



## Rapidly growing Mycobacterium infections after cosmetic surgery in medical tourists: the Bronx experience and a review of the literature



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### ABSTRACT

**Background:** Medical tourism is increasingly popular for elective cosmetic surgical procedures. However, medical tourism has been accompanied by reports of post-surgical infections due to rapidly growing mycobacteria (RGM). The authors' experience working with patients with RGM infections who have returned to the USA after traveling abroad for cosmetic surgical procedures is described here.

**Methods:** Patients who developed RGM infections after undergoing cosmetic surgeries abroad and who presented at the Montefiore Medical Center (Bronx, New York, USA) between August 2015 and June 2016 were identified. A review of patient medical records was performed.

**Results:** Four patients who presented with culture-proven RGM infections at the sites of recent cosmetic procedures were identified. All patients were treated with a combination of antibiotics and aggressive surgical treatment.

**Conclusions:** This case series of RGM infections following recent cosmetic surgeries abroad highlights the risks of medical tourism. Close monitoring of affected patients by surgical and infectious disease specialties is necessary, as aggressive surgical debridement combined with appropriate antibiotic regimens is needed to achieve cure. Given the increasing reports of post-surgical RGM infections, consultants should have a low threshold for suspecting RGM, as rapid diagnosis may accelerate the initiation of targeted treatment and minimize morbidity.

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### Introduction

Medical tourism for cosmetic surgery procedures is on the rise, and approximately four million Americans travel abroad annually to receive medical care (Singh, 2016). The rapid availability of affordable treatments, perceived quality, and familiarity with one's host country all factor into the decision to travel for medical care, especially for cosmetic procedures (Singh, 2016; Hanefeld, 2015; Franzblau, 2013). However, there has been significant debate concerning the health outcomes of these patients and the financial burden that this imposes on the resident country's healthcare system. Increasing reports of post-surgical rapidly growing

Mycobacterium (RGM) infections have become a public health concern, and timely diagnosis and treatment of these iatrogenic infections is necessary, which requires a high index of clinical suspicion.

RGM are a type of non-tuberculous mycobacteria (NTM) characterized by their growth within 7 days when subcultured in the laboratory, differing from other mycobacteria, which may take several weeks to grow (De Groot, 2006). RGM are ubiquitous in the environment and are a recognized cause of skin and soft tissue infections associated with surgical site infections, typically due to contaminated water sources (Phillips, 2001; Zosso, 2015). There have been a number of recent RGM outbreaks identified in patients who have undergone cosmetic procedures abroad, including breast augmentation, abdominoplasty, liposuction, and buttock lift procedures (Singh, 2016; Furuya, 2008; Schnabel, 2014). Recent reports of invasive Mycobacterium infections associated with contaminated heater cooler units in cardiovascular surgery have also been described (Stewardson, 2017).

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Three clinically relevant species frequently associated with cosmetic surgery infections are *Mycobacterium abscessus*, *Mycobacterium chelonae*, and *Mycobacterium fortuitum* (Zhang, 2015). RGM, particularly *M. abscessus*, can form biofilms and they tend to be resistant to disinfectants. Thus, inadequate sterilization techniques are thought to be largely responsible for these surgical infections (Zosso, 2015; Furuya, 2008; Esteban, 2008; Chadha, 1998). RGM infections are uniquely challenging as they are difficult to diagnose and treat, with disease recurrence being a common morbidity of this disease process. The treatment of these infections often requires medical as well as surgical interventions to achieve clinical cure.

The authors' clinical experience with four cases of RGM infections acquired through cosmetic surgery procedures performed in the Dominican Republic is described in this report. These patients first presented to the Montefiore Medical Center (MMC), a multi-site academic medical center, between August 2015 and June 2016.

## Case reports

### Case 1

A 31-year-old female presented in May 2016 with diffuse burning in her abdomen and fever. Two months prior to presentation she had undergone a bilateral revision mastopexy, abdominoplasty, and liposuction in the Dominican Republic. She reported an increase in drainage from her umbilical and abdominal surgical sites and dehiscence of her lower abdominal wound. Radiographic and clinical evaluation revealed multiple anterior abdominal wall abscesses. She was started on empiric therapy with ampicillin–sulbactam and vancomycin. She later underwent percutaneous drainage with removal of 30 ml of bloody turbid fluid, which was sent for culture.

The culture stained positive for acid-fast bacilli (AFB), and growth was later identified as *M. abscessus* using RNA polymerase  $\beta$ -subunit (*rpoB*) gene sequencing, a laboratory method used by National Jewish Health, Denver, Colorado, USA, and validated according to the Clinical Laboratory Improvement Amendment (CLIA) (Adékambi, 2003). Ampicillin–sulbactam and vancomycin were discontinued, and intravenous imipenem–cilastatin, intravenous amikacin, and oral clarithromycin were initiated while awaiting sensitivity results. A repeat computed tomography (CT) scan showed interval resolution of the abscesses and she was discharged 9 days after presentation on this regimen.

In June 2016, within 2 weeks of commencing this antimicrobial regimen, the patient returned to the hospital with fever despite compliance with the antibiotic treatment. CT showed residual phlegmon in the abdomen, with extensive inflammatory changes of the rectus sheath but no drainable collections. Her *M. abscessus* isolate was later found to be susceptible to amikacin, tigecycline, cefoxitin, clarithromycin, azithromycin, clofazimine, and tobramycin, but was intermediately susceptible to imipenem–cilastatin (based on broth microdilution minimum inhibitory concentration (MIC) method). Her regimen was optimized by increasing the dose of amikacin to 12.5 mg/kg and switching to cefoxitin and azithromycin for better tolerability. Her clinical course was complicated by the development of severe leukopenia with a white blood cell count of  $0.9 \times 10^9/l$  and absolute neutrophil count of  $0 \times 10^9/l$  attributed to 4 weeks of cefoxitin. As a result, cefoxitin was switched to tigecycline, which was poorly tolerated due to significant gastrointestinal adverse effects. Tigecycline was discontinued; imipenem–cilastatin was then restarted and amikacin and azithromycin were continued.

Despite continuing maximal antibiotic therapy, she developed recurrence of the abdominal abscesses with extension to the right

labia majora in late July 2016. She required multiple rounds of incision and drainage for re-accumulation of abdominal wall abscesses. A decision was made at this point to pursue clofazimine as an alternative treatment given her complicated course with multiple recurrences, limited antibiotic choices based on susceptibility data, and intolerance to several antibiotics due to significant adverse effects. Clofazimine was obtained under a single patient investigational new drug (IND) application from the US Food and Drug Administration (FDA), which she began in September 2016; intravenous antibiotics were stopped. She was continued on the combination regimen of oral azithromycin and clofazimine for a total of 5 months, with transient clofazimine-induced hyperpigmentation of the skin. She has not developed further recurrences to date.

### Case 2

A 52-year-old female presented in late August 2015 with bilateral breast pain and right breast drainage. She had undergone two prior bilateral breast augmentations performed in the Dominican Republic, in 2002 and 2015, the latter only 6 weeks prior to presentation. Four weeks postoperatively, she reported fever, chills, and copious purulent discharge from the right breast incision site. She was admitted, evaluated by plastic surgery, and underwent removal of the bilateral breast implants. Gram staining of cultures showed Gram-positive cocci and she was discharged home with a 2-week course of oral trimethoprim–sulfamethoxazole.

Culture growth was noted within 10 days and the isolate identification was confirmed 3 weeks later, in September 2015, as *Mycobacterium chelonae/abscessus* complex (identified using high-performance liquid chromatography (HPLC) by the Mycobacteriology Laboratory at New York City Department of Health) (Butler, 1991). She was started on clarithromycin based on the localized infection. Two weeks later the patient developed increased bilateral breast drainage with fistula formation and wound dehiscence. An ultrasound showed a 1.2-cm loculated fluid collection in the right breast. She underwent incision and drainage of the bilateral breasts and 5 ml of serous fluid was removed and sent for culture. Cefoxitin and amikacin were added to her clarithromycin regimen.

Antibiotic susceptibility testing showed sensitivity to amikacin, kanamycin, tobramycin, cefoxitin, imipenem–cilastatin, clarithromycin, azithromycin, clofazimine, and tigecycline, and intermediate susceptibility to linezolid. Cefoxitin was switched to imipenem–cilastatin for convenience of administration (four times daily vs. three times daily dosing), while amikacin 12.5 mg/kg/daily and oral clarithromycin were continued. Intravenous antibiotics (imipenem–cilastatin and amikacin) were continued for a total of 1 month and clarithromycin alone was continued subsequently.

The patient did relatively well, with two mild recurrences at 3 months and 7 months later. Both episodes were treated with the addition of oral linezolid to clarithromycin with a good clinical response. In both instances, she developed localized fluctuance over the left breast with purulent drainage. In March 2016, she was re-evaluated by plastic surgery and underwent debridement with excision of breast tissue revealing deep retained nylon sutures that were visibly the source of the chronic draining sinuses. These nylon sutures were removed and cultures obtained during the procedure were negative.

A few days after completion of a 2-month course of linezolid and clarithromycin, her right breast abscess recurred. Intravenous antibiotic therapy with imipenem–cilastatin, tigecycline, and clarithromycin was initiated. Tigecycline and clarithromycin were later switched to amikacin 12.5 mg/kg/daily and azithromycin due to persistent nausea. In an effort to prevent recurrence, the patient

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