

Buerger's Disease and Fitness for Work in a Flight Personnel: A Case Report

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How to cite this paper: Jammeli, I., Aloui, A., Ben Abdelkader, M., Athimni, Z., Bouhoula, M., Asma, C., Kacem, I., Maoua, M., Brahem, A., Kalboussi, H., El Maalel, O., Chatti, S. and Mrizak, N. (2022) Buerger's Disease and Fitness for Work in a Flight Personnel: A Case Report. *Occupational Diseases and Environmental Medicine*, 10, 71-77.

<https://doi.org/10.4236/odem.2022.102006>

Received: September 3, 2021

Accepted: March 28, 2022

Published: March 31, 2022

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Abstract

Buerger's disease, also called thromboangiitis obliterans (TAO), is an inflammatory disease affecting small and medium size blood vessels of the limbs. Several risk factors are strongly associated with this disease. In fact, heavy smokers represent 99% of patients diagnosed with Buerger's disease and smoking cessation can slow down the progression of the pathology. Ulcers and gangrene are very common complications and TAO may also cause a vasculitis as well as ischemic damage to the distal part of the limbs that can eventually lead to limb amputation. Here, we report the case of a 43 years old patient, a flight personnel working in a Tunisian airline company who consults for a lesion of the left toe that appeared 2 weeks ago. He is a chronic inveterate smoker with 36 pack-years. The diagnosis of TAO was made based on the clinical presentation and the results of the Doppler Ultrasound of the left toe. This disease has a major impact on the quality of life due to the risk of necrotic ulcers and amputation. Navigation is a profession that requires a high level of physical and mental fitness. According to the international and Tunisian standards, the applicant or the holder of medical certificate must not have a cardiovascular condition that may affect the safety of the exercise.

Keywords

Buerger's Disease, Flight Personnel, Medical Fitness

1. Introduction

Buerger's disease, also called thromboangiitis obliterans (TAO), is an inflammatory disease affecting small and medium size blood vessels (1 to 5 mm of diame-

ter) of the limbs resulting in vascular thrombosis with total or partial vessel obstruction. The damage, in this case, is segmental and multi-focal. It was described for the first time by Von Winiwater, in 1879, but the terminology and physiopathology were detailed in 1908 by Leo Buerger [1].

It is a very common disease in some areas such as India, South East Asia, the Middle East and Eastern Europe. In terms of epidemiology, the prevalence of Buerger's disease is difficult to estimate due to the lack of specific diagnostic criteria. Several risk factors are strongly associated with this disease. In fact, heavy smokers represent 99% of patients diagnosed with Buerger's disease and smoking cessation can slow down the progression of the disease. The big majority of patients are male (over 90%) and the onset of the disease occurs at a young age between 20 to 40 years old which distinguishes it from atherosclerosis obliterans [2] [3].

Despite the significant association with smoking, the pathophysiological mechanism of this illness remains unrevealed. The TAO mainly affects young subjects who can suffer from ischemic ulcer or necrosis, severe pain, claudication, coldness of extremities, migratory thrombophlebitis and Raynaud's phenomenon. This pathology can also be revealed by the absence of peripheral pulse, cyanotic extremities and a thin or a shiny skin [4] [5].

Buerger's disease, like any other peripheral artery disease, can lead to intense pain of the limbs, walking impairment, poor physical performance and physical inactivity [6].

Ulcers and gangrene are very common complications and TAO may also cause a vasculitis as well as ischemic damage to the distal part of the limbs that can eventually lead to limb amputation. Arterial angiography is very useful to contribute in the diagnosis of TAO by a smooth and a gradually diminishing segmental lesion of the distal vessel and collateral vessels, like a corkscrew [5].

The severity of the Buerger's disease lies in the frequency of necrotic lesions that not only require a prolonged hospitalization but also can lead to limb amputation which can have a strong impact on the quality of life and the professional life. In fact, TAO represents the etiology of hospitalization among 0.5 up to 5% of people admitted in the hospital for peripheral arterial occlusive diseases in Europe and more than 16% in Japan. Although surgical treatment can improve the prognosis of patients, it is not frequently applicable in Buerger's disease. Smoking cessation remains the most effective measure to slow down the progression of the disease [7] [8].

Here, we present a case of a flight personnel working in a Tunisian airline company who got diagnosed with TAO disease in July 2021 in order to discuss his fitness for work.

Oral consent to publish was obtained from the patient.

2. Case Presentation

We report the case of a 43 years old patient, a flight personnel working in a Tu-

nisian airline company since 2003, married and a father of 3 children, who consults for a lesion of the left toe that appeared 2 weeks ago.

This patient who is from the region of Grombalia (Tunisia) has no particular medical history. He is a chronic inveterate smoker (36 pack-years). He reported that he stopped smoking a month ago.

The dermatologist who has examined the patient has made the diagnosis of an ingrown toenail of the left foot and prescribed a medical treatment made of antibiotics and antiseptics.

The patient history revealed the occurrence of a resting pain in the toes. He also reported intermittent claudication that appeared more than two months ago and that occur after walking for more than one kilometer.

Physical examination has revealed an apparent good general health, a normal heart auscultation, a normal blood pressure (120/80mm Hg). The pedal pulse was present and the popliteal pulse was palpable. The brachial and wrist pulses were also palpable. Examination of the lower limbs has noted pallor on the elevation of the limbs and redness in declivity. The examination of the left toe has highlighted a dry erythematous squamous lesion containing a dark crust and a destruction of the distal part of the nail.

The other nails of the left foot are dry and fragile.

The complementary blood tests ordered for this patient showed normal blood glucose level of 0.97 g/liter and a normal lipid profile. Creatinine and blood ionogram were also normal.

The electrocardiogram is normal.

The standard chest radiography is normal. The radiography of the left big toe (front and side) is also normal.

The ultrasound of the big toe showed a thrombosis of the first metatarsal and dorsal interdigital arteries of the big toe. It also showed a synovial thickening of the metatarsophalangeal joint of the big toe related to synovitis.

The arterial Doppler ultrasound of the lower limbs had shown:

- An atheromatous infiltration
- A thrombosis of the lower third of the right superficial femoral artery, extended to the popliteal artery
- A bilateral distal arteriopathy, on the right, a permeable anterior tibial artery followed to the distality with a low resistance flow. On the left, it showed a permeable peroneal artery followed to the distality with an acceptable flow.

The diagnosis made for this patient is thromboangiitis obliterans or Burger's disease.

After the diagnosis was made, this employee took medical leave and was temporarily unable to work. He initially received a medical treatment based on antibiotics, antiseptics and painkillers in order to alleviate the pain and the inflammation of the toe. He also got a good local care of the skin ulceration. Afterwards, the affected toe got operated soon after the diagnosis. The evolution after the surgical treatment of the left toe was favorable and the operating follow-ups remain simple and almost painless. On discharge the recommendation hig-

highlighted the importance of smoking cessation which was done by the patient a month ago. He currently benefits of a regular follow-up in order to prevent and screen for any complication of the disease.

3. Discussion

The TAO is a non atherosclerotic, recurrent, segmental, thrombo-occlusive and non-destructive vascular disease that can lead to gangrene and loss of skin. It affects the neurovascular bundles of the lower limbs (rarely the upper limbs and the cerebral vessels). This pathology is often asymmetrical and the toes are not all affected to the same degree [9].

The physiopathological mechanism of the disease is not entirely clarified but smoking represents the main risk factor and it is also incriminated in the triggering of flare-ups. Tobacco is capable, by his compounds, of inducing the dysfunction of platelets and the endothelial cells which can provoke the inflammation and the thrombosis. Other factors, mainly psychological, were also implicated in the pathogenesis of the disease including a low socioeconomic status, a chronic anxiety and a high mental stress [9] [10].

Systemic involvement in Buerger's disease is very rare. The visceral damage that can be detected in this disease is, more likely, attributed to the atherosclerosis promoted by or associated to TAO (Puechal and Fiessinger, 2006). In a recent review of literature evaluating the visceral involvement associated to TAO, authors have found cases of visceral damage including multiple organs such as the heart, coronary artery involvement as well as retinal and central nervous system involvement. The authors concluded, in this review, that TAO can be a systemic disease with a primary clinical presentation in the extremities [11].

The progression of this illness is characterized by acute exacerbations separated by phases of remission that may last several years. During the flare-ups, the tropic lesions evolve either by being more proximal or by affecting a limb that was not initially affected. Life expectancy in patients with Buerger's disease is usually normal with a survival rate of almost 95% within 10 years and 85% after 25 years. In a national Japanese study including 850 subjects diagnosed with TAO disease, the risk of amputation was 2.73 times higher in patients who continued to smoke. At the end of 5 years follow up period, one quarter of patients had to get an amputation. After 10 years, the risk of amputation is up to 45% [8].

The therapeutic management of the disease is based on conservative therapy in which the major measure is to quit smoking completely and definitively in association with local care of the affected limb. Patient education has a crucial role to play in the management of the disease in order to handle his illness and slow down its progression. The surgical treatment is rarely possible due to the diffusion of vascular damage and the distal nature of the disease. If revascularization is indicated, bypass surgery is carried out but the results have often been disappointing. Sympathectomy could represent a last option before deciding amputation. A new era has begun with the use of gene transfer in order to create

a therapeutic angiogenesis in TAO. Experimental therapies are being evaluated such as intramuscular injections of VEGF and implantation of autologous bone marrow mononuclear cells [8] [12].

The human being is adapted to life on the surface of the earth but the contest of the air has led him to venture in a complete different area. Airspace is a hostile environment characterized by lack of oxygen, a lower atmospheric pressure and a drop of the temperature. In aviation, hypobaric hypoxia is, by far, the most common form. In the same context, the cardiovascular system will be essentially solicited by hypoxia and the accelerations of aircrafts [13].

The unprecedented expansion of civil aviation during the past two decades has mainly focused on flight safety and the selection of healthy and qualified employees. On the other hand, the duration of long-haul flights has extended to 18 - 20 hours by the recent introduction of brand-new aircraft, including Boeing 787-9 and Airbus A350-XWB. These long-haul flights may pose certain risks including hypoxia, a low humidity, a dehydration, a disruption of the circadian rhythm and prolonged sitting, which may cause venous thromboembolism to the people involved. The association between long-haul flights and thromboembolism linked to air travel is an undeniable fact [14] [15].

Flight personnel represent a young population, with a relatively high sociocultural level, having a profession that requires high physical and mental performance. Compared to the general population, these workers have a lower prevalence, after adjustment according to age and gender, of current smoking, obesity and hypertension. On the other hand, they have a higher prevalence of regular physical activity [13] [16].

According to international standards, subjects with peripheral occlusive arterial diseases, before and after the surgical treatment, shall be assessed unfit for the navigation activities. Provided there is no significant functional impairment, a fit assessment may be considered following noninvasive exploration of the coronary circulation (If necessary, invasive exploration) [17].

According to the Tunisian standards, the decree of the minister of transport of 25 September 2001 fixing the conditions of physical and mental fitness for the personnel of civil aviation specifies in its chapter regarding the cardiovascular system that applicants for a medical certificate presenting a peripheral vascular disease, before and after surgical treatment, shall be assessed unfit, unless it is proven the absence of a significant functional impairment, of any lesion of the coronary arteries or of any important atheromatous lesion in other vessels. The applicant or the holder of the medical certificate must not have a cardiovascular condition that may affect the safety of the exercise of his work [18].

In this case, the patient was temporally unfit to exercise his job. Nevertheless, the evolution after the surgery was favorable and he currently benefits of a regular follow-up in order to get an early diagnosis of any possible complication of the disease that may compromise his ability to work. A complete screening of any damage of other vessels is regularly required. To the best of our knowledge,

there are no studies on the impact of Buerger's disease on the fitness for work of flight personnel. More research is needed to evaluate the repercussions of this pathology, not only on the social life but also on the professional activities.

4. Conclusions

Buerger's disease, also called thromboangiitis obliterans, is an inflammatory disease affecting the small and medium caliber vessels with smoking as the main risk factor. It is a pathology that has a major impact on the quality of life as well as the professional career due to the risk of necrotic ulcers and the risk of amputation. Although systemic damage is rare, the involvement of the coronary arteries and the cerebrovascular circulation is still possible which requires a complete screening of other damages that can be life-threatening. Smoking cessation remains the most effective measure in order to slow down the progression of the disease.

The cardiovascular system can be solicited by aeronautic factors including hypoxia, the decrease of the partial oxygen pressure and the drop in temperature. A systemic involvement associated to the Buerger's disease in particular damage to the coronary and cerebral arteries, although rare, could affect the safety of flying. Thus, a careful clinical examination is required in order to detect a systemic involvement especially of the cardiovascular system. Reconciling between work and Buerger's disease is not an easy task, the impact of the disease on the patient's health must be evaluated and the complete screening of other systemic damage should be performed.

This pathology has a major impact on social activities and professional activities as well. A regular follow-up is highly recommended in order to detect complications that may compromise the safety of work. The best treatment remains smoking cessation. Patients affected by this disease need to be constantly reminded of the importance of smoking cessation and of the importance of a regular follow-up.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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