OPIS PRZYPADKU/CASE REPORT
Submitted/Otrzymano: 26.05.2009 •Corrected/Poprawiono: 10.06.2009 • Accepted/Zaakceptowano: 17.06.2009

Anaesthetic implications of lepromatous leprosy in Europe: case report
Rare European experience

Susana Hernández, José Ramón Ortiz-Gómez, Miguel Salvador, Julio Barrena, Ana Carla Lobón
Department of Anesthesiology, Hospital Virgen del Camino, Pamplona, Spain

Summary

Leprosy is an uncommon disease in developed countries, but due to immigration and global travel it is still possible to find patients affected by Hansen's Disease in our hospitals, which can require anaesthesiological services for surgical interventions. As we are not very familiar with the disease, it can still be misdiagnosed.

We describe a case report of a woman with Hansen's Disease who was programmed for elective osteosynthesis of a femoral fracture, and its anaesthetics implications. *Anestezjologia i Ratownictwo 2009; 3: 288-291.*

Keywords: anaesthesia, Hansen's Disease, lepromatous leprosy

Introduction

Leprosy (Hansen's Disease) is a chronic granulomatous infection caused by *Mycobacterium Leprae*. It has a global prevalence of 5.7 per 10,000 population. India accounts for about one-third of leprosy cases in the world and has by far the greatest number of cases among individual countries [1]. At the end of 2005, the global prevalence of leprosy was estimated by the World Health Organisation (WHO) to be around 1 per 10,000 population, but there are six countries where prevalence is more than 1/10,000: Brazil, the Republic of the Congo, Mozambique, Madagascar, Nepal and Tanzania [2]. It is spread from person to person by droplets, and has a long incubation period measurable in years [3]. The introduction of combination multidrug therapy (dapsone, rifampicin and clofazimine) in 1982 by the WHO has resulted in highly effective treatment with a low relapse rate. But leprosy is still considered a public health problem in tropical and sub-tropical countries of the Americas, Asia and Africa, and is the most important of the three causes of severe neuropathy in developing countries. Although leprosy affects the skin and peripheral nerves in particular, it also commonly involves the superficial tissues such as skin, mucosa of the upper respiratory tract, subcutaneous portions of the nerves and the anterior chamber of the eye. It's also important because of the disability and morbidity that can result, as well as the social stigma that it still carries.

Leprosy is uncommon in European countries, but thanks to immigration and global travel, it is increasingly likely that we may find cases in our hospitals. Because of this, we must be prepared to provide good treatment to leprous patients.

Case report

We describe the case of a 41 year-old Brazilian woman diagnosed with Hansen's Disease since the age of 13. The patient was also diagnosed with paranoid schizophrenia. She was programmed for elective reduction and osteosynthesis of a femoral fracture**.** The patient presented hypopigmented hypoaesthetic patches on her legs, with sensory loss in her soles. A nerve conduction study showed normal nerve conduction

velocity and absence of sensory responses in legs at low amplitude in the right cubital and radial nerves. Routine pre-operative haemogram, coagulation, kidney and liver function tests were normal. Pre-operative chest X-ray was also within normal limits, whereas the pre-operative electrocardiogram (ECG) showed sinus rhythm and anterior wall ischemia. A general anaesthesia technique was chosen as the patient refused any regional intervention. The patient received 2 mg midazolam IV 10 minutes before surgery. In the operating room she was connected to an Aestiva 5 multichannel vital signs monitor (non-invasive blood pressure, ECG, pulse oximetry, capnography, anaesthetic gases analyzer and entropy). Pre-oxygenation was made for 5 min with O_2 100% and then, anaesthesia was induced with propofol (200 mg) and fentanyl (0.15 mg). After an adequate hypnosis was achieved, a laryngeal mask airway (Proseal No. 4) was inserted. Neuromuscular blocking agents were not used. Intermittent positive pressure ventilation was started and anaesthesia maintained with sevoflurane (MAC 1) and air, 60% in oxygen via a semi-closed circuit. Supplemental doses of fentanyl (up to 0.450 mg), acetaminophen (1 g), ketorolac (30 mg) and ondansetron (4 mg) were also administered. The patient was transferred to the post-anaesthetic recovery unit, where she stayed for 1.5 hours (receiving supplementary oxygen and morphine (up to 5 mg)). There were no adverse events during surgery, anaesthesia or immediate postoperative periods, with only initial tachycardia followed by a constant heart rate being remarkable.

Discussion

Clinical manifestations of leprosy vary in accordance with the immune response of the host. The Ridley-Jopling or the WHO classifications are often used to characterise the patient's disease [4]. The spectrum of clinical presentation varies widely, depending on the type of leprosy (Table 1), so we will have to consider many potential implications in the anaesthetic management of these patients.

Generally, TT and BT are considered to equivalent to paucibacillary, and BB, BL and LL are considered to be multibacillary.

A very important clinical setting is the presence of any leprous reactions, which are very serious complications consequence of dynamic changes in the immune status of the patient (Table 2).

Another relevant aspect that we must take into account before surgery and anaesthesia is the cardiac dysautonomia that can be found in this disease. This

Table 1. Lepra's definition by Ridley-Jopling and the equivalent WHO classification

Ridley-Jopling			WHO
Tuberculoid leprosy (TT) Borderline tuberculoid (BT)	Highest host resistance	Nerve damage occurs early and is more severe.	Paucibacillary (five or fewer skin lesions without bacilli on skin smear).
Mid-borderline (MB) Borderline lepromatous (BL) Lepromatous leprosy (LL)	Lowest host resistance	Nerve damage although widespread occurs later and is less severe.	Multibacillary (six or more skin lesions and possible positive skin smear).

Table 2. Reactions in leprosy

Type	Clinical features
Type-1 (reversal reaction)	Sudden increase in inflammation of quiescent skin lesions combined with new lesions, neuritis, and low-grade fever. Thought to be a delayed-type hypersensitivity reaction. A reversal reaction occurs with initiation of therapy as the bacterial load is diminished.
Type-2 (erythema nodosum leprosum)	A panniculitis with variable vasculitis, fever with multiple tender erythematous nodules and less typically may include neuritis, oedema, arthralgias, leukocytosis, iridocyclitis, pretibial periostitis, orchitis, and nephritis. Thought to be due to immune complex deposition.
Lucio's reaction (Lucio's phenomenon)	Diffuse type of leprosy, uncommon and may be associated with diffuse tender nodular erythematous lesions that may become necrotic, ischemic necrosis of the epidermis and upper dermis, with thrombus and endothelial proliferation in the larger vessels of the deep dermis, fever, and, more rarely, hepatosplenomegaly and lymphadenopathy. Endothelial cells are parasitised by the organism. Typically, there is a large antigen load and almost no immunologic resistance.

may present as an abnormal response in heart rate and blood pressure to standing, or absence of response to various perioperative manipulations such as intubation, extubation or anticholinergic drugs [1], baroreflex dysfunction or abnormal response to Valsalva manoeuvres [5]. All of these are more pronounced in patients with longer duration of leprosy. It is also common to find tachycardia, ST and T wave changes, bundle branch block, extrasystoles and prolongation of the QT interval [5]. The initial tachycardia observed in the patient in this case report was due to vagal cardiac neuropathy, and the typical "fixed" heart rate resulted from the progression of dysfunction of the cardiac sympathetic system. Cardiorespiratory arrests and sudden deaths may occur and exercise tolerance is also limited in these patients [1].

We must document any nerve damage and sexual impotence (as indicators of dysautonomia) prior to regional anaesthesia. Nerve damage can result in varying degrees of nerve function impairments that lead to deformities [6].

Spinal and epidural anaesthesia should be used cautiously in patients with long standing disease because hypotension and urinary retention are frequent problems. Neurological deficit can also follow after nerve blocks or regional anaesthesia.

We also have to pay attention to respiratory function, which is frequently affected in leprosy patients and can result in impaired breath-holding time and decreased response to cough [1]. These have been postulated to be the result of compromised pulmonary chemosensitive function due to vagus and sympathetic plexus block [1,5]. Different anatomical areas of the respiratory tract are involved in leprosy such as the nose, larynx and pharynx. The nose is a major site of lepromatous infiltration and the largest source of output of leprosy bacilli. Complete loss of intranasal sensitivity has been reported in one case [5]. This intranasal anaesthesia is found to be related to the advancement of intranasal disease. Loss of sensation may lead to repeated trauma, ulceration and epistaxis, due to repeated "picking" of the nose in an attempt to remove the crusting. Therefore, we must take great care when we introduce nasogastric catheters or when making nasotracheal intubations. It's very important to teach patients to look after their nose the same as their hands and feet [7].

The liver is frequently involved in advanced lepromatous leprosy as a result of bacteraemia. The specific granulomatous lesions suggestive of leprous hepatitis are mainly seen in lepromatous leprosy (40%), whereas, granulomata in the liver could be present in all types of leprosy (70%). Some of the hepatic lesions progressed to stellate fibrosis and early cirrhotic changes (40%) [5]. All of this can impair metabolism of drugs during anaesthesia.

Renal involvement is frequent and glomerulonephritis of all types, interstitital nephritis and amyloidosis have all been reported, mainly in lepromatous leprosy. A wide range of renal pathology was found. Membranous glomerulonephritis (31.5%) was the commonest type of glomerular lesion, followed by interstitital nephritis and diffuse proliferative glomerulonephritis (22.2% each) [5]. These problems can result in decreased renal clearance of drugs during anaesthesia.

Eyes must also receive special care from us as due to anaesthesia, ulceration, lagophthalmos and exposure keratitis are common complications of leprosy. Therefore we must cover and protect patients' eyes.

Musculoskeletal manifestations are seen in patients with leprosy but are uncommon. Prevalence for all manifestations ranges from 1% to 5% for leperous patients, but may increase to 50% to 70% during reactional states. The presentation may include nodules, arthralgias, arthritis, Charcot arthropathy, swollen hand syndrome, vasculitis, and enthesitis [4]. Chronic osteomyelitis, osteoporosis and digits resorption are frequently associated, and so it is very important to pay attention to positioning to avoid pathological fractures.

A 'syringomyelia-like' syndrome has been infrequently reported in lepromatous leprosy and others neurological disorders such as Tangier Disease. This syndrome includes facial onset sensory and motoneuronopathy (FOSMN syndrome), and appears to have a neurodegenerative aetiology. It is characterised by initial development of paraesthesiae and numbness in a trigeminal nerve distribution, which slowly progresses to involve the scalp, neck, upper trunk and upper limbs in sequential order. Motor manifestations, including cramps, fasciculations, dysphagia, dysarthria, muscle weakness and atrophy develop later in the course of the illness. Neurophysiological findings have revealed a generalised sensory motor neuronopathy of caudally decreasing severity in all four patients. FOSMN syndrome appears to be a slowly progressive neurodegenerative disorder, whose pathogenesis remains to be

determined [8].

Hypercalcemia secondary to leprosy has been described in some studies. Abnormal calcium homeostasis has been associated with a variety of granulomatous diseases, including leprosy. Extrarenal production of physiologically active 1, 25-dihydroxyvitamin D in granulomatous tissue, could be the underlying mechanism, possibly due to over-expression of 1α-hydroxylase by the entrapped macrophages [9].

Finally, drug treatment in leprosy must always be detailed and obtained in the pre-operative study because of the side-effects that they can produce. Dapsone can produce haemolytic anaemia, methaemoglobinaemia, agranulocytosis, hepatitis, peripheral neuropathy, psychosis and lepra reaction. Rifampicine may produce intermittent toxic syndromes (e.g. flu syndrome, shock syndrome, and rarely, thrombocytopenic purpura and acute renal failure) [1].

In conclusion, leprosy is an uncommon disease in developed countries but due to immigration and global travel it is possible to find patients affected by Hansen's Disease in our hospitals, and these patients can require anaesthesiological services for surgical interventions. As we are not very familiar with this disease it can still be misdiagnosed. Attention must be drawn to the lack of relevant literature about the anaesthesiological implications when dealing with leperous patients, that could help specialists to provide better management. Finally, it is certainly necessary to conduct new empirical studies in the future.

Correspondence address:
Susana Hernández
Hospital Virgen del Camino. Servicio de Anestesiología y Reanimación.
C/ Irunlarrea 4. 31008 Pamplona, Navarra
Phone: 848429400
E-mail: susanaher2001@yahoo.es

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