

Mycobacterium Fortuitum Infection of Acupuncture Sites

– A case report –

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We report a case of *Mycobacterium*(*M.*) *fortuitum* infection in a 65-year-old female who presented with erythematous to purplish colored tender nodules and plaques with crust and purulent discharge on both upper and lower extremities along the sites of acupuncture.

The culture of surgically excised specimen in 3% Ogawa media yielded slightly yellowish colored colonies within 2 days. Several tests for identification of the species were performed and growth on 5% NaCl, negative niacin test, positive results in nitrate reduction, catalase, urease and iron uptake tests were noted.

Excision of the lesions followed by administration of minocycline and ciprofloxacin showed no sign of relapse to date a year after treatment.
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Key Words: Acupuncture, *Mycobacterium fortuitum*.

Mycobacterium(*M.*) *fortuitum*, a rapidly growing mycobacterium of Runyon's group IV, was reported to be a pathogenic organism by Cruz¹ in 1938. Group IV organisms are the rapid growers of mycobacterium. Whether or not pigment is produced, the colonies show growth within three to five days. *M. fortuitum* and *M. chelonae*, with its subspecies *M. abscessus*, are included in this group².

The occurrence of *M. fortuitum-chelonae* infections is usually related to surgical procedures, trauma, or injections. These organisms are usually resistant to therapy with conventional antituberculous agents³. In 1983, Wallace et al⁴ identified several clinical syndromes associated with these bacteria, including primary cutaneous infections

with or without osteomyelitis, postsurgical infections (mastectomy, median sternotomy, and others), pulmonary infections, miscellaneous infections (keratitis, lymphadenitis, peritonitis, etc.), and a disseminated disease.

We report a case of *M. fortuitum* infection occurring on previously acupunctured sites.

REPORT OF A CASE

A 65-year-old female visited the Department of Dermatology, Pusan National University Hospital in November 1990 with a four-month history of multiple dusky erythematous to purplish colored tender nodules and plaques with crust and purulent discharge on her upper and lower extremities (Fig. 1, 2). Four months before, she had received acupuncture on her head and both extremities to relieve frequent headaches she had had for several years. Three to four days after acupuncture painful erythematous indurated nodules and plaques with purulent discharge and tenderness were noted on the acupuncture sites. The nodule on her scalp involuted spontaneously, but the lesions on her ex-

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Table 1. Summary of results of in vitro identification tests

| | | |
|---|--|----------------------------------|
| 1. Growth characteristics (3% Ogawa media) | Optimal temperature time of maximal growth color of colony | 37°C 7 days buff |
| 2. Growth on differential media | McConkey agar 5% NaCl 28°C | + + |
| 3. Biochemical tests | Niacin Nitrate reductase Catalase Iron uptake test Urease Pirazinamidase | - + + + + + |
| 4. Drug susceptibility test | Isoniazid, Rifampicin, Streptomycin, Ethambutol, Kanamycin, Cycloserine, PAS, Ethionamide Minocycline, Amikacin, Cefoxitin, Polymixin, Ciprofloxacin, Pyrazinamide | resistant susceptible |

Table 2. Differential characteristics of group IV Mycobacteria

| A. Growth characteristics | | | | | | |
|---------------------------|---|-----------------------|----------------------|----------------------|-------------------------------|----------------|
| Organism | Optimum isolation temperature and time for growth | Pigmentation light | Pigmentation dark | Growth on 5% NaCl | Growth on McConkey agar | |
| <i>M. fortuitum</i> | 37°C 3-5 days | buff | buff | + | + | |
| <i>M. chelonae</i> | | | | | | |
| spp. <i>chelonae</i> | 28°C 3-5 days | buff | buff | - | - | |
| spp. <i>abscessus</i> | 35°C 3-5 days | buff | buff | + | + | |
| Our case | 37°C 3 days | buff | buff | + | + | |
| B. Biochemical tests | | | | | | |
| Organism | Niacin | Nitrate reduction | Catalase PH7.068 | Urease | Pyrazin- aminidase | Iron uptake |
| <i>M. fortuitum</i> | - | + | + | + | + | + |
| <i>M. chelonae</i> | | | | | | |
| spp. <i>chelonae</i> | V* | - | + | + | + | - |
| spp. <i>abscessus</i> | - | - | + | + | + | - |
| Our case | - | + | + | + | + | + |

*= Variable

tremities persisted.

Her past medical and family history was non-contributory. No other abnormalities were detected on physical examination. Routine laboratory tests including complete blood cell count, urinalysis, liver function test, serologic test for syphilis, stool examination, and chest roentgenogram were negative or within normal limits except for ele-

vated erythrocyte sedimentation rate (46 mm/hr), and strong positive reaction of Mantoux test (induration 20×15mm, vesicle formation). Patch tests to cobalt, nickel, chrome, and mercury were negative. Circulating IgG in serum was slightly elevated up to 1,720 mg/dl (normal control: 800-1,500 mg/dl). CMI multitest® result was within normal limits. Fungus culture showed no growth, and



Fig. 1. Multiple symmetrically distributed erythematous hypertrophic nodules on both upper extremities.

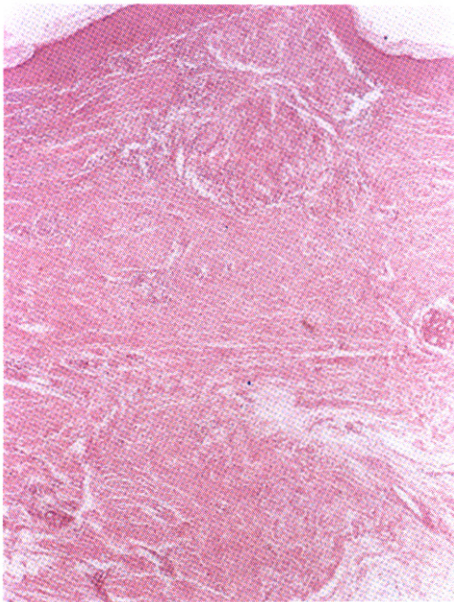


Fig. 3. Biopsy specimen taken from right thigh showed granulomatous infiltration in the upper and mid dermis(H & E stain, $\times 40$).

bacterial culture exhibited coagulase-negative staphylococcus aureus.

The skin biopsy specimen revealed an abscess with granulomatous reaction composed of histiocytes, mononuclear cells and giant cells, and subcutaneous fat necrosis(Fig. 3, 4, 5). The culture of surgically excised specimen in 3% Ogawa media yielded slightly yellowish colored colony at 37°C, and also 24°C, 32°C and 42°C in two days(Fig. 6, 7). Growth characteristics were studied on the differential media including egg base culture media containing 5% NaCl under incubation at 28°C



Fig. 2. Dusky erythematous crusted nodules and abscess formation on the lateral aspect of the right lower extremity.

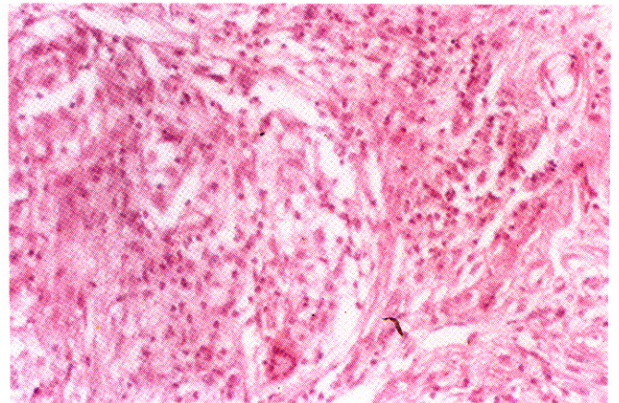


Fig. 4. Granulomatous infiltration was composed of histiocytes, mononuclear cells, and some giant cells(H & E stain, $\times 200$).

and McConkey agar media. Biochemical tests including niacin, nitrate reductase, catalase, iron uptake, urease, pyrazinamidase test were performed and the results of *in vitro* identification tests are summarized in Table 1. The organism was eventually identified as *Mycobacterium fortuitum*. The drug susceptibility test revealed resistance to conventional antituberculous agents such as isoniazid, rifampicin, streptomycin and ethambutol. Pyrazinamide was the only antituberculous agent efficacious against this organism. The effective antibiotics were minocycline, amikacin, ce-

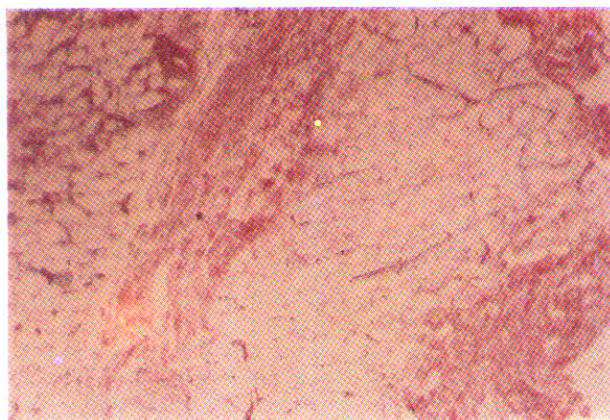


Fig. 5. Inflammation and mild fat necrosis in the deep dermis and subcutaneous fat tissue(H & E stain, X100).



Fig. 7. Colonies were also detected on Ogawa media at 24°C, 32°C and 42°C.

foxitin, polymixin and ciprofloxacin.

The patient underwent excision of the lesion and two weeks of treatment with intravenous cephalothin during her admission. After she was discharged, she received oral minocycline(200 mg/day) for seven weeks and oral ciprofloxacin(1.0 g/day) for another one week. She has been free of relapse to date a year later.

DISCUSSION

Cutaneous mycobacterial infection can occur with *M. tuberculosis* or other mycobacterial agents.

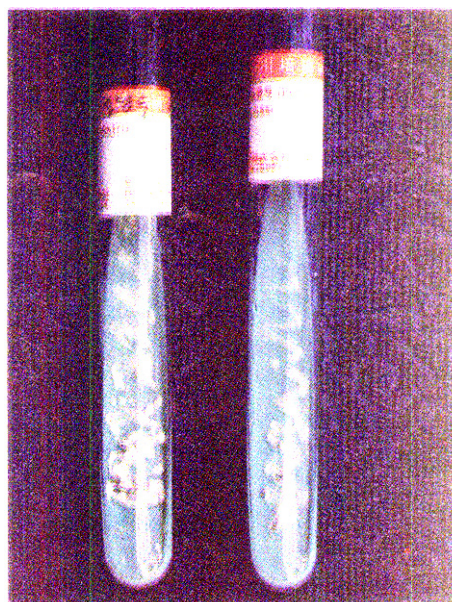


Fig. 6. Culture of the biopsy specimen on Ogawa media at 37°C, two days later, showed slightly yellowish colored colonies of *M. fortuitum*.

M. fortuitum is an uncommon causative agent of human mycobacterial infection. Cruz¹ isolated and designated the organism from a post-injection abscess in 1938, and titled it *M. fortuitum*. *M. fortuitum* is capable of saprophytic existence, and has been isolated from a number of natural sources. This organism has been found in soil specimens from widespread areas, and also has been recovered from dust and water⁵.

The pathogenesis of *M. fortuitum* human infection is still poorly defined. The organism has been recovered from sputum and saliva of normal persons, and from sputum and gastric contents of persons without any obvious related diseases. There is no evidence of from-person-to-person spread of the infection. Cutaneous and ocular diseases appear to be the result of traumatic entrance of organisms. These organisms may come from dirty skin, foreign bodies, contaminated needles, syringes, or injectable materials⁶. In the patient with a history of antecedent penetrating trauma, the mycobacterial infection usually becomes apparent within four to six weeks following the injury, but can appear as long as ten years later. In our case, the contaminated acupuncture needle could be an infection source of cutaneous lesions.

Cutaneous disease and deeper infections related to trauma are most common of the *M. fortuitum*

infections^{1,7-9} and postinjection abscesses, many of which are initially considered to be "sterile", are the most frequent trauma-related infection. Cutaneous infection and abscesses are characterized by an indolent, remittent course with fistula formation and scarring but eventual healing^{6,10}.

The histologic picture in atypical mycobacteriosis is just as variable as the clinical pattern and may present nonspecific acute and chronic inflammation, suppuration and abscess formation, or tuberculoid granulomas with or without caseation. The presence or absence of acid fast bacilli depends, on the tissue reaction. In suppurative lesions, especially where the spherical vacuoles are visible, numerous acid fast bacilli often can be found. In the necrotic center of the granulomas, acid fast bacilli also can be found. In the granulomatous infiltrate, as a rule, no bacilli can be demonstrated⁵. In our case, although the histologic feature revealed an abscess with granulomatous reaction, no bacilli could be found.

The microbiologic differentiation of *M. fortuitum* from *M. chelonae* is important because *M. chelonae* is more difficult to eradicate¹¹. Both mycobacteria grow rapidly on Löwenstein-Jensen medium at room temperature and body temperature. But only *M. fortuitum* will grow at 42°C, and shows nitrate reductase activity; this is the most reliable test for species identification¹². Results of the iron uptake test are positive in *M. fortuitum* infections, and also occasionally in infections with subspecies of *M. chelonae*. Drug susceptibility testing can also clarify speciation. Differential characteristics of growth on differential media and biochemical tests were summarized (Table 2).

In the management of rapidly growing mycobacterial infection the role of the surgical drainage of abscess is widely accepted, but the choice of the concomitant antimicrobial therapies is not so clear-cut³. The *M. fortuitum-chelonae* complex belongs to the group of mycobacterium other than tuberculosis, which do not respond to standard antimycobacterial therapy. Amikacin, doxycycline, sulfonamides, erythromycin and cefoxitin have shown some activity against these organisms although some strains have shown resistance to therapeutic concentrations; therefore antimicrobial susceptibility testing is essential¹³. Among the effective antibiotics in our case such as minocycline,

amikacin, cefoxitin, polymixin, ciprofloxacin, we used minocycline and ciprofloxacin and to date, at least for one year, any sign of a relapse has not been noted.

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