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Research Article

Thrombo-angitis obliterans: a clinico-pathological study

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ABSTRACT

Background: Thrombo-angitis obliterans (TAO) is a disease of young and middle aged individuals who are addicted to smoking from early teens. Greater awareness should be created among the general population regarding smoking, as it is the major cause of TAO. Early diagnosis and management is essential as it is a self limiting disease with complete cessation of smoking.
Methods: 50 patients of TAO were selected based on inclusion and exclusion criteria. Data was collected by history, clinical examination and radiological investigation. Patients were treated with conservative management, lumbar sympathectomy, cervical sympathectomy, disarticulation and amputation.
Results: Majority of the patients were in the age group of 30-40 years. All the patients were males belonging to low socio-economic status and chronic smokers. Most of them had right lower limb involvement and presented with rest pain with intermittent claudication. Majority of them were manual workers. 80% of the patients had low temperature in the affected limb. 96% of the patients had dorsalis pedis and posterior tibial arteries involvement. 44 patients underwent lumbar sympathectomy. Ischaemic ulcer healed in 56% of these patients, colour changes improved in 78% and rest pain improved in 42%.
Conclusions: TAO was common in males aged 30-40 years belonging to low socio-economic status. Lower limb was commonly involved. Smoking has a definite role in the development of TAO. Pain was the predominant complaint. Manual labourers were commonly affected. Medium to small calibre vessels were involved. Majority of the patients were treated by lumbar sympathectomy.

Keywords: Thrombo-angitis obliterans, Smoking, Lumbar sympathectomy

INTRODUCTION

Thrombo-angitis obliterans (Buerger's disease) is a clinical syndrome characterized by the presence of segmental thrombosis and occlusions of small and medium sized arteries in the lower and frequently the upper limbs, associated with prominent arterial wall inflammatory cell infiltration. In 1847, Von Winiwater first described thrombo-angitis obliterans (TAO). However, Leo Buerger studied this disease extensively and in 1924 published a book and hence it is also called Winiwater-Buerger's disease.[1,2]

Even though TAO is seen worldwide, there is higher prevalence in India, Southeast Asia and eastern European countries than the West.[3-6] It is predominantly seen in young adult male smokers.[4-8] The pathogenesis is poorly understood and most hypotheses are controversial. Smoking is the major aetiological agent in the pathogenesis of this disease.[3-6] However it is unwise to consider this disease to be caused by single aetiological agent i.e. smoking. A lot of questions have to be answered - why is it common in the East where the smoking is universal? Why all heavy smokers do not end up with the disease? Why is it common among the poor

socio-economic strata? This brings into the possibility of environmental, nutritional and hormonal factors into picture.

Early diagnosis and management of this disease is important. But there is no specific marker of the disease and the diagnosis is based on clinical and angiographic criteria.[5] Even though wide spectrum of medical and surgical therapies have been proposed; total cessation of tobacco use remains the only means of stopping the disease progression.[9]

The present study has been done to evaluate the etiopathological factors, clinical presentation and treatment options for thrombo-angitis obliterans.

The objectives of the present study are:

1. To study the association between age, sex, smoking and socio-economic status in the etiology of thrombo-angitis obliterans.
2. To study the pattern of clinical presentation.
3. To study the efficacy of lumbar sympathectomy in the management of thrombo-angitis obliterans.

METHODS

Source of data

Patients presenting with signs and symptoms of thrombo-angitis obliterans in surgical outpatient department or admitted to surgical wards of K.R. Hospital, attached to Mysore Medical College and Research Institute, Mysuru, India during the period December 2007 to August 2009 were studied. Approval from Institutional ethics committee was taken to conduct the study.

Method of collection of data

Fifty patients of thrombo-angitis obliterans were randomly selected. Data collection was by meticulous history, clinical examination and appropriate radiological investigation.

Inclusion criteria

- Patients with signs and symptoms of thrombo-angitis obliterans.[9]

Exclusion criteria

- Other causes of peripheral vascular disease like Raynaud's disease, scleroderma.
- Patients with risk factors for atherosclerosis like hypertension, diabetes except smoking.
- Patients aged more than 50 years with ischemic changes in the limb.

Diagnostic criteria in thrombo-angitis obliterans[9,10]

The features specific to Bueger's disease are peripheral ischemia of non-atherosclerotic, inflammatory nature and a self-limiting course. Hence diagnostic criteria are discussed from a clinical point of view.

Diagnostic criteria included in the present study are:

- Smoking history
- Onset before the age of 50 years
- Infrapopliteal arterial occlusion
- Either upper limb involvement or phlebitis injuries
- Absence of atherosclerotic risk factors other than smoking.

Investigations

Investigations employed for the cases selected are:

- Routine investigation
  Blood: Haemoglobin%,
  Bleeding Time,
  Clotting Time,
  Fasting Blood Sugar,
  Post Prandial Blood Sugar,
  Blood urea,
  Serum creatinine
  Urine analysis: Albumin,
  Sugar,
  Microscopy
- Serum electrolytes
- ECG
- Arterial Doppler of the limb

Treatment

Patients were treated with one or more of the following modalities of treatment.

- Conservative management
- Lumbar sympathectomy
- Cervical sympathectomy
- Disarticulation
- Amputation

Follow-up

Patients on conservative management were followed up every month and patients who underwent surgery were followed up every three months.

Statistical analysis

Data was analysed and the results were presented as frequency, percentage and confidence intervals appropriately.

RESULTS

1. *Age*

Out of 50 patients, 26 (52%) were in the age group 30-40 years, 14 (28%) in the age group of 20-30 years and 10 (20%) in the age group of 41-50 years. The mean age of presentation in our series was 35.12 years. (Table 1).

Table 1: Age incidence of TAO.

Age group (years)	Number of patients	Percentage
20-30	14	28
31-40	26	52
41-50	10	20
Total	50	100

2. *Sex*

All the patients in the present study were male patients (Table 2).

Table 2: Sex incidence of TAO.

Sex	Number of patients	Percentage
Male	50	100
Female	0	0
Total	50	100

3. *Socio-economic status*

48 patients (96%) were of low socio-economic status (Table 3).

Table 3: Socio-economic status and incidence of TAO.

Socio-economic status	Number of patients	Percentage
Low	48	96
High	2	4
Total	50	100

4. *Side of disease*

26 patients (52%) had right lower limb involvement, 19 patients (38%) had left lower limb involvement. Both lower limbs were involved in 3 patients (6%). Right upper limb was involved in 2 patients (4%) (Table 4).

5. *Smoking*

All patients were smokers. 32 patients (64%) were heavy smokers (>20 beedies/day), 18 patients (36%) were moderate smokers (10-20 beedies/day). All patients were beedi smokers. The duration of smoking varied from 10-25 years (Table 5 and 6).

Table 4: Side of disease and incidence of TAO.

Side of disease	Number of patients	Percentage
Right lower limb	26	52
Left lower limb	19	38
Bilateral lower limb	3	6
Right upper limb	2	4
Left upper limb	0	0
Total	50	100

Table 5: Smoking and incidence of TAO.

Number of beedies per day	Number of patients	Percentage
Non-smokers	0	0
Occasional smokers (<10 beedies/day)	0	0
Moderate smokers (10-20 beedies/day)	18	36
Heavy smokers (>20 beedies/day)	32	64
Total	50	100

Table 6 : Duration of smoking.

Duration (years)	Number of patients	Percentage
<10	0	0
10 to 15	8	16
15 to 20	12	24
20 to 25	20	40
>25	10	20
Total	50	100

6. *Mode of presentation*

Mode of presentation of TAO is shown in Table 7.

Table 7: Mode of presentation of TAO.

Symptoms	Number of patients	Percentage
Pain	50	100
Discolouration	32	64
Ulcer	39	78
Gangrene	16	32
Edema	12	24

Skin discolouration

Blackening of the skin was seen in 32 patients (64%).

Gangrene

Gangrene of the limb/toes was present in 16 patients (32%).

Signs of ischemia

Signs of ischemia either in the form of dryness of the

skin, loss of subcutaneous fat, loss of hair, brittle hair was seen in 42 patients (84%).

Line of demarcation

Out of the 16 patients who presented with gangrene of the limb/toes, 13 patients had a definite line of demarcation and 3 patients did not have definite line of demarcation.

Edema and ulceration of the limbs

39 patients (78%) presented with superficial ischemic ulcers. 12 patients had associated limb edema (24%).

Temperature and anaesthetic changes

40 patients had low temperature in the affected limb compared to the body temperature (80%). 10 patients among 50 had associated hypoanaesthetic area (20%).

7. *Occupation*

Majority of the patients were manual labourers constituting 70% (35 patients), 10 patients (20%) were petty businessmen, 3 patients (6%) were craftsmen and other 2 patients (4%) were unemployed (Table 8).

Table 8: Occupation and incidence of TAO.

Occupation	Number of patients	Percentage
Labourers	35	70
Petty businessmen	10	20
Craftsmen	3	6
Others	2	4
Total	50	100

8. *Vessel involvement*

In the present study, dorsalis pedis and posterior tibial arteries involvement was seen in 48 patients (96%). Associated popliteal artery involvement was seen in 5 patients (10%). Radial and ulnar arteries were involved in 2 patients (4%) (Table 9).

Table 9: Peripheral vessel involvement in TAO.

Peripheral vessels	Number of patients	Percentage
Dorsalis pedis alone	0	0
Posterior tibial alone	0	0
Dorsalis pedis and posterior tibial	43	86
Dorsalis pedis, posterior tibial & popliteal	5	10
Radial and ulnar	2	4
Total	50	100

9. *Systemic examination*

Out of 50 patients in the present study, only 3 patients (6%) had cardiovascular system involvement and anginal symptoms. No other patients had any other abnormalities.

10. *Investigations*

(a) Routine investigations

- Ten patients had mild to moderate anemia (20%).
- ECG changes – Ischemic changes were seen in 3 patients.
- None of the patients were diabetic.
- No other abnormalities were detected in other patients.

(b) Specific investigations

Of 50 patients, 40 patients underwent color Doppler of arteries of the affected limb. All of them had features of infrapopliteal involvement with decreased flow in the affected vessels.

11. *Treatment*

In the present study, 44 patients (88%) underwent lumbar sympathectomy, 4 patients (8%) underwent above knee amputation. 12 patients who had gangrene underwent disarticulation of the affected part in addition to lumbar sympathectomy. 2 patients (4%) with upper limb involvement underwent cervical sympathectomy. All patients (100%) irrespective of other treatment modalities were put on vasodilators (Table 10).

Table 10: Treatment in TAO.

Modalities of treatment	Number of patients
Vasodilators	50
Lumbar sympathectomy alone	32
Cervical sympathectomy alone	2
Amputation	4
Lumbar sympathectomy with disarticulation	12
Disarticulation alone	0

Table 11: Effects of lumbar sympathectomy on TAO.

	Number of patients	Number of patients benefited (%)	95% CI
Rest pain	12	5 (42)	19.3 – 68.1%
Discolouration	32	25(78)	61.0 – 89.3%
Ulcer	39	22(56)	41.0 – 70.7%

CI = confidence interval

Of the 44 patients who underwent lumbar sympathectomy, ischemic ulcer healed in 22 (56%) of 39 patients, colour changes improved in 25 (78%) of 32 patients, rest pain was improved in 5 (42%) of the 12 patients (Table 11).

Figure 1: Thrombo-angitis obliterans of the upper limb showing gangrenous changes in the finger tips.

Figure 2: Thrombo-angitis obliterans of the lower limb showing gangrenous changes in the great toe.

DISCUSSION

This was a hospital based study conducted on a total of 50 patients who presented to the surgical outpatient department or admitted to surgical wards of K.R. Hospital, attached to Mysore Medical College and Research Institute, Mysuru, during the period December 2007 to August 2009.

In our study, majority of patients (52%) were in the age groups 30-40 years. The mean age of presentation in our case series was 35.12 years. In a study by Chopra BS et al of 61 cases of thrombo-angitis obliterans, the average age of presentation was 34.2 years.[11]

All the patients (100%) in the present study were males. A study by Chopra BS et al also had similar findings.[11] It may be so because in India the incidence of smoking among males is comparatively very high compared to females. However, there has been an increase in the incidence of TAO in women. Njo KT and Smit AJ reported thrombo-angitis obliterans in two female smokers.[12] In a study by Olin J et al of 112 patients diagnosed as having thromboangiitis obliterans, 23% patients were women.[13] Yorukoglu Y et al also reported an increased incidence of TAO in women.[14] The increasing incidence in women has been attributed to the increased smoking in women.

Majority of the patients, about 96% (48 patients) were of low socio-economic status. Only 4% (2 patients) were belonging to high socio-economic status.

In the present study, right lower limb was involved in 52% (26 patients), followed by left lower limb involvement (38%). Both lower limbs were involved in 6% patients. Right upper limb was involved in only 2 patients (4%). In a study by Olin J et al, about 46% of patients with thrombo-angitis obliterans had isolated lower extremity involvement, 28% had upper extremity involvement and about 26% had both upper and lower extremity involvement.[13]

All patients in our study were smokers and they smoked beedi. Majority of them (64%) were heavy smokers. In a case-control study by Mabbubar R et al during the period 1995 to 1996, it was concluded that beedi smoke may play a more important role in causing thrombo-angitis obliterans than cigarette.[15] This leads to the speculations that unprocessed and low-grade tobacco used for producing beedies might have a more important role to initiate thrombo-angitis obliterans than cigarrette.

Most common mode of presentation of TAO was pain with intermittent claudication in the affected limb. Other modes of presentation were rest pain, skin discolouration, ulceration of the limb, gangrene of the foot or toes and edema. In a retrospective study of 344 patients with thrombo-angitis obliterans during 1980-2004 conducted by Atis A et al, it was found that colour changes were seen in 290 (84.3%), rest pain in 160 (46.5%), claudication in 166 (48.2%) and necrotic ulcer in 185 (55.1%).[16]

Majority of the patients were manual workers followed by petty businessmen and craftsmen. Other 4% (2 patients) were unemployed. This observation may be due to the habit of excessive smoking and susceptibility to trauma in manual workers.

In our study, the temperature in the affected limb was low as compared to the body temperature in 80% patients. About 20% patients had associated hypo-anaesthetic changes. Dorsalis pedis and posterior tibial arteries involvement was seen in 96% of patients. 10% had associated popliteal artery involvement. Radial and ulnar arteries were involved in 4% patients. From this observation, we can infer that thrombo-angitis obliterans involves the medium and small sized vessels with special reference to lower limbs. Cardiac involvement in the form of angina (ECG changes) was seen in 3 patients. No other abnormalities were seen in any of the other patients.

In the present study, 10 patients had mild to moderate anemia, 3 patients had ischemic changes in the ECG. None of the patients were diabetic. All 40 patients who underwent Color Doppler of the arterial system of the affected limb had features of infrapopliteal involvement with decreased flow in the affected vessels. Results of

Colour Doppler support the fact that TAO involves the medium and small sized vessels with special reference to lower limbs.

In the present study, all patients were put on vasodilators. Majority of the patients underwent lumbar sympathectomy. Of the 44 patients who underwent lumbar sympathectomy, ischemic ulcer healed in 22 (56%) of 39 patients (95% CI is 41.0 -70.7%), colour changes improved in 25 (78%) of 32 patients (95% CI is 61.0- 89.3%), rest pain was improved in 5 (42%) of the 12 patients (95% CI is 19.3 – 68.1%). A retrospective study by Atis A et al on 344 patients with Buerger's disease reported that color changes improved in 230 (79.3%) patients, foot coldness were decreased in 288 (92.3%) and rest pain were improved in 43 (26.8%). Necrotic ulcers healed in 30 of 185 patients.[16]

CONCLUSION

From the results of this study and several previously reported studies, following conclusions can be drawn.

- Majority of the patients were in the age group of 30-40 years.
- Males were commonly involved.
- Low socio-economic status patients were more commonly involved.
- Lower limb was commonly involved.
- Smoking had a definite relation in the development of thrombo-angitis obliterans.
- Pain was the predominant complaint in majority of the patients.
- Manual labourers were commonly involved.
- Medium to small caliber vessels were involved.
- Majority of the patients were treated by lumbar sympathectomy and vasodilators.

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