Mycobacterial breast implant infection is a rare complication after augmentation mammaplasty. A review of the literature demonstrates multiple examples of breast implant infection with Mycobacterium fortuitum, but only rare discussion of Mycobacterium avium-intracellulare (MAC). The authors report an unusual case of MAC breast implant infection in a patient with a complex surgical history. (Aesthetic Surg J 2007;27:167–171.)

The authors present a complex case history of a patient who underwent several operations, including mastectomy, transverse rectus abdominis myocutaneous (TRAM) reconstruction, lobectomy for pneumonia with placement of a latissimus dorsi muscle flap, and ultimately development of a very unusual Mycobacterium avium-intracellulare contralateral breast implant infection. The current appropriate options and considerations for evaluation and treatment of suspicious breast implant infections are presented.

Aesthetic breast augmentation carries with it a distinct and well-known possibility of infection. Although the risk of infection typically is very low, when it occurs, the physical, physiological, and psychological sequelae can be devastating. Before the advent of breast implants, attempts at breast augmentation with silicone injections into breast parenchyma were known to cause chronic breast abscess, with an incidence of 12%.1 Currently, most breast augmentation surgeons use either silicone gel-filled or saline solution-filled implants. Despite careful attention to sterile technique, the overall incidence of implant infection remains at 1% to 4% annually after augmentation mammaplasty2 and 2% to 6% annually after breast reconstruction procedures.3

The most common cause of infection is bacterial in nature. However, when conservative treatment of post-implantation cellulitis is used, fungal and mycobacterial super-infections can sometimes ensue. Although rare, the literature does report both isolated and clustered cases of mycobacterial infections.2,4-10 The vast majority of cases of mycobacterial infections that have been associated with breast implants are due to Mycobacterium fortuitum, but cases of Mycobacterium chelonae9 and one case of Mycobacterium avium-intracellulare10 have been reported as well. The authors present this case report of a patient who had development of a mycobacterial breast implant infection after a cascade of concomitant medical problems and surgical interventions over a 2-year course.

Case Presentation

The patient was a 44-year-old Filipino woman with a history of appendectomy as a child, bilateral breast augmentation with silicone gel-filled implants in 1987, and rhinoplasty later that same year. The patient had an intracapsular implant rupture on the left side in 1997 that was diagnosed by ultrasound criteria. She chose to keep the implants in place for personal reasons.

In October 2002, she was hospitalized and treated for M avium-intracellulare (MAC)–related pneumonia. In May 2002, the patient noted for the first time an episode of bloody discharge from her right nipple. This was never brought to medical attention. In January 2003, the patient was admitted to the University of California–Irvine Medical Center as a transfer for work-up of fevers, chills, and a productive cough. A right breast mass was
discovered during her admission physical examination.

Biopsy of this lesion revealed a pathologic diagnosis of infiltrating ductal carcinoma. The patient had a palpable mass in the left axilla as well but underwent a metastatic work-up that was otherwise negative for distant disease. She then underwent left axillary lymph node sampling for staging purposes that was also negative for carcinoma. Her work-up also revealed a nearly obstructing lesion in the upper lobe of her left lung that was biopsy-negative for tumor and was thought to be caused by a MAC infection. She was treated medically with rifampin, azithromycin, and levoﬂoxacin (Levaquin) to gain control of the MAC infection.

During the same admission, the patient underwent a right modified radical mastectomy and pedicled TRAM flap reconstruction on January 24, 2003. The right silicone gel–ﬁlled breast implant was removed during this operation. Although the left implant had a known intracapsular rupture, it was left in place with the understanding that it would be removed in the future during planned staged revision surgery to correct breast asymmetry. Final pathologic study of the right breast cancer showed mixed invasive lobular carcinoma (90%) and invasive ductal carcinoma (10%); estrogen receptor positive, progesterone receptor positive, Her-2-neu positive, and P53 negative. Two of 17 lymph nodes were involved with disease. Her final stage was T4 N1 M0. Post-mastectomy treatment was followed by radiation therapy and chemotherapy.

The patient recovered well initially and went home, but a cough and hemoptysis developed starting in October 2003. This eventually progressed, and the patient presented again to the University of California–Irvine Medical Center with worsening respiratory symptoms. The patient underwent bronchoscopy and further radiographic work-up that showed progression of the *M avium-intracellulare* infection in the upper lobe of her left lung (Figures 1 and 2). Persistent and intractable hemoptysis developed, and on January 1, 2004, the patient underwent an emergency left upper lobectomy in conjunction with a pedicled left latissimus dorsi flap to cover the bronchial stump. The patient had a complicated hospital course with development of a bronchopleural ﬁstula, septic shock, adult respiratory distress syndrome, and Ogilvie’s syndrome. She required prolonged ventilation, hemodynamic support, and tracheostomy placement. The patient eventually recovered and was discharged home on March 2.

The patient returned on April 23 with drainage from her left inframammary scar associated with fever, left breast enlargement, and left breast tenderness. A chest computed tomographic scan was performed to rule out the possibility of a ﬁstula between her left thoracic cavity and the left breast. No ﬁstula was identiﬁed, but extracapsular extrusion of the ruptured silicone gel with surrounding ﬂuid was noted (Figure 3). The patient then underwent left implant removal on April 24. Intraoperative ﬁndings included an extracapsular rupture
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of the breast implant with extruded silicone material and surrounding purulence. She has done well after surgery and is currently awaiting bilateral revision breast surgery.

Discussion

The atypical mycobacteria may infect a wide variety of tissues, including the lungs, lymph nodes, skin, soft tissues, bones, joints, and meninges. Furthermore, disseminated disease is particularly prone to occur in patients with immunodeficiency, hematologic disease, pulmonary disease, or malignancy. Atypical mycobacterial infections have been reported as localized infections with breast implants and systemically as part of a patient presentation with silicone breast injections. However, this is the first case in the literature to report concurrent pulmonary and breast implant–atypical Mycobacterium avium-intracellulare infection.

M avium-intracellulare complex is composed of 2 species (M avium and M intracellulare) that are very difficult to separate on standard laboratory testing. It is part of the Group III (nonchromogen) class of atypical mycobacteria and is one member of the “slow-growing” group. M avium-intracellulare is highly resistant to antituberculosis drugs. The original inoculum of Mycobacterium in this case is unclear. Atypical mycobacteria have been cultured from previous operative sites as long as 48 years after the initial procedure. Mycobacteria spread to cutaneous tissues either hematogenously or from adjacent structures, including involved lymph nodes. The initial site for this patient may have been the pulmonary infection. It was this suspicion that prompted computed tomography evaluation for possible thoracomammmary fistula before explantation of the prosthesis.

Mycobacteria other than Mycobacterium tuberculosis continue to be classified in accordance to the scheme developed by Timpe and Runyon. This categorizes the atypical Mycobacterium on the basis of pigment production, colonizing characteristics, and rate of growth. Although it may take as long as 6 weeks to culture, M fortuitum is the most rapidly growing member of the genus and may account for the increased incidence of detection compared with M avium-intracellulare. laboratories trying to isolate M fortuitum traditionally use blood agar plates and thioglycolate broth, which may grow the pathogen, but it takes longer than traditional “routine” incubation periods. Some laboratories use Lowenstein-Jensen media or, better, the BACTEC (Becton-Dickenson, Sparks, MD) automated instrumentation system for faster identification of the organism because it allows recovery of most acid-fast bacilli within 6 to 8 days by use of a unique radiometric broth.

M fortuitum has been implicated as a skin commensal but has been isolated from soil, dust, water sources (including hospital sinks), human abscesses, and sputum, without any evidence to support person-to-person spread. Gentian violet (hexamethyl-pararosaniline hydrochloride mixed with pentamethyl and tetramethyl pararolaniline hydrochloride) is a commonly used skin-marking solution. Its popularity and common use for more than 100 years is mostly due to its skin marking ability, antifungal properties, and antibacterial prophylaxis ability against staphylococcal colonization in the umbilical stump in newborns. Despite these intrinsic properties, M chelonae (another rapid growing atypical) has even been isolated in gentian violet skin-marking solution.

Periprosthetic mycobacterial infections generally present with the clinical hallmark of local signs of infection without systemic illness. Breast swelling, tenderness, erythema at the incision or overlying the prosthesis, calor, and discharge of fluid or extrusion of the prosthesis through the incision site have all been reported. With operative exploration, the infection is usually localized in the periprosthetic space, and fluid is typically clear-to-cloudy and odorless.

Figure 3. Pedicled right breast TRAM reconstruction and left breast abscess associated with left silicone gel–filled breast implant (April 2004).
There are various strategies for evaluation and treatment of patients with suspicion of infected breast implants. The authors combine the recommendations of Haiavy and Tobin\(^8\) and Widgerow et al\(^6\) regarding suspicious prosthetic breast infections:

1. The patient should be seen as soon as possible.
2. Assume a high index of suspicion on the basis of clinical signs and symptoms. If fluid is suspected, aspiration should be performed, and a drain should be inserted. (Inform patient of risk of perforation.)
3. The exudates should be sent for Gram staining, acid-fast staining, and aerobic, anaerobic, and acid fast cultures. The clinician should inform the laboratory of his/her suspicion, and cultures should be kept for at least 14 days.
4. If tissue is removed, it should also be sent for histopathologic evaluation in search of granulomas and acid-fast organisms.
5. The patient should be monitored closely, and the drainage should be measured daily. It is wise to send multiple cultures to the laboratory to increase chances of isolation.
6. If the clinician has a high index of suspicion, the patient should be prescribed an empiric multi-agent antibiotic treatment in consultation with an infectious disease specialist.

These guidelines were reinforced by Heisten et al\(^7\) and Lee et al\(^10\) who suggested that acid-fast smears and cultures be performed at the initial onset of a post-implantation infection, and that one also should obtain capsular tissue and specimens of any unusual tissue for pathologic examination, including acid-fast stain. This infection may be rare; however, when present, substantial morbidity can be avoided with early aggressive therapy.\(^7\)

Radiographic assessment can be very useful when a diagnosis is unclear and should be used on a case-by-case basis. The CT and mammographic findings in patients with an abscess and periprosthetic breast infection were previously described by Walsh et al.\(^22\) They may be useful for evaluation of future patients with suspected periprosthetic infections, as well as to work up concurrent disease.

As stated by Wilkinson,\(^23\) atypical mycobacteria can be successfully treated with few or no sequelae, without implant removal, or drastic soft tissue surgery. Surgery is indicated in cases of extensive or life-threatening disease, abscess formation, exposure of the implanted prosthesis, or if drug therapy becomes problematic.\(^24\) Surgical intervention is an important option, but consideration should be given to nonoperative therapy.

The authors present a patient with a very complex condition who underwent several operations and ultimately ended up with a very unusual mycobacterial breast implant infection. Review of the literature demonstrates multiple examples of breast implant infection with \textit{M. fortuitum}, but only rare discussion of \textit{M. avium-intracellularare}. This low incidence of MAC infections may be secondary to low levels of suspicion by the treating surgeons, incomplete fluid analysis, or inability to correctly analyze fluid and tissue specimens for this slow growing organism, incomplete work-up, or a general failure to report these cases. Most likely it is due to a combination of all of these. Treatment plans can vary for this disease process. Overall, aggressive evaluation and appropriate intervention are the key to minimizing morbidity and maximizing outcome. ■

References


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