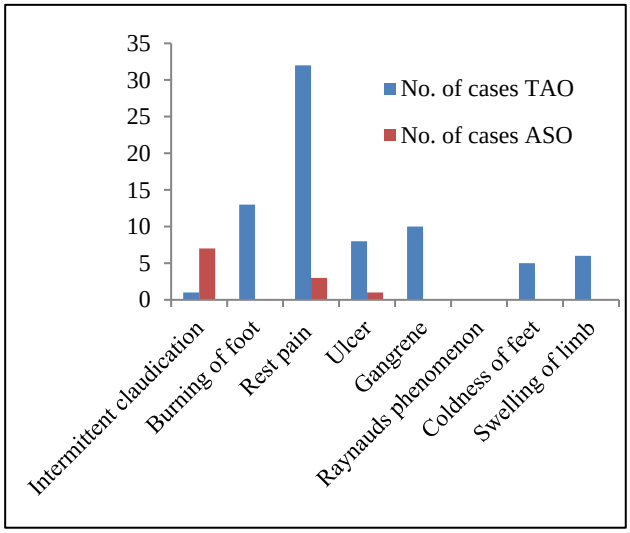

Figure 4: Type of presenting features.

Involvement of limbs

Involvement of the limbs based on symptomatology and clinical examination is shown in Table 1. Based on the symptomatology TAO was commonly involved in right and left limbs with 24-cases as compared to ASO (Figure 1 A and B). Based on the clinical examination right leg was involved in maximum number of cases (52%). Ulceration was commonly involved in the right 1st toes and distribution of the gangrene was commonly involved in both the 2nd toes.

Table 1: Involvement of the limbs.

Based on symptomatology		
Limbs	**No. of cases TAO**	**No. of cases ASO**
Both	1	3
Right	24	2
Left	24	3
Based on clinical examination		
Limbs	**No. Of cases**	**%age**
Both	10	20
Right	26	52
Left	14	28
Site of involvement		
Ulceration		
Site (toes)	**Right**	**Left**
1st	3	0
2nd	2	1
3rd	0	0
4th	1	0
5th	0	0
Distribution of gangrene		
1st	1	0
2nd	2	2
3rd	0	0
4th	0	0
5th	0	0

Distribution of cases according to severity of disease

Table 2 shows the distribution of cases according to the severity of disease. Highest number of cases presented with Grade-II severity (56%) followed by Grade-III (38%) and Grade-I (16%).

Table 2: Distribution of cases according to the severity of disease.

Severity of disease	Symptoms	No. of cases	%age
Grade-I	Intermittent claudication	8	16
Grade-II	Rest pain, cold feet, burning feet	23	56
Grade-III	Ulceration and gangrene	19	38

Table 3: Associated diseases.

Disease	No. of cases	
	TAO	ASO
IHD	0	2
Diabetes mellitus	2	2
Hypertension	2	3
Anaemia	10	1
COPD	5	1

Table 4: Routine investigations.

Investigations	No. of cases
Anaemia	11 patients
Urine sugar	0.5-1.5% (4 patients)
Fasting blood sugar	206-340 mg % (4 patients)
ESR	5 -25 mm/hour
Chest X-ray	Evidence of COPD in 18
ECG abnormalities	S/o IHD in 2 non-specific changes in 12
Serum cholesterol	250-350 mg % in 3

Associated diseases

Anaemia was the most commonly associated disease with TAO (10-cases) and hypertension was the most commonly associated disease with ASO (3-cases) as shown in Table 3. Out of total of 50-patients, 39-patients were smokers and 10-patients were alcoholics in addition to these patients. The duration of smoking ranged between 6-years to 32-years and in the form of beedies, 10 to 25 per day. Alcohol consumption in the form of arrack was found in 10 patients with duration of 10 to 20 years (average daily consumption 180 to 360 ml). Six patients were earlier diagnosed as having chronic obstructive pulmonary disease and were on treatment.

Investigations

Routine investigations were done in all patients and the specific findings are shown in Table 4 and 5. Out of the 26-patients of right lower limb involvement, Doppler detected flow in 2 of the posterior tibial artery and 6 of dorsalis pedis and 5 of popliteal arteries which were clinically not palpable. Similarly in left lower limb, Doppler detected flow in 2 popliteal, posterior tibial artery and 3 of dorsalis pedis artery. The correlation of clinical findings and Doppler study is shown in Table 6. Arteries of the amputated limbs were subjected to histopathology. Out of the 12 patients who have undergone either above knee or below knee amputations two patients showed evidence of atherosclerosis and 9-patients showed evidence of TAO.

Table 5: Doppler findings.

Right lower limbs (26 cases)							
Artery	**M**	**S**	**W-T**	**W-B**	**F-D**	**F-A**	**Block**
CFA	2	-	24	2	2	-	2
SFA(P)	2	2	24	2	2	1	2
SFA(D)	4	3	20	4	-	2	-
POP-A	-	-	-	5	5	13	13
PTA	-	-	-	6	6	20	-
DPA	-	-	-	4	4	22	-
Left lower limbs (14 cases)							
CFA	-	-	14	-	-	-	-
SFA(P)	1	1	13	1	1	-	1
SFA(D)	3	2	11	2	3	-	2
POP-A	-	-	4	3	3	7	7
PTA	-	-	-	3	3	11	11
DPA	-	-	-	2	2	12	12
Both lower limbs (10 cases)							
CFA	1	-	9	-	-	1	1
SFA(P)	-	-	9	1	1	-	-
SFA(D)	-	1	8	-	-	-	-
POP(A)	-	-	-	2	2	3	3
PTA	-	-	-	1	1	6	6
DPA	-	-	-	1	1	9	9

M-morphology, S-stenosis, W-waveform, T- triphasic , B-biphasic, F-flow, D-dampened, A- absent; CFA-common femoral artery; SFA-superficial femoral artery, POP(A)-popliteal artery; PTA-posterior tibial artery, DPA-dorsalis pedis artery.

Table 6: Correlation of clinical findings and Doppler study.

	Right				Left				Both			
Pu	**F**	**P**	**PT**	**D**	**F**	**P**	**PT**	**D**	**F**	**P**	**PT**	**D**
C	4	18	24	26	3	9	14	14	1	6	10	9
Do	4	13	22	20	3	7	12	11	1	5	9	8

Pu-pulsation, F-femoral, P-popliteal, PT-posterior tibial, D-dorsalis pedis, C-clinically, Do-Doppler.

Table 7: Details of treatments.

Treatment	**No. of cases**		
No treatment	6		
Conservative medical Rx only	4		
Surgery	40		
Lumbar sympathectomy done	18		
Lumbar sympathectomy with disarticulation/trans metatarsal amputation	10		
Major amputations	12		
Lumbar sympathectomy			
Procedure	**Right**	**Left**	**Bilateral**
Lumbar sympathectomy alone	10	7	1
Lumbar sympathectomy with disarticulation-TMA	6	4	0
Indications for sympathectomy	**No. of cases**		
Rest pain	28		
Ulceration	10		
Gangrene	9		
Procedure	**Right**	**Left**	
Sympathectomy with DA/TMA	6	4	
Above knee amputations	4	4	
Below knee amputation	2	4	
Types of amputations	**No. of cases**		
Primary	8		
Secondary-present	1		
Secondary-past	1		
Revision amputation	4		

Table 8: Comparison of sex distribution.

Authors	**Males**	**Females**	**Total**	**Ratio**
KD Meyers[3]	249	162	411	3:2
Yogasundaram[4]	62	18	80	7:2
Present Study	48	2	50	24:1

Details of treatment

In the present study, out of the 50-cases, 40-patients underwent some form of surgical treatment (40 cases out of 42 cases belonging to grade 1 and 11); 4-patients were managed conservatively and 6-patients refused surgery. Out of 6-patients, who refused surgery, two of them had undergone sympathectomy and one patient had undergone below knee amputation (Table 7). Out of 4-patients managed conservatively, 3-patients had intermittent claudication only as their symptom and one refused surgery. In our study one patient had previously undergone below knee amputation. Major amputations were done in 10 patients (total 14) and sympathectomy with disarticulations and transmetatarsal amputations were done in 10 cases. Trans-metatarsal amputations were done in 4 patients, right-3, and left-1.

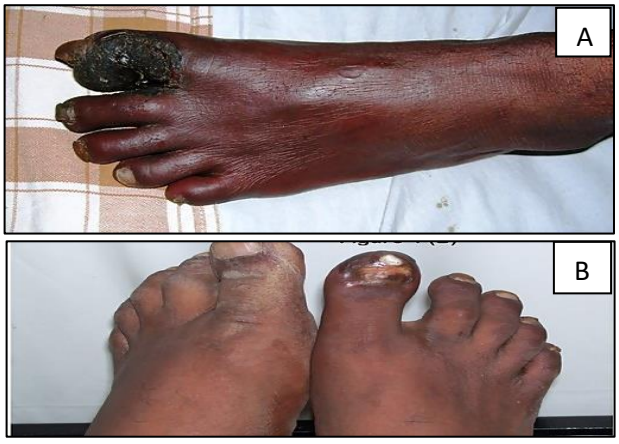

Figure 1: (A) and (B) Photographs showing TAO in Left 1st toe and Right 1st toe

Conservative medical treatment included Tab. Pentoxiphylline (Trentral) 400 mg tid. Tablet Dynaspirin (Dipyridamol and Aspirin) 1 mg bd and antioxidant and B-complex vitamins. These drugs were prescribed to all patients. Both subjective improvements in pain relief and temperature were noted in 23-patients. Three patients did not show any changes, and 2-patients had progression of the disease and underwent below knee amputation later in the same study period.

Duration of hospital stay

The duration of the hospital stay ranged from 4-days to 43-days with an average of 21-days. Patients in whom there was infection of the amputation stump and those who underwent revision amputation stayed for a longer time.

Post-operative complications and mortality

Among those who had undergone primary amputations, non-healing of the stump was found in 2-patients and

these patients were subjected for revision amputations. Out of the 4-patients managed conservatively three patients showed some degree of improvement in their symptoms and one patient lost for follow up. There was no mortality in the present study.

Follow up

Strict abstinence from tobacco smoking was stressed at the time of discharge and the patients were followed for a period ranging from 2 months to 1½ years. Out of the total 50 patients, 6 patients refused treatment and another 6 patients were lost for follow up. Majority of the patients attending follow up were doing well.

DISCUSSION

A study of chronic lower limb ischaemia was done and the majorities of the cases were males. Only 2 cases were females and this gives a ratio of 24:1. These findings were a marked deviation in comparison to other studies (Table 8).[3,4] In the present study the highest distribution of cases was seen in the 3rd and 4th decades of life which is in sharp contrast to the study done by Yogasundarams where they reported mostly elderly people.[4]

Table 9: Comparison of symptom distributions.

Symptoms	Present study	Martins[5]	Mangalvedkars[6]	Shionoya S[7] (328 cases)
Intermittent claudication	8	11	18	106
Burning of foot	13	0	17	0
Rest pain	30	3	13	287
Ulcer or gangrene	19	7	10	40
Raynauds phenomenon	0	4	0	0
Cyanosis and Coldness of feet	5	3	1	63
Swelling of the limb	8	1	0	0
Thrombophlebitis	0	11	0	0
Asymtomatic	0	0	0	111

Table 10: Comparison with other study.

Comparison of lower limb involvement		
Pattern	**Present study**	**Nayak RS[8]**
Right	26 (52%)	42 (28%)
Left	14 (24%)	36 (24%)
Both	10 (20%)	56 (36%)
Upper limbs	0	13 (9%)
All four	0	3 (2%)
Total	**50**	**150**
Comparison of level of absent pulsations		
Vessel	**Present study**	**Nayak RS[8]**
Femoral	8	10
Popliteal	28	23
Posterior tibial	40	60
Dorsalis pedis	38	57
Brachial	0	1
Radial	0	14

It could be seen that in comparison to Indian and Western study (Table 9) there were no cases of thrombophlebitis and Raynaud's phenomenon in the present study as well as in other Indian study, and the number of patients presenting with rest pain and gangrene was higher in present study which was in agreement with study done by Mangalvedkar.[6]

In Shionoya series, there was a significant proportion of patients having asymptomatic disease which was not seen in the present study.[7] However their detection was based on survey methods but the proportion of patients presenting with rest pain and gangrene was comparable.

Comparison of lower limb involvement

In our study both lower limbs were involved with an almost equal frequency. There were no cases of either upper limb involvement or involvement of upper limbs in association with lower limbs (Table 10). Involvement of both limbs was comparatively less in the present study than that of study done by Nayak RS.[8] Although the levels of absent pulsations were comparable in both groups in the lower limbs, there was no absent pulsation in the upper limbs in the present study.

Severity of the symptoms according to the grade

Patients were grouped into three main categories as suggested by Fontain, and the results are shown in Table 11. Majority of the patients in the present study were either Grade II or Grade III whereas in Nayak RS series most of the cases belonged to Grade III.[8]

Table 11: Severity of the symptoms according to the grade.

Severity of disease	Symptoms	No. of cases	%	Nayak RS[8]	%
Grade-1	Intermittent claudication	8	16	4	3
Grade-II	Rest pain, cold feet, burning of feet	33	66	3	2
Grade-III	Ulceration and gangrene	19	38	143	95

Comparison of results of sympathectomy

Among patient who underwent sympatectomy (28 cases), 23 patients reported improvements in their symptoms namely relief of pain and healing of ulcers (89% of those undergone surgery). At 6-months post operatively, this was in marked variance with other observers where in the results were 58.5% in Grade II patients and 61.7% in Grade-III patients, and 100 sympathectomies were studied in patients with chronic lower limb ischaemia at the same level of follow up.[9]

However long term follow up studies were needed to come to a conclusion.

Table 12: Comparison of the results of sympathectomy.

Results	Present study	Postlewaite JC
Improvement	82%	51%
No change	10%	29%
Subsequent amputation	3%	16%
Death	0%	2%

In comparison to the results of sympathectomy done by Postlewaite JC there was significant improvement in pain and healing of ulcers and the failure rate was almost half as compared to their study.[10] The findings varied considerably in the two studies. These findings might be because of inadequate follow up in the present study.

CONCLUSION

Chronic lower limb ischaemia is a common condition in our population. Among various etiology sited in the literature, atherosclerosis obliterans and thromboangitis obliterans account for the majority. Occupation is more important in patients with TAO as it may predispose to it and also the disease may have impact on the lifestyle. Lack of awareness among the people, improper history and dark complexion of our population makes it difficult to elucidate a good history and physical signs.

However, availability of the Doppler ultrasound has made it easier to know the nature of the vessels involved and the collateral circulation and thus has improved the trend towards limb salvage. Since majority of the patients presented in an advanced stage, feasibility of vascular reconstruction had become limited; also because of lack of expertise at all centers and especially in patients with TAO.

Though the role of lumbar sympathectomy had been debated in the recent past as a treatment modality for chronic lower limb ischaemia, it still remained an important interventional measure in limb salvage with good results.

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