

## Case Report

# Soft tissue infection due to *Mycobacterium fortuitum* following acupuncture: a case report and review of the literature

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### Abstract

We report the first case of a post-acupuncture soft tissue infection due to *Mycobacterium fortuitum*. Two months after finishing an acupuncture treatment session, an immunocompetent 23-year-old woman developed cellulitis at the side of the needle insertions and the acid-fast bacillus was isolated from a closed abscess. The patient was successfully treated with a proper drug combination. We review the literature concerning the infection source and the risks for skin and soft tissue infection due to mycobacteria after acupuncture. The infection source in most cases is unknown but is probably associated with the inadequate sterilization of the needles or the puncture site. We show that these infections are not rare but difficult to diagnose. To avoid delays in the definitive diagnosis, infection with mycobacteria should be considered for skin and soft tissue infections, in particular late-onset infections, which are negative for routine bacterial cultures and without a clinical response to antibiotics used for acute pyogenic infections. Bacterial cultures from this lesion should be maintained for at least six weeks before discharged as negative.

**Key words:** *Mycobacterium fortuitum*, acupuncture, soft tissue infection, Venezuela

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### Introduction

Nontuberculous mycobacteria (NTM) include more than 140 acid-fast bacilli species, many of which have only recently been described and recognized as pathogenic. They are common in soil, dust, and water and can cause respiratory infections, lymphadenitis, skin and soft tissue infections, and, rarely, disseminated systemic illness, affecting not only patients with HIV infection but also patients with a medicine-induced immunosuppression or the immunocompetent hosts. Skin and soft tissue infections caused by NTM in the immunocompetent host, often emerging in outbreaks, have been reported to be associated with injections [1], liposuction [2,3], plastic surgery and breast implant surgery [4,5,6], laser-assisted *in situ* keratomileusis (LASIK) [7] and mesotherapy [8]. Injectable medicines or medical instruments contaminated with mycobacteria from the environment are often the source of infection. The source of infection in seven patients who developed keratitis caused by *Mycobacterium szulgai* after

LASIK surgery was a saline solution used for intraoperative lavage which got contaminated from the ice water in which it was stored [7]. The source for an outbreak of soft tissue infections due to NTM, affecting at least 68 patients in Venezuela and associated with mesotherapy [9], were the microinjections with a homeopathic medicine contaminated with *M. abscessus*. The inadequate use and management of disinfectants and antiseptics is another source of nosocomial outbreaks of soft tissue infection. In the United States an antiseptic, the ammonium quaternary compound benzalkonium chloride, became contaminated with NTM and caused infection in 12 patients following steroid injections [1]. In Venezuela the inadequate sterilization of the suction cannulae with a low-level disinfectant, a commercial solution of an ammonium quaternary compound, has been reported as the cause of infection with mycobacteria after liposuction [2]. Moreover, in Brazil an epidemic of infections after video-assisted surgery (1,051 possible cases) was

caused by a single clone of *M. massiliense* which presented tolerance to 2% glutaraldehyde [10]. It is thought that this clone had been spread with commercially available, nonactivated glutaraldehyde solutions and both the selective pressure of 2% glutaraldehyde use and the inadequate mechanical cleaning of surgical instruments facilitated the occurrence of the outbreak.

Acupuncture has become widely accepted and practiced as an alternative form of medicine, and its use has grown during the past decades, particularly in the western world. Many patients believe this treatment to be safe and effective; however, acupuncture is an invasive procedure whereby a needle is inserted in the skin, sometimes to a depth of 2-3 cm, and adverse effects including mechanical injuries and infectious complications have been reported [reviewed in 11,12]. Concerning infectious complications, Hepatitis B, Hepatitis C, and HIV transmission due to the reuse of the needles without adequate sterilization between patients has been reported. The most common bacterial infection associated with acupuncture is local cellulitis at the site of needle insertion, but also more serious infections, such as endocarditis, spinal epidural abscesses, necrotizing fasciitis, and sepsis have been reported. The most common bacterial pathogen is *S. aureus*. Other reported organisms include *Pseudomonas aeruginosa*, streptococcal species, and *Propionibacterium acnes*. Here we report the first case of soft tissue infections due to *Mycobacterium fortuitum* following acupuncture. We review the literature for other reports of soft tissue infection due to mycobacteria and we discuss the possible source of the infection.

### Case Report

In October 2007, a 23-year-old woman was referred to our hospital with red-violaceous ulcerated skin lesions and subcutaneous nodules on her limbs, which had lasted for two months (Figure 1). Four months earlier she had received five sessions of acupuncture treatment and eight weeks after the last session she developed subcutaneous nodules at the acupuncture points which developed into ulcers with the discharge of a serous secretion. Her medical record showed normal laboratory values but reported the isolation of *S. aureus* from the open ulcers, which was sensitive to all drugs tested. Initially she had been treated with cefadroxil (500 mg PO every eight hours for 10 days) and a topical antibiotic (bacitracin). Because no improvement was seen,

**Figure 1.** Upper and lower panel - Ulcerated lesions at the acupuncture site.

**A.**



**B.**



oxacillin (1 g IV every 8 hours) was administered for seven days but without any clinical effect. In the same report, a serous secretion, aseptically aspirated with a needle from a closed lesion, was reported negative for bacteria after 72 hours of incubation. In our department a specimen was taken by needle aspiration from a closed lesion for a differential diagnosis, including infection due to mycobacteria and fungi. Infection with mycobacteria was suspected because of the late onset of the symptoms, two months after the last acupuncture session. An acid-fast bacillus was recovered on Lowenstein Jensen after four days of incubation at 37°C and identified as *M. fortuitum* by PCR-restriction fragment length polymorphism analysis of the *hsp65* gene (PRA). Susceptibility testing according to 2003 CLSI standards [13] showed susceptibility to doxycycline and minocycline, sulphonamides, amikacin, ciprofloxacin, ofloxacin and imipenem, and resistance to cefoxitin and clarithromycin. Following the recommendations of the American Thoracic Society for the management of nontuberculous

mycobacterial infection of skin and soft tissue, treatment with two drugs with *in vitro* activity against the clinical isolate was initiated [14]. The patient received doxycycline (100 mg twice daily) and ciprofloxacin (500 mg twice daily) for six months, resulting in a slow but gradual resolution of the lesions. More than one year after finishing the antibiotic therapy the injuries were inactive but hyperpigmented scars persisted.

## Discussion

The risk of serious events occurring in association with acupuncture is very low, below that of many common medical treatments, and is estimated to be 0.05 per 10,000 treatments, and 0.55 per 10,000 individual patients [reviewed in 11,12]. Both reviews extensively refer to skin and soft tissue infection due to bacteria and viruses; however, they mention only two articles with a total of 4 patients infected with NTM. Searching the PubMed, MEDLINE, and LILACS databases for peer-reviewed articles in the English language, using the keywords “acupuncture” and “mycobacterium”, (December 2009), seven articles, with more than 200 patients affected, can be found which report on skin and soft tissue infection due to mycobacteria associated with acupuncture treatment; three case reports [15,16,17] and four outbreak reports [18,19,20,21]. In most reports, *M. chelonae* or *M. abscessus* is the infectious agent; additionally, two cases caused by *M. nonchromogenicum* have been described [18]. To our knowledge, here we report the first case of a post-acupuncture cutaneous infection due to *M. fortuitum*. Following the recommendations provided in the 2007 American Thoracic Society/Infectious Diseases Society of America statement [14], our patient was successfully treated for six months with two drugs with *in vitro* activity against the clinical isolate.

We were unable to identify the source of the infection. Additionally, the source of infection could not be established in any of the seven available reports of acupuncture-associated cutaneous mycobacterial infections. All reports consider contamination of the needles but no proof is presented. Only one article shows that a disinfectant used for the disinfection of the medical devices in a clinic may have been the source of the outbreak of *M. abscessus* infection among 109 patients following acupuncture [21]. In an investigation of this outbreak, a single strain of *M. abscessus* was isolated from the wounds of the patients and from a diluted

glutaraldehyde solution that was used to disinfect the physical therapy devices.

Available reports consider the need for proper skin disinfection to avoid infection. However, disinfection of clean skin before injection is not generally considered necessary and observations of lack of infection following injections without prior skin disinfection support this [22,23]. The British Medical Acupuncture Society for this reason declares that the routine use of alcohol swabs before needling is not required [24]. Although we have no proof, we consider the widespread use of quaternary ammonium (QAC) derivatives in Venezuela, commercialized as an antiseptic with label claims to sterilize medical instruments, as a possible risk factor for infection with mycobacteria [25]. QACs are extensively used in our country for skin disinfection and “sterilization” of critical and semicritical medical devices; however, QACs are considered low-level disinfectants and they do not kill mycobacteria [26]. The impermeable waxy cell membrane provides mycobacteria with resistance toward QACs; consequently, these disinfectants can become contaminated with mycobacteria. An outbreak of postinjection *M. abscessus* infection caused by contamination of a QAC, used for disinfection of the skin, has been reported [1]. Moreover, in Venezuela, the inadequate sterilization of the suction cannulae with a commercial solution of a QAC has been reported as the cause of infection with mycobacteria after liposuction [2].

In the revised literature, most publications conclude that clinical diagnosis of mycobacterial skin and soft tissue infections is not easy to perform and that the diagnosis is often delayed. Delays of more than one year have been reported [4,8]. In our case, there was a delay of two months between the onset of the symptoms and the definitive diagnosis, and only co-infecting micro-organisms were isolated, never the real cause of infection, the mycobacterium. A high degree of clinical suspicion and appropriate microbiological techniques are necessary to avoid delays in diagnosis.

Concerning the laboratory procedures, samples must be sent to the lab with instructions to perform mycobacteriological studies. Samples from contaminated body sites contain other micro-organisms that may grow more rapidly than mycobacteria and thus interfere with their recovery. In the lab, a decontamination procedure should be performed on specimens collected from non-sterile body sites to overcome contamination or overgrowth

of cultures with other bacteria and fungi. For this reason, *S. aureus* strain was isolated from our patient on the first occasion because no decontamination step was performed on the sample. Tissue samples or fluids from normally sterile sites do not require decontamination and can be inoculated directly in culture medium. However, as mycobacteria are slow growers, the culture media should be incubated for at least six weeks before reported as negative. The medical record of our patient reported that a second sample had been taken from a closed lesion by aspiration and inoculated directly in culture medium, but the plates were discharged as negative after 72 hours of incubation, which is not enough time for *M. fortuitum* to show up on the plates. In our hands, a needle aspiration of a closed lesion yielded *M. fortuitum* after an incubation period of four days.

We believe that to achieve an earlier diagnosis of a mycobacterial infection, physicians should be aware of the possibility of this type of infection when caring for patients with chronic skin or soft tissue infections following an invasive procedure and specifically request the laboratory to test for mycobacteria. Late-onset infection, particularly one that does not respond to conventional antibiotic treatment or an infection with negative preliminary culture after 48 hours of incubation, should alert the clinician. In general, mycobacterial infections appear after a delay of 20 to 105 days after the trauma, targeting the skin and soft tissue on the site of penetration [4,8]. With appropriate treatment, nontuberculous mycobacterial skin and soft tissue infections can be managed successfully.

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