Mastitis Due to *Mycobacterium abscessus* after Body Piercing

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We describe a patient with granulomatous mastitis due to *Mycobacterium abscessus* that presented as a mass lesion and was associated with a pierced nipple. To our knowledge, this is the first reported case of mastitis due to *M. abscessus* and the first association of this organism with body piercing.

Infections due to nontuberculous mycobacteria are being identified with increasing frequency [1]. Mycobacteria that belong to Runyon group IV, known as “rapidly growing mycobacteria,” are considered to be emerging pathogens [1]. This group of organisms encompasses 3 major pathogenic species: *Mycobacterium fortuitum*, *Mycobacterium chelonae*, and *Mycobacterium abscessus*. Approximately 60% of diseases that are caused by rapidly growing mycobacteria are cutaneous or subcutaneous infections [1]. Infections usually have an antecedent history of penetrating trauma, presence of a foreign body, or surgery. Other types of documented infections that are caused by rapidly growing mycobacteria include lymphadenitis, pulmonary disease, keratitis, endocarditis, otitis media, and disseminated disease [1–3]. *M. abscessus* is a ubiquitous, rapidly growing type of mycobacteria that is known to cause disease after inoculation resulting from trauma. This organism has been implicated as a cause of postinjection abscess, and several outbreaks have been reported [1, 4]. Nonsterile water has been suspected in most of these outbreaks, which have occurred among patients who have undergone cardiac surgery, cosmetic surgery, podiatric and otologic procedures, or dialysis [4]. To our knowledge, there have been no reported cases of mastitis due to *M. abscessus* and no associations of this organism with body piercing.

**Case report.** A 17-year-old girl with no significant past medical history presented with a 2-month history of a right breast mass with associated local tenderness. She denied having a history of nipple discharge or any other pertinent symptoms. Physical examination revealed a 3.0-cm, mobile, tender, subareolar mass. Mammography and ultrasound studies demonstrated a lobulated lesion, which was thought to represent a fibroadenoma. Because the patient desired surgical resection, the lesion was removed and frozen-section analysis was done.

Gross examination of the resected specimen revealed red-yellow fatty tissue with multiple, small, tan-pink, well-circumscribed nodules and an adjacent abscess cavity. Microscopic examination demonstrated nonnecrotizing, necrotizing, and suppurative granulomatous inflammation (figures 1–3). Results of acid-fast, Fite-Faraco, and Gomori methenamine-silver stains were negative for the presence of microorganisms. After culture information was obtained, several additional acid-fast–stained biopsy sections were examined, but acid-fast bacilli were not found.

A nonpigmented mycobacterium was isolated from fungal media (brain-heart infusion agar with 10% sheep blood; BBL) on incubation day 8; media that were inoculated for the recovery of mycobacteria, which were incubated at 37°C, were negative for growth. A semiquantitative assessment of growth was made at differing incubation temperatures (4 denoted abundant growth; 3+, moderate growth; 2+, light growth; and 1+, rare colonies present). This organism grew in >5 days and demonstrated 4+ growth at 32°C, 3+ growth at 26°C, and 2+ growth at 37°C. Biochemical testing showed that the organism...
was positive for arylsulfatase, tellurite, growth on 5% NaCl, urease (weak), and catalase, but was negative for nitrite reduction and Tween 80 (JT Baker) hydrolysis. This organism was, therefore, identified as *M. abscessus* [5]. In vitro susceptibility testing found that the organism was susceptible to clarithromycin and azithromycin but was resistant to amikacin, cefoxitin, and doxycycline.

A history of nipple piercing was obtained retrospectively, after the results of histopathologic and microbiological examination confirmed the diagnosis of mycobacterial infection. Because the original medical history was obtained while the patient’s parent was present in the room, the patient did not divulge a history of nipple piercing that had occurred 1 year prior to presentation. The patient had worn a nipple ring until 1 month before the onset of symptoms. She did not receive antibiotic therapy postoperatively, and she was without symptoms 9 months after surgery.

**Discussion.** The identification of nontuberculous mycobacterial infections is increasing. Rapidly growing mycobacteria are considered to be emerging pathogens. This group of mycobacteria, also known as “Runyon group IV,” is named for its ability to demonstrate growth in subculture within 7 days. The 3 most commonly encountered, rapidly growing mycobacteria are *M. chelonae*, *M. fortuitum*, and *M. abscessus*. The rapidly growing mycobacteria have been implicated in a variety of infections that have involved both immunocompromised and immunocompetent hosts. For 4 years, Wallace et al. [1] followed 125 patients who had disease due to these organisms. Cutaneous infections accounted for 59% of the cases of disease caused by such organisms. Fifty-four percent of the cutaneous infections occurred after the patients had undergone surgical procedures, especially augmentation mammoplasty and median sternotomy. *M. fortuitum* was the organism that was most frequently isolated in specimens obtained from these patients (36 patients), followed by *M. abscessus* (20) and *M. chelonae* (7). Pulmonary infections were the next most frequent manifestation of disease and represented 27% of infections. The pulmonary disease that was produced was usually unilateral and noncavitary. The most frequent causative agents of pulmonary disease were *M. abscessus* (17 patients) and *M. fortuitum* (6). The other manifestations of rapidly growing mycobacterial infections were cervical lymphadenitis, keratitis, endocarditis, and disseminated disease with positive blood culture results. Disseminated disease, however, is quite rare, with <60 instances having been reported in the literature since 1960 [1, 2].

Nosocomial infections caused by rapidly growing mycobacteria may result from local skin trauma, cutaneous injection (especially among patients with diabetes), mammoplasty, bronchoscopy, and median sternotomy [1, 2, 4, 6]. In 1938, da Costa Cruz [7] reported the first instance of nosocomial disease caused by rapidly growing mycobacteria—a cutaneous abscess that occurred after injection. Rapidly growing organisms have been increasingly implicated in nosocomial infections; 4% of all outbreaks investigated by the Centers for Disease Control and Prevention (Atlanta) from 1980 through 1990 were caused by mycobacteria, most of which were rapidly growing species [8].

*M. abscessus* is a rapidly growing mycobacterium that is found everywhere, especially in soil and water. This organism has caused several nosocomial outbreaks of postinjection cutaneous abscess [1, 9]. Most outbreaks have been linked to contaminated nonsterile water and are often associated with injections [8–10]. Vandepitte et al. [9] described a large outbreak that involved 100 patients in a hospital in Kinshasa, Zaire. The largest outbreak of postinjection abscesses due to *M. abscessus*, however, involved 350 patients in Colombia and occurred in 1993 [10]. In this outbreak, the source of infection was contaminated water that had been used to wash a reusable
syringe, which was cleaned intermittently with commercial soap and tap water [10].

Villanueva et al. [10] studied 240 patients who had postinjection abscess due to \textit{M. abscessus}, and they found that the incubation period ranged from 7 to 121 days, with most lesions detected by 30 days after injection. Patients typically presented with 1 or more subcutaneous nodules that ranged in diameter from 0.5 mm to 2.0 cm. The lesions were typically erythematous, but they varied in consistency from firm and fixed to soft and mobile. Twenty percent of patients reported experiencing pain, and 60% reported having unspecified regional discomfort. Hyperpigmentation of the overlying epidermis and florid cellulitis may also occur with these infections. The mean duration of these lesions in these patients was 9–12 months [10].

The patient in the present report had undergone nipple piercing 10 months before the onset of symptoms. It is unclear whether this interval between piercing and presentation represents a long incubation period or the possibility of subsequent infection from a contaminated nipple ring. The large size of her lesion (3.0 cm), which was 1.0 cm larger than those reported by Villanueva et al. [10], suggests the possibility that the disease was of longer duration. The long incubation period, however, raises the possibility that infection occurred after the initial body piercing, possibly as the result of a contaminated nipple ring.

If the infection were definitively traced to the site of the procedure, this would raise many public health concerns and concern for the possibility of further outbreaks. Employees who perform body piercing are required to adhere to the US Occupational Safety and Health Administration guidelines for exposure to bloodborne pathogens (guideline 29 CFR 1910.1030). Infections caused by nontuberculous mycobacteria are not reportable to state health departments, however, so the prevalence of infections that are caused by these organisms and, therefore, the methods of transmission may not be fully realized.

Acid-fast bacilli, with their waxy, mycolic acid–containing cell walls, are inherently resistant to adverse environmental conditions. In the microbiology laboratory, these organisms survive harsh decontamination procedures that involve the use of sodium hydroxide and that kill most other bacteria. Therefore, it is not surprising that mycobacteria may resist needle or skin decontamination procedures. \textit{M. abscessus}, like most mycobacteria, may be demonstrated in smear samples or biopsy specimens by use of the typical Ziehl-Neelsen acid-fast stain. A variety of diseases that are caused by mycobacteria, including nodular lymphangitis caused by \textit{Mycobacterium marinum}, may be extremely rare, and acid-fast stains may yield negative results; therefore, the absence of acid-fast bacilli does not exclude the possibility of disease caused by these organisms [11]. For the patient in the present study, diagnosis was established by correlation of the findings of culture and histopathologic examination. No other cultures that were processed at the same time that this specimen was processed yielded \textit{M. abscessus}, which suggests that this organism was not a laboratory contaminant.

Because nontuberculous mycobacteria are ubiquitous organisms that are commonly found in water and soil, it is not surprising that contamination of culture material may occur, especially if culture material obtained from nonsterile sites. Therefore, when considered without supportive histopathologic findings, a single culture that yields these organisms, especially in small numbers, may not suffice for the diagnosis of disease due to nontuberculous mycobacteria and may raise the suspicion of contamination. To address this problem, the American Thoracic Society has established criteria for the diagnosis of pulmonary disease caused by nontuberculous mycobacteria. A biopsy specimen that shows histopathologic features that are consistent with a mycobacterial disease (e.g., granulomatous inflammation, acid-fast bacilli, or both) and the presence of 1 or more cultures of sputum samples or bronchial washings that test positive for these organisms, even in low numbers, are sufficient to establish a diagnosis of an infection due to nontuberculous mycobacteria [11]. Histopathologic examination of tissue biopsy specimens obtained from this patient was notable for the presence of granulomatous inflammation, and cultures were positive for nontuberculous mycobacteria, thereby meeting the stated criteria. These criteria, however, apply to symptomatic pulmonary infections. Definitive criteria have not been established for the diagnosis of extrapulmonary nontuberculous mycobacterial infections.

The definitive diagnosis, therefore, requires identification of the organism by culture and by biochemical or molecular evaluation. Because of the possible infrequency of the presence of mycobacteria in tissue, swab specimens should never be used for culture, because they are inadequate to establish the exclusion of mycobacterial disease. Adequate materials for culture include aspirated pus samples or, preferably, deep tissue samples. \textit{M. abscessus}, like other rapidly growing mycobacteria, grow at 35°C, but they may grow better at slightly lower temperatures. The microbiology laboratory should be notified if these organisms are suspected so that additional temperatures may be used for incubation. It is important to recognize the clinical situations in which these organisms are likely to occur so that tissue can be obtained for histopathologic examination and culture.

The mainstay of therapy for subcutaneous disease caused by rapidly growing mycobacteria often includes surgical drainage and antimicrobial therapy. Resistance to antituberculosis drugs is uniform among the rapidly growing mycobacteria, which is yet another important reason for recognizing this group of pathogens. The current antibiotic of choice is clarithromycin [10]. For patients who undergo surgical drainage followed by
treatment with clarithromycin, the rate of treatment success is >90% [10]. Recurrence of disease may be seen in patients treated with surgery alone [12].

Despite the growing number of patients who have disease caused by *M. abscessus* and other rapidly growing mycobacteria, these organisms continue to be underrecognized as pathogens. The patient in the present study developed mastitis and a breast abscess due to *M. abscessus* after undergoing nipple piercing. To date, there have been no reports of mastitis due to *M. abscessus*, and no association of this organism with infections due to body piercing has been made. Body piercing is a growing fad in the popular culture; rapidly growing mycobacteria should be considered in the differential diagnosis of cutaneous infection or subcutaneous abscess, especially those cases that occur after injection, trauma, surgery, and now body piercing.

References