

Thromboangiitis Obliterans (Buerger's Disease)

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Abstract— *Thromboangiitis Obliterans (TAO) is a non-atherosclerotic segmental inflammatory disease predominantly affecting the medium to small sized arteries and veins of both lower and upper extremities. Cigarette smoking is the most important contributing factor in the development of the disease. The disease is assuming alarming proportions on the Indian subcontinent. Clinical features and investigations constitute the basis of an early diagnosis of thromboangiitis obliterans. Abstinence from smoking is the mainstay of treatment despite the availability of a wide spectrum of medications for the treatment of the disease. Surgical interventions have minimal scope in the management of the disease. Newer modalities such as stem cell therapy may perhaps hold a future for preventing disease progression.*

Keywords— *Thromboangiitis obliterans diagnosis treatment.*

I. INTRODUCTION

Thromboangiitis Obliterans (TAO) is a non-atherosclerotic segmental inflammatory disease affecting both the extremities. In the typical acute phase of the disease, there is thrombosis and acute inflammation involving all the layers of the vessel wall. TAO is distinguished from other types of vasculitis by its close association with tobacco consumption. TAO was first described in 1879 by Felix von Winiwarter who was an Austrian surgeon¹. It was then described as pre senile spontaneous gangrene. It was Buerger who then named the disease as Thromboangiitis Obliterans and described its close relationship with smoking in 1924¹.

Etiopathogenesis

The prevalence of the disease in India is quite high, ranging from 45-63%. It predominantly affects men though the incidence in women continues to increase due to increased smoking habits.

The exact etiology of TAO is still unknown. Various etiologies have been put forward to explain the etiopathogenesis of this disease. Though classified as a type of vasculitis, it is different from other vasculitis. The peculiar feature in thromboangiitis obliterans is that the internal elastic lamina is preserved.

Smoking: Exposure to tobacco plays a pivotal role in the initiation and progression of the disease². Patients with thromboangiitis obliterans have an increased cellular sensitivity to type I and III collagen as compared to the other healthy males. It is an abnormal sensitivity or allergy to some components of tobacco that leads to inflammatory small vessel

occlusive disease. There is a close relationship between active smoking and a proactive course of Buerger's disease.

Genetics: There is no gene that has been identified to date which can be attributed to predisposition of TAO³. However in the United Kingdom there is preponderance of HLA 9 and HLA B5 antigens.

Hypercoagulability: Level of urokinase plasminogen activator inhibitor was 40% lower in patients with thromboangiitis obliterans as compared to normal. An increased platelet response to serotonin has been described in Buerger's disease. Elevated plasma homocysteine levels have been found in patients with thromboangiitis obliterans⁴. High homocysteine levels are closely associated with higher amputation rates as compared to others. High anticardiolipin antibody titers in thromboangiitis obliterans patients are associated with higher incidence of major amputation⁵.

Endothelial dysfunction: Antiendothelial cell antibodies are elevated in 25% of the cases. Antiendothelin antibody titers correspond to the severity of the disease process. There is also an endothelium dependent vasorelaxation in the peripheral vasculature of patients with Buerger's disease^{6,7}.

Infection: Poor oral hygiene was seen in patients suffering from thromboangiitis obliterans. Oral bacterial DNA was found in arterial specimens of thromboangiitis obliterans patients in 93% cases⁸. Phlebotic lesions of thromboangiitis obliterans show oral bacterial DNA by PCR method.

Immunological mechanism: Presence of different types of antibodies such as antinuclear, anti-elastin, anti-collagen I and III and anti-nicotine antibodies as well as deposits of immunoglobulins IgC 3, IgC4 in the blood vessels of patients. Anticardiolipin antibodies are important in the pathology of thromboangiitis obliterans⁷.

Pathology

Acute phase lesions are characterized by severe inflammation of all the layers of the vessel wall predominantly affecting the veins along with occlusive thrombosis. There is a significant polymorphonuclear leukocytic reaction characterized by karyorrhexis leading to micro abscess formation. Intermediate phase is characterized by progressive organization of the occluding thrombus in the vessels. During the phase, there is a significant inflammatory infiltrate within the thrombus with much less inflammation in the vessel wall. The chronic phase is characterized by organization of the thrombus with extensive recanalization, prominent vascularization of the tunica media and adventitia and perivascular thrombosis. The distinct feature in all three phases is, that the internal elastic lamina essentially remains intact. This helps in distinguishing thromboangiitis obliterans from arteriosclerosis and other types of vasculitis wherein, there is gross disruption of the internal elastic lamina. Segmental involvement leading to skip areas are typically seen in thromboangiitis obliterans.

Clinical Features

The disease usually affects young males with strong smoking habits. Symptoms commence before the age of 40 years. These include migratory thrombophlebitis or signs of vascular insufficiency in adults. The disease has a predilection for the lower extremities typically affecting the anterior and posterior tibial arteries in the lower extremity and the ulnar artery in the upper extremity. Two or more limbs may be involved in Buerger’s disease. Intermittent claudication, rest pain, ulceration and gangrene usually follow as the disease progresses. The Rutherford classification (Table I) has graded the disease based on advancing severity of symptoms, ranging from asymptomatic disease to severely ischaemic ulcers and gangrene.⁹

TABLE I. Rutherford Classification

Grade	Category	Clinical feature
0	0	Asymptomatic
I	1	Mild claudication
I	2	Moderate Claudication
I	3	Severe claudication
II	4	Rest pain
III	5	Ischemic ulceration not exceeding digits
IV	6	Severe ischemic ulcer or gangrene

Investigations

There is no specific diagnostic tests for thromboangiitis obliterans. Diagnosis is predominantly based on clinical features. Two systems for diagnosing thromboangitis obliterans have been described. The Shionoya criteria and the Olin criteria have been described which are of great practical utility^{10, 11}. (Table II).

Treatment

Cessation of smoking is the mainstay of treatment. The patient has to stop smoking with immediate effect, completely and permanently. The progression of the disease is immediately altered by cessation of smoking. Patients have to be persuaded to quit smoking with the help of aggressive

counselling and rehabilitation. Medical therapy focuses on relief of symptoms.

TABLE II. Diagnostic criteria

Shionoya criteria	Olin criteria
Onset before 50	Onset before age 45
Smoking history	Current or previous tobacco use
Infrapopliteal occlusions upper limb involvement or phlebitis migrans	Distal extremity ischemia, claudication, rest pain, ischemic ulcers and gangrene
Absence of atherosclerotic risk factors other than smoking	Exclude a proximal source of emboli with echocardiography and angiography. Demonstrate consistent angiographic findings in the involved and clinically non-involved limbs

Intermittent claudication is the most important symptom which becomes more severe as the disease progresses. A variety of medications have been used for treating TAO.¹²

Platelet inhibitors - Aspirin and Clopidogrel are usually started in patients with vascular disease. However there is no evidence to suggest that these medications will arrest the progression of the disease. In fact, they are mainly indicated for preventing secondary events in patients with vascular disease.

Vasodilators - Calcium channel blockers are effective only in those cases of thromboangiitis obliterans which have a significant component of vasospasm. Calcium channel blockers have a secondary effect of changing the O₂ extraction capability thereby improving the efficiency of O₂ in the extremities.

Pentoxifylline - This drug improves the microcirculation by a variety of mechanisms: improvement of red blood cell deformability, decrease in blood viscosity, platelet aggregation inhibition and reduction in fibrinogen levels. Pentoxifylline is found to increase the claudication distance thereby improving the quality of life.

Cilostazol - It is a phosphodiesterase type III inhibitor which inhibits cAMP phosphodiesterase. Increase in cAMP in platelets and blood vessels leads to inhibition of platelet aggregation and promotion of smooth muscle cell relaxation. The main side effect of this drug is severe headache. Other side effects include bulky stools, loose motions and palpitations. The drug has been found to have beneficial in patients with thromboangiitis obliterans.

Surgical revascularization has limited role in thromboangiitis obliterans due to diffuse vascular damage and the distal nature of the disease.¹³ However a wide range of procedures, such as sympathectomy, omentopexy and Ilizarov technique have been described. However the results with all these techniques are extremely poor.

Spinal cord stimulation has also been tried in refractory cases.

Inhibition of sympathetic vasoconstriction improves the peripheral microcirculation. Nitric oxide and gamma amino butyric acid system in the spinal cord may be important intermediaries leading to pain relief. This technique also improves the circulation in the limb.

Prostaglandin analogues have been found to have a beneficial effect on patients with thromboangiitis obliterans.

Cessation of smoking accompanied with prostaglandin analogue administration have been found to have a beneficial effect by alleviating pain, improving ulcer healing and reducing the amputation rate.

Many other experimental modalities are being tried out.

Oral endothelium antagonists, gene transfer to stimulate angiogenesis and stem cell therapy are being tried out. However, these modalities are still in an experimental stage.

II. CONCLUSION

Thromboangiitis obliterans is a peculiar type of vasculitis strongly linked to tobacco. Diagnosis is predominantly clinical based on its strong association with tobacco consumption. Abstinence from smoking is the mainstay of the treatment. Medical line of treatment will only help in improving the symptoms but will not help in arresting the progression of the disease. Surgical treatment is of limited value. Newer therapies such as prostaglandins, endothelin antagonist, gene transfer and stem cell therapy are being carried out for testing their efficacy in managing this disease. Despite all modalities of treatment, early diagnosis and absolute cessation of smoking remain the mainstay of treatment.

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