

Case Report

Non-Tuberculous Mycobacteria Infection Following Autologous Fat Grafting on the Face

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Abstract

Autologous fat grafting (AFG) for facial augmentation has become more and more popular because of its biocompatibility and low donor site morbidity. The differential diagnoses of delayed nodule formation after the procedure include fat necrosis and atypical infection. In this study, we report on a female patient suffering from nontuberculous mycobacteria (NTM) infection after AFG for facial augmentation. Multiple flesh-colored and erythematous nodules and tumors developed on her face 6 weeks after the procedure. Tissue culture yielded *Mycobacterium abscessus*. The management of NTM infections is discussed and a reminder of the importance of standard aseptic surgical techniques is provided.

Level of Evidence: 5

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Autologous fat grafting (AFG) has been widely used for cosmetic surgery because of its biocompatibility and low donor site morbidity. Delayed nodule formation after AFG may give rise to fat necrosis, cyst formation, or atypical infection. All of the above conditions can share similar manifestations of palpable mass, erythema, swelling, and tenderness in the early stage, but they have distinct outcomes and responses to treatment. Nontuberculous mycobacteria (NTM) infection is a rare complication following AFG which leads to cosmetic disfigurement. Prevention, recognition, and treatment are essential in management of such infectious complications.

CASE REPORT

A 40-year-old female patient without underlying diseases presented with erythematous and flesh-colored nodules and tumors on the face in December 2015, and indicated that the lesions had developed over the preceding 6 weeks. The lesions ranged from 1 to 3 cm in diameter and were located on the bilateral cheeks and temple area (Figure 1A, 1C, and 1E). The patient had previously undergone the

grafting of 20 mL of autologous fat harvested from her abdomen based on power-assisted liposuction, to the glabella, temple, midcheek, nasolabial folds, and the chin. This procedure was performed by a plastic surgeon along with a transconjunctival lower blepharoplasty without prophylactic antibiotics at a local medical clinic 3 months prior to presentation, and then the tender nodules and tumors appeared 6 weeks after the procedure. The patient had none of the following symptoms: fever, chills, malaise, weight loss, or respiratory or gastrointestinal discomfort. Intralesional steroids and systemic empirical antibiotics (oral amoxicillin/clavulanate and intravenous

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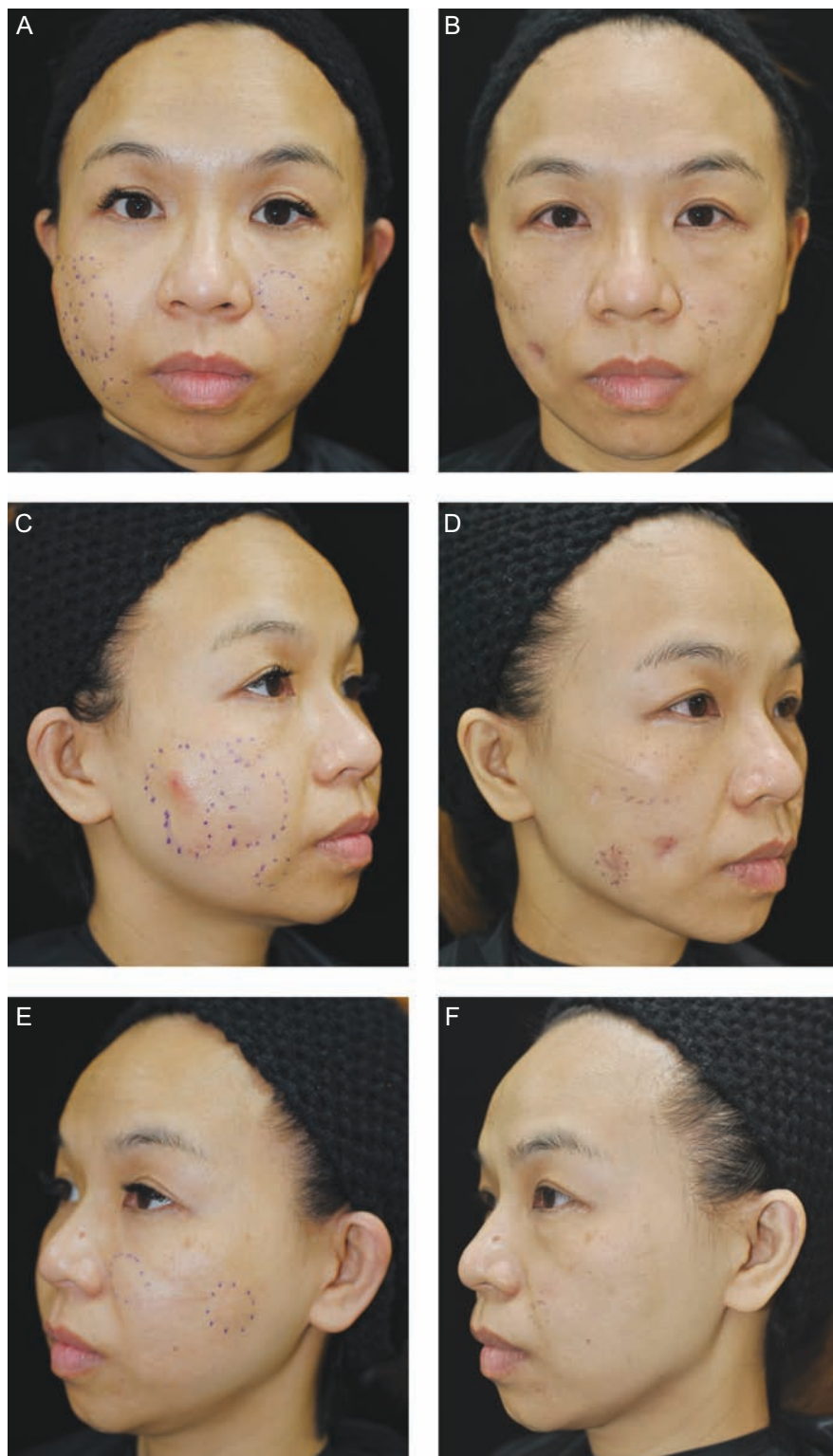


Figure 1. (A, C, E) This 40-year-old woman presented with multiple erythematous and flesh-colored nodules and tumors, ranging from 1 to 3 cm in size, at the bilateral sides of the cheeks and temple area 3 months after the procedure. The extent of subcutaneous lesions is circumscribed with a dotted line. (B, D, F) Six months after she finished a one-year treatment course of antibiotics, the nodules and tumors decreased in size and number, and left with two depressed scars on the right cheek. The extent of residual subcutaneous nodules is circumscribed with a dotted line.

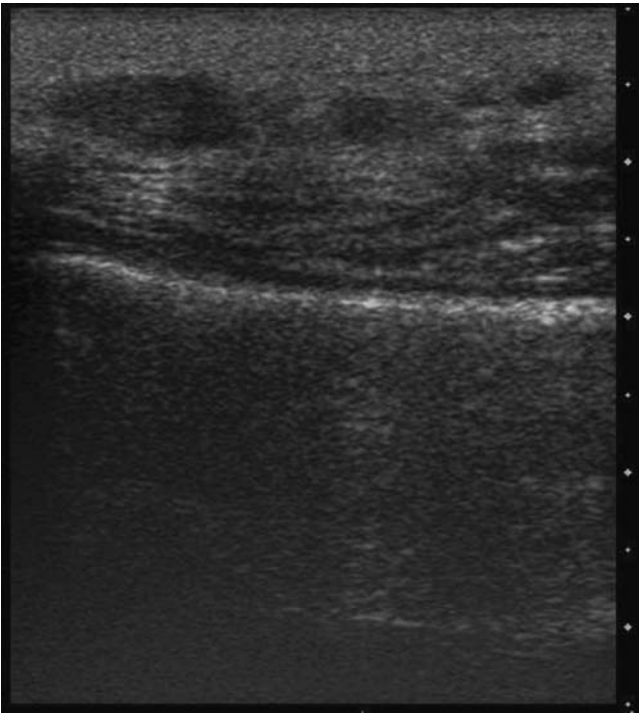


Figure 2. Ultrasound evaluation was carried out using a 10 MHz linear probe and showed multiple isolated hypoechoic, heterogeneous lesions with posterior enhancement in the subcutis.

gentamycin) without culture obtained were administered periodically at the clinic without improvement. The patient was then referred to our institution. Ultrasound evaluation was carried out using a 10 MHz linear probe and showed multiple isolated hypoechoic, heterogeneous lesions with posterior enhancement in the subcutis (Figure 2). Histopathology demonstrated subcutaneous necrotizing granulomatous inflammation (Figure 3), while acid-fast staining was negative. A 1+ result from the tissue specimen by direct acid-fast smear was available 2 days after biopsy. A tissue culture result was positive for *Mycobacterium abscessus*, while fungal and bacterial culture results were negative. A cutaneous NTM infection was diagnosed. After she received a one-year course of clarithromycin and moxifloxacin, the nodules and tumors decreased in size and number. Over 6 months of follow up, a clinical cure was achieved based on neither local heat, erythema, tenderness, nor swelling on the previous involving sites, and left with two depressed scars on the right cheek (Figure 1B, 1D, and 1F).

DISCUSSION

Rapid growth mycobacteria (RGM) were so named by Runyon because of their visible growth within one week on standard agar used for mycobacterial culture. Nearly

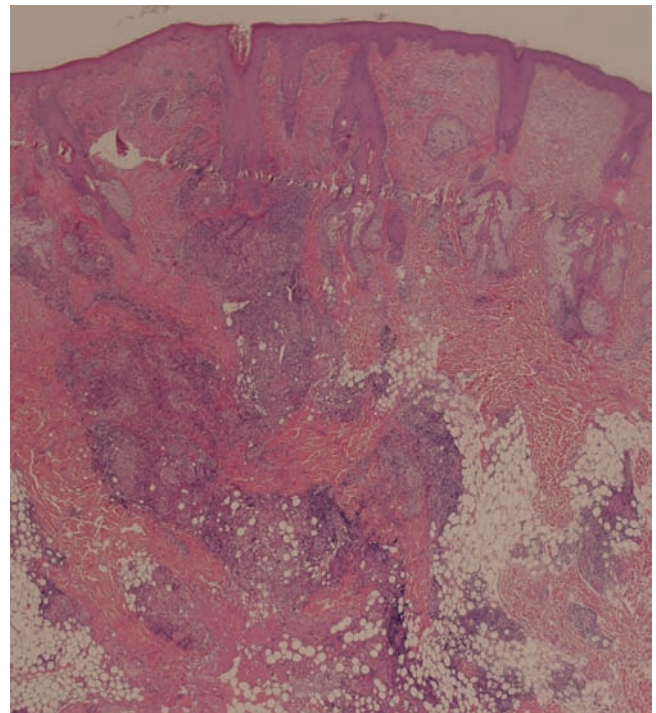


Figure 3. Photomicrography demonstrated subcutaneous necrotizing granulomatous inflammation (Hematoxylin-eosin stain, original magnification $\times 40$).

a hundred RGM species have been identified. The most prevalent RGM species associated with human disease are *M. abscessus*, *M. chelonae*, *M. fortuitum*, and *M. smegmatis*. *M. abscessus* is ubiquitous in the environment, including in soil, water, and dust, as well as in family and hospital settings. *M. abscessus* infections have been reported in patients who recently underwent invasive procedures such as lipofilling, tattooing,¹ and acupuncture.² The clinical features of cutaneous NTM infections may range from asymptomatic infections to those featuring tender erythematous violaceous nodules, ulceration, abscesses, and draining sinuses with discharge. The ultrasound patterns of the nodular lesions of cutaneous NTM infections have been reported to exhibit hypoechoic images with round or ragged forms.³ Suppurative granulomatous inflammation is the most characteristic feature in skin biopsy specimens from cutaneous NTM infections, and acid-fast bacilli staining was previously reported to be positive for only 11% to 27% of such cases.⁴ Therefore, cultures taken from biopsy and pus specimens are essential for diagnosis, and molecular biology techniques might be helpful. Nucleic acid sequencing (16S rRNA) and polymorphism analysis of restriction fragments of the hsp65 gene are the genotypic methods currently used in many clinical laboratories for the identification of NTM infections. However, *M. chelonae* and *M. abscessus* cannot be

differentiated by 16S rRNA sequence analysis.⁵ Therefore, for cutaneous *M. abscessus* and *M. chelonae* infections, a macrolide-based regimen with or without surgical debridement is frequently used.⁵ For serious disease, a minimum of four months of therapy is necessary to provide a high likelihood of cure.⁶

NTM infections following AFG could be a sporadic event, or outbreaks occurring in clusters.⁷ Risk factors for infection include a contaminated water supply or the inadequate sterilization of surgical equipment,^{7,8} such as the cannulas used in liposuction and fat transfer.⁹ The most common causative species associated with this complication are *M. abscessus*^{8,10} and *M. chelonae*.^{11,12} These mycobacterial species resist the activity of organomercurials, chlorine, 2% concentrations of formaldehyde and alkaline glutaraldehyde, and other commonly used disinfectants.¹³ In addition, most of these species are relatively resistant to many of the first- and second-line antibiotics.⁵ The complication would be inevitable even though perioperative prophylactic antibiotics were given. To minimize this severe complication of AFG, the surgeon performing the procedure must carefully follow recommended sterilization guidelines.

Another differential diagnosis of delayed nodule formation after AFG is fat necrosis. The rate of graft-related fat necrosis ranges from 2% to 23%,¹⁴ and the occurrence of such necrosis may be attributed to insufficient vascularization, intratissue mechanical stresses, and inflammatory reactions.¹⁵ The variable clinical presentation of fat necrosis ranges from a palpable firm nodule to a tender mass. Relevant diagnostic tools include clinical examination, ultrasonography, computed tomography, magnetic resonance imaging, histopathologic diagnosis, or a combination of techniques. Ultrasound images of fat necrosis range from cystic lesions with hypochoic areas to hypochoic lobules with posterior shadowing.³ Treatment includes liposuction or surgical excision.

Delayed nodule formation following AFG often lead to an initial diagnostic impression of fat necrosis in the absence of other supportive evidence, and might be treated with surgical debridement if the treatment response is slow. To prevent from unnecessary surgical procedures and scars afterwards, tissue sampling for histological and microbiological examination should be considered for making a definite diagnosis. If culture results are negative, repeated sample collection for cultures should be considered. The aforementioned culture types can identify the organism responsible for the infection and thus be very helpful in selecting the most suitable antibiotics or antifungal agents.

One limitation of this report was the exact sources of contamination in the process could not be identified. During the treatment process, we had a close contact with the office, and they reported no outbreak of cluster infection. Either the liposuction or fat processing via centrifugation with the water as a source of contamination might

contribute to NTM infections in our case. Another important limitation was the optimal duration of therapy could not be determined. A clinical cure was achieved based on the resolution of all symptoms and signs. Long-term monitoring for recurrence is still warranted.

CONCLUSIONS

We report herein a single case in which the patient presented with multiple tender nodules and tumors after AFG. Cutaneous *M. abscessus* infection was confirmed by tissue culture. Differential diagnoses include fat necrosis, oil cyst formation, or atypical infection. Noninvasive examinations may be helpful tools, but skin biopsy and culture collection are necessary for definite diagnosis. Adequate sterilization, early recognition, and prompt treatment are essential to prevent such an infection from causing further cosmetic complications.

Disclosures

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