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Review

Thromboangiitis obliterans (Buerger's disease)

Ignacio J. Rivera-Chavarría*, José D. Brenes-Gutiérrez

Division of Vascular Surgery, Rafael Ángel Calderón Guardia Hospital, Caja Costarricense del Seguro Social, San José, Costa Rica

HIGHLIGHTS

- Current concepts on the pathophysiology and diagnosis of Thromboangiitis Obliterans.
- Importance of complete abstinence of tobacco.
- Actual Treatments of Thromboangiitis Obliterans.

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ABSTRACT

Thromboangiitis Obliterans is a non-atherosclerotic inflammatory disease of unknown etiology, which has a strong association with tobacco. We present current concepts on the pathophysiology and diagnosis, as well as a review in treatments.

Contents

1. Introduction

Thromboangiitis Obliterans (TAO), also known as Buerger's disease, was described in 1908 when Buerger published his classic paper and later his book in 1924 [1]. It is a nonatherosclerotic inflammatory disorder of unknown etiology that affects small and

* Corresponding author. Servicio Vascular Periférico, Hospital Rafael Ángel Calderón Guardia, Barrio Aranjuez, San José, 10101, Costa Rica.
E-mail address: riveraignacio@gmail.com (I.J. Rivera-Chavarría).

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medium-sized vessels of the extremities and has a strong association with smoking [2,3].

This panarteritis affects men ages between 25 and 35 years and can involved arteries, veins and nerves of arm and legs [1]. Extraordinary manifestations of TAO can involve the gastrointestinal, cerebrovascular, coronary and renal arteries [4,5].

2. Epidemiology

Although Buerger's disease has a worldwide distribution, it is more prevalent in the Middle East and Far East than in North America and Western Europe.

The prevalence of the disease among all patients with peripheral arterial disease varies from as low as 0.5 to 5.6% in Western Europe to as high as 45 to 63% in India, 16 to 66% in Korea and Japan, and 80% in Israel among Jews of Ashkenazi ancestry [6].

Several studies have reported an increase in the prevalence of the disease in women ranging from 11% to 23% [7].

3. Pathophysiology

The pathological features accompanying TAO are categorized in three phases including acute, subacute and chronic, according to the thrombus pattern and the nature of the inflammatory cells. In contrast to other forms of vasculitis, the normal structure of the affected vessel, and particularly the internal elastic lamina, remains intact in all three phases of TAO [8].

The main characteristic of the acute phase is a hypercellular and inflammatory thrombus with minimal inflammation in the vascular wall of the affected vessel. In this phase, the polymorphonuclear (PMN) leukocytes are predominant cells at the site of inflammation, which may form microabscesses within the thrombus. However, in the subacute phase, PMNs in the microabscesses are surrounded by a granulomatous inflammation, which may lead to organization and recanalization of the thrombus. Finally, the mature thrombus with vascular fibrosis is observed in the end-stage phase [9].

Although smoking is considered to be the most important risk factor of TAO, the essence of this relationship remains unclear until now. Endothelial cells play a key role in initiation and perpetuation of the inflammatory response and endothelial dysfunction in turn is reflected by impaired endothelium-dependent vasorelaxation, observed in studies on forearm blood flow [10,11].

4. Diagnosis

The diagnostic criteria of TAO still vary, despite the fact that the need for strict criteria was postulated 30 years ago. Some criteria are: Shionoya, Mills and Japanese Ministry of Health and Welfare, but the most used are Shionoya Criteria (Table 1) [4].

The exclusion of arteriosclerosis or risk factors of other occlusive vasculopathies is the most crucial criterion. Vascular disease to be ruled out: arteriosclerosis obliterans, traumatic arterial thrombosis, popliteal arterial entrapping syndrome, occlusive vasculopathy due to systemic lupus erythematosus or scleroderma diffusum, Behcet's disease [4].

Table 1
Shionoya clinical criteria.

Clinical criteria
1. Smoking history
2. Onset before the age of 50 years
3. Infrapopliteal arterial occlusions
4. Either upper limb involvement or phlebitis migrans
5. Absence of atherosclerotic risk factors other than smoking.

Typical arteriographic lesions are described as corkscrew-shaped collaterals, known as Martorell's sign, which may represent compensatory changes in vasa vasorum, in the presence of segmental lesions, or in occlusions in the distal extremity [7].

Unfortunately, corkscrew collaterals are not pathognomonic of Buerger's disease as they may be seen in diseases such as systemic lupus erythromatosis, mixed connective tissue disease, scleroderma, CREST (calcinosis, Raynaud's syndrome, oesophageal dysmotility, sclerodactyly and telangiectasia) syndrome or any other small vessel occlusive disease or in patients with cocaine, amphetamine, or cannabis ingestion [12].

Arteriographic abnormalities in the unaffected contralateral hand are also typical, because the disease is usually not limited to a single limb [13].

Vessel biopsy is rarely indicated, unless the patient presents atypically, such as at an older age or with large-sized artery involvement. The typical histopathologic findings include a highly inflammatory thrombus infiltrated with polymorphonuclear leukocytes and multinucleated giant cells, affecting both arteries and veins [14].

5. Prognosis

Amputation risk of the long-term results of TAO management are 25% per 5 years, 38% per 10 years and 46% per 20 years [15].

Fazeli et al. described 108 patients with Shionoya's criteria. The mean age of starting cigarette smoking was about 21 years old and the mean number of cigarettes smoked was about one pack of twenty cigarettes per day. The multivariate analysis demonstrated that the duration of smoking has a significant relationship with adverse outcome, namely major amputation and could not demonstrate an influence of number of cigarettes smoked per day, the age of disease onset or gender on limb salvage from amputation. Smoking cessation had a highly protective effect with respect to avoiding amputations, while decreasing the number of cigarettes per day did not have any effect on the outcome of the disease [16].

6. Therapy

1. Cessation of smoking:

Results in dramatic improvement. Complete abstinence from the use of all tobacco, including cigarettes, cigars, and smokeless tobacco, is advisable in these patients [17]. Substituting cigarette smoking with smokeless (chewing) tobacco does not appear to decrease the risk of TAO. Nicotine-containing patches can also keep the disease active [18].

2. Surgical revascularization

Surgical revascularization is often ineffective because the distal target vessels are often involved in this diffuse segmental disease [19].

3. Endovascular Therapy

This treatment may be technically challenging because of the prevalent location of lesions in distal vessels, with frequent compromised runoff at the foot level; thus, to extend the intervention until the foot, reconstitution of more distal arteries dorsalis pedis, plantar, and foot arch has been made mandatory to achieve the high technical success rates. Graziani et al. achieved technical success in 95%. No mortality or complication related to the procedure and sustained clinical improvement was achieved in 16 of the