In today's world, smoking is very common, and it is considered as a status symbol. Use of different kinds of tobacco in cigarettes and cigars is becoming a fashion. But most people are unaware of how critical this is for the development of cancerous ulcers. Almost five out of every 10 patients of Buerger's syndrome are smokers. Buerger tried to find the root cause of this particular problem. Here are the facts and figures one should consider when smoking frequently.

Introduction

In 1908, a unique disease was described by Buerger, and a detailed analysis based on his pathological conclusions is being used in practice today. Buerger's disease is a chronic disease caused by thrombosis, i.e., the severe inflammation and blood clotting, specifically in the veins and arteries. The bodily parts that are most affected with this painful disease are the hands and the feet.

Buerger's disease is also known as thromboangiitis obliterans. This is a very unusual disease that interrupts blood circulation along the specific artery or vein of the legs and
It is common for the victims of Buerger’s disease to smoke too many cigarettes or other types of tobacco.

**Definition of Buerger’s Disease**

Buerger’s disease as inflammation of the blood vessels

![Image: “Buerger’s Disease (CT-angiogram)” by Milorad Dimic MD. License: CC BY-SA 3.0](image)

Buerger’s disease is persistent. It is illustrated by fragmental inflammation and **thrombosis, which causes a severe damage of small- to medium-sized arteries and veins**, eventually affecting the peripheral structure of the lower and upper limbs.

**Blood clotting** inflames the patient’s blood vessels, consequently causing the swelling and blockage in the vascular structure of the body. Thrombi (blood clots) ultimately cause destruction and damage to the **skin tissues**, leading to infectious gangrene. It starts from the tips and toes and then, eventually, spreads toward the legs and arms of the patient.

**Risk Factors of Buerger’s Disease**

The attributed cause is undefined, but the **consumption of tobacco** is the main culprit in the growth and expansion of Buerger’s disease. Also, if it is evident that **autoimmune aspects** are involved, the pathophysiological factors that are thought to be responsible are platelets, leukocytes, endothelial cells and sensory neurons. Additionally, possible triggers that may be causing this disease are **genetic factors**, male gender, mental stress due to a social and economic crisis as well as infectious agents. It is also important to note the cardiovascular menaces and glucose intolerance in diabetic patients.

**Pathophysiology of Buerger’s Disease**

Thromboangiitis obliterans is considered as idiopathic. However, some of the causes may stem from genetic alterations that result in Buerger’s disease.
**Inflammatory endarteritis** is a severe state of **thromboangiitis obliterans**. It causes a vasculopathy inflammation, in which a prothrombotic state is generated that will eventually lead to vaso-occlusive phenomena. Initiation of the inflammation process occurs within the tunica intima. This medical condition is closely linked with the intense use of tobacco, and its permanence will lead to expansion in the peripheral blood vessel structures.

Mild to severe claudication patients will quickly reach the critical limb ischemia, attributing to tissue loss and rest pain. The appearance of sensitive limb ischemia includes **paresthesia, poikilothermia, paresis, pallor, mottling and lack of pulse**.

Chief pathophysiology of these Buerger’s disease symptoms appears when the **vessels start to get inflamed and form clots**. This may result in obstructed blood flow throughout the tissues of the body, which may lead to the **death of tissues** due to lack of oxygen and nutrients. Ultimately, this produces **vasculitis** as well as ischemic changes in the extremities.

Buerger’s disease affects people who are likely to smoke 1–2 packs of cigarettes daily. TAO patients are hypersensitive towards tobacco extracts that are injected into the skin layers. Also, they have amplified cellular affection toward peripheral endothelium-dependent vasorelaxation and collagen types I and III. Patients also indicate a complex frequency of leukocyte antigen (HLA)–A9, HLA-B5 and also HLA-A54, thus signifying a genetic element to the disease.

**Clinical Features of Buerger’s Disease**

Buerger’s disease commonly initiates with **lethargy** and **pain in the affected areas**. The symptoms may include:

- Pain in the hands, legs and feet, which occurs every now and then, along with open sores on the hands and feet;
- Pale fingers or toes at low temperatures;
- Swelled veins

Further signs and symptoms may appear as a result of the decreased blood supply.

- Alteration in the skin color of the lower and upper limbs (pallor skin with shininess or thickness)
- Presence of weak pulse in the leg and foot
- Lack of blood flow, causing death of tissues known as gangrene
- Non-healing ulcers and wounds appearing on the leg and foot
- Reduction of hair growth on the lower limbs
- Bluish toes
- Severe burning sensation and pain in the toes
- Pain and cramps in the leg while patient is lying
- Feeling of numbness and heaviness in legs and toes
- Reddish blue color of the lower limbs
- Thick and opaque toe nails

If the patient has experienced any signs and symptoms of Buerger’s disease it is essential to notify the physician. It should not be assumed that the signs are merely the consequences of aging.
Investigations and Diagnosis of Buerger’s Disease

The majority of patients affected with TAO are around **20-45 years old**. This ailment does not arise in elderly or pediatric patients. Mostly males are affected by TAO, with the **ratio of male to female patients being at 3:1**. However, with the increasing number of smoking females, the disease rate in women is assumed to be rising.

The signs and symptoms of Buerger’s disease may look like those of many other diseases, therefore a detailed assessment by a doctor is required to conclude the correct cause. There’s no authentic test to assess if someone is suffering from arterial disease, but there are certain tests a physician can execute to exclude other diseases, for example, a simple **blood sample test**.

Additional assessment that a consultant may make is the **Allen test**. This is an intrusive test, in which the patient is requested to tighten their fist, while pressure is applied upon an artery of the hand. When the fist is opened, the physician will release the increased pressure from the artery and the hand should look paler than its original color. If the paleness disperses very slowly, that might be a sign of Buerger’s disease.

Overall, doctors practice five principles in assessing the diagnosis:

- Use of tobacco
- Pain during rest
- Ulceration of the feet and hands, especially before the age of 50
- Blockage of arteries
- Blockage of artery or clot formation cause is not known

Analysis based on certain criteria has been recommended:

- Age should be less than 50 years
- Recent or present history of tobacco
- Existence of infrapopliteal arterial occlusive ailment pointed by pain while resting, claudication, gangrenes or ischaemic ulcers and recognized by a test known as non-invasive vascular
- Either phlebitis migrans or upper-limb participation
- Non-existence of atherosclerotic risk issues, excluding smoking
- Hypercoagulable states
- Autoimmune diseases
- Proximal source of emboli by echocardiography or arteriography
- **Diabetes mellitus**

There is no particular investigation, but the following might be employed in diagnosing the root cause:
Angiogram

It is considered the most common test for arterial blockage along with X-rays, which are taken after the inoculation of dyes.

Serological

There are no particular serological indicators to identify Buerger’s disease. Suggested tests to find out other reasons of vasculitis consist of LFTs, FBC, fasting glucose, renal function tests, CRP, ESR and autoantibodies.

Angiography

Some angiographic characteristics are typical of Buerger’s disease (however, not pathognomonic). These comprise of *corkscrew* looking arteries, resulting from vascular damage—mainly the arteries in the areas of the ankles and wrists. Angiograms can also illustrate stenoses or occlusions in different areas of both the legs and arms. At times, it becomes necessary to do angiograms of other parts of the patient’s body, similar to a mesenteric angiogram, to exclude other types of vasculitis that include vascular areas common for the Buerger’s disease.

Doppler ultrasound

Lately, Doppler ultrasound has been used to exclude Buerger’s disease and other reasons of secondary Raynaud’s color.

Echocardiography

This is necessary to eliminate a source of recurring emboli.
Others

Due to the risk of cancerous elements, sometimes a biopsy in non-healing areas is required, but these skin biopsies are very rarely done.

Therapy of Buerger’s Disease

Treatment of Buerger’s disease

Pharmacological therapy is usually ineffective; quitting tobacco is the only known measure to prevent TAO progression. In the medium- and small-sized arterial vessels, endovascular revascularization or surgical possibility chances are very low due to the lack of a distal objective for revascularization. With the evolution of the disease, the only possible option is amputation.

There is no satisfying treatment for Buerger’s disease yet. Nevertheless, the signs and symptoms of this disease can be controlled and treated by raising the blood flow, abandoning the habit of smoking tobacco or using its products, escaping cold climate, and in certain situations, operating on the affected nerves. The nerves are surgically severed to stop the pain via a procedure called sympathectomy. You can raise the circulation by taking an adequate amount of liquids and staying energetic.

Vascular surgery

Vascular surgery is a process, in which a bypass of the blocked vein is implanted. A vein is taken from a different part of the patient’s body or an artificial grafting, which is then connected to the affected vein, thus allowing the blood to bypass the constricted area.

Avoid the expansion of the signs and symptoms by abandoning smoking and staying away from secondhand smoke.

Review Questions

The correct answers can be found below the references.

1. What is the underlying pathophysiological process in Buerger’s disease?

   A. Inflammation process
   B. Allergic reaction
   C. Bacterial invasion
   D. Fungal infection

2. A 30-year-old smoker complains of soreness of the fingertips. On examination, ulceration and gangrene are identified. What would be the possible diagnosis?

   A. Diabetes
   B. Cardiovascular Disease
   C. Buerger’s Disease
   D. Raynaud’s Disease

3. What should be the best possible diagnostic criteria for Buerger’s Disease?
A. Existence of atherosclerotic
B. Proximal Emboli
C. Non-hypercoagulable state
D. Diabetes insipidus

References


**Correct answers:** 1A, 2C, 3B

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