JIDC | THE JOURNAL OF INFECTION IN DEVELOPING COUNTRIES

Case Report

Nocardia farcinica infection after facial lipolysis injection in an immunocompetent patient

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Abstract

Introduction: Injection lipolysis is a widely used technique for the rapid reduction of localized fat deposits. Although complications such as non-tuberculous mycobacterial infections have been reported, *Nocardia* infections following this procedure remain rare.
Case presentation: This report details a case of *Nocardia* infection in an immunocompetent patient after facial lipolytic agent administration. The patient exhibited amelioration of facial edema and resolution of chest rash following a course of amoxicillin-clavulanate treatment, ultimately achieving recovery and discharge.
Conclusions: This case highlights the importance of considering *Nocardia* infection as a potential complication of lipolytic injections and provides valuable insights into its diagnosis and management.

Key words: injection lipolysis; *Nocardia* infection; immunocompetent; complications; treatment; case report.

J Infect Dev Ctries 2026; 20(2):301-305. doi:10.3855/jidc.20262

(Received 21 April 2024 – Accepted 23 June 2025)

Introduction

Many people strive to pursue beauty. Obesity not only hinders the achievement of this goal but also brings serious health risks. Studies have shown that obesity is a significant risk factor for various chronic diseases [1]. Common strategies for addressing obesity and overweight include dietary modifications, regular physical activity, and maintaining healthy sleep patterns. Nevertheless, these methods often require prolonged adherence to yield significant results, presenting a considerable challenge for individuals struggling with self-regulation. Additionally, conventional approaches may not effectively target localized fat deposits. In contrast, injection lipolysis offers a non-surgical, minimally invasive alternative for subcutaneous fat reduction, delivering sustained weight loss and body contouring effects within a shorter timeframe—comparable to outcomes typically achieved through long-term diet and exercise regimens [2]. The United States Food and Drug Administration (USFDA) approved the first injectable lipolytic drug for fat reduction, called ATX-101 (Kybella), in 2015 [3]. Since its introduction, injection lipolysis has gained popularity as a non-surgical body contouring modality. Nevertheless, the safety and efficacy of this technique remain uncertain, necessitating additional clinical research to develop standardized treatment protocols. Injection lipolysis procedures are currently undergoing clinical trials globally and have yet to receive official approval.

Several adverse effects of injection lipolysis have been recorded, including pain, swelling, bruising, hematoma, infection, and allergic reactions [4]. In particular, infectious complications can pose challenges in both diagnosing and treating patients. Many reported cases of non-tuberculous mycobacterial infections occur in patients with prior fat-reducing surgical or non-surgical interventions [5]. However, there is limited literature on *Nocardia* infections associated with injection lipolysis. We report a rare case of *Nocardia* infection in an immunocompetent patient subsequent to facial injection lipolysis, representing a clinically significant and previously underreported complication.

Case presentation

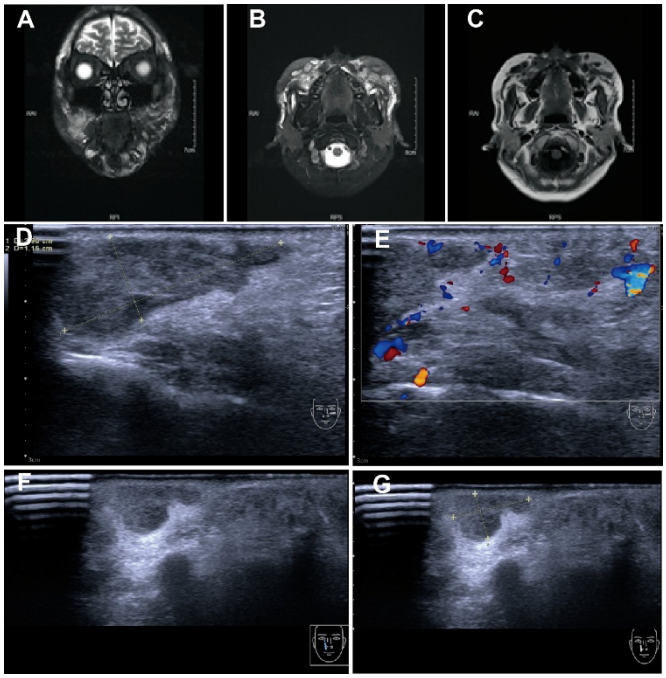
Clinical features

A female patient in her twenties presented to the dermatology clinic with bilateral facial swelling of one month's duration. Physical examination revealed diffuse, mildly firm and tender edema involving both facial regions. The patient's medical history was unremarkable, with no known comorbidities or drug allergies. One month prior to presentation, the patient underwent facial injection lipolysis at an external aesthetic clinic using Lipobean® (a Korean lipolytic agent containing phosphatidylcholine, deoxycholic acid, and 3% benzyl alcohol). Within days of the procedure, she developed progressive facial swelling accompanied by pruritus and tenderness. The external hospital had administered intravenous ceftriaxone and dexamethasone; however, the swelling was repeated. Consequently, the patient sought further diagnostic and therapeutic management at Zhejiang Provincial People's Hospital (Zhejiang, China).

Imaging examination

Initial plain magnetic resonance imaging (MRI) of the facial region demonstrated bilateral maxillofacial swelling with multifocal abnormal signal intensities (Figure 1A–C). Given the temporal association with the recent lipolytic injection procedure, post-procedural infectious complications were strongly suspected. Subsequent high-resolution ultrasonography of bilateral facial regions confirmed the presence of subcutaneous soft tissue infection accompanied by multiple small abscess formations (Figure 1D–G).

Figure 1. Imaging examination.

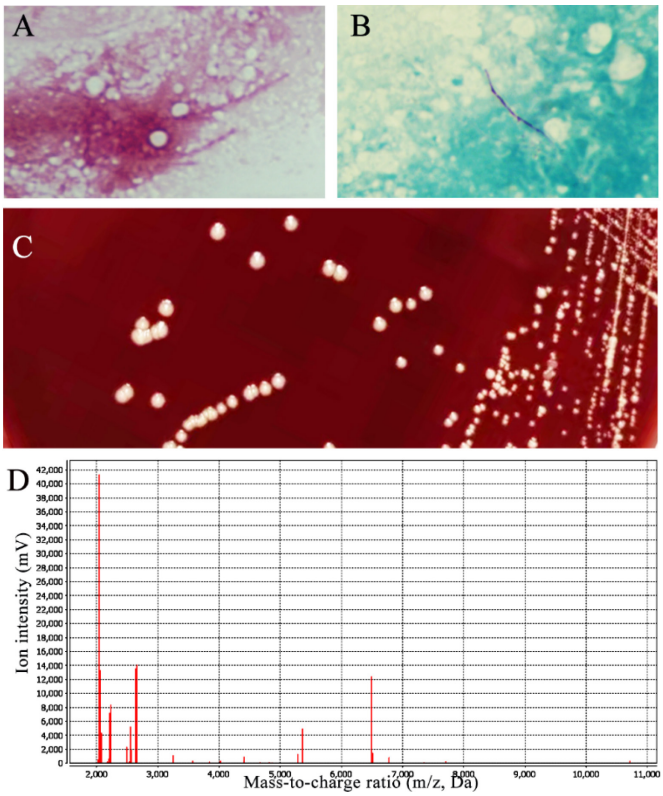


A–C. Facial MRI scans showing bilateral swelling of the maxillofacial region with scattered abnormal signals. **D–E.** Left facial ultrasound examination revealing several mixed echogenic areas within the subcutaneous soft tissues, with the largest measuring approximately 29mm*12mm. **F–G.** Right facial ultrasound examination showing a single mixed echogenic area within the subcutaneous soft tissues, measuring approximately 12mm*7mm.

Etiological examination

Following standard aseptic preparation of the puncture site, 2 mL of yellowish purulent fluid was aspirated from the facial swelling. Direct microscopic examination of Gram-stained specimens revealed branching, filamentous Gram-positive bacilli (Figure 2A). Modified acid-fast staining demonstrated slender, beaded, red-staining acid-fast bacilli (Figure 2B), suggestive of *Nocardia* species. The aspirated fluid was inoculated onto blood agar plates and incubated at 37 °C for 48 hours. A white colony with wrinkled surface, easily dislodged, was isolated (Figure 2C). Matrix-

Figure 2. Etiological examination.



A. Gram stain showing Gram-positive rods with long filaments and right-angle branching. **B.** Weak acid-fast stain revealing red, slender weak acid-fast positive rods. **C.** Isolated white, wrinkled colonies on blood agar plates. **D.** Matrix-assisted laser desorption/ionization time-of-flight (MALTID-TOF) mass spectrometry analysis indicating Nocardia farcinica as the causative agent.

assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS) definitively identified the isolate as *Nocardia farcinica* (Figure 2D). Antimicrobial susceptibility testing results are detailed in Table 1.

Treatment and prognosis

Under ultrasound guidance, multiple puncture aspirations were performed to relieve the facial effusion in the patient. The patient was concurrently initiated on a comprehensive medical regimen consisting of intramuscular dexamethasone sodium phosphate (10 mg once daily) to control inflammatory edema and oral doxycycline (0.10 g every 12 hours) as empirical antimicrobial therapy targeting the suspected infection. After the diagnosis of facial *Nocardia* infection, a combination of sulfamethoxazole-trimethoprim was chosen as the initial treatment, with a dosage of 0.96 g orally twice daily. However, the patient experienced significant adverse drug reactions, including generalized rash, severe abdominal pain with vomiting, and liver dysfunction. Therefore, methylprednisolone (60 mL) was administered intravenously for anti-inflammatory treatment, levofloxacin sodium chloride injection (100 mL once daily) for anti-infective treatment, and omeprazole injection (60 mg once daily) for gastric protection. Meanwhile, sulfamethoxazole-trimethoprim was discontinued, and amoxicillin clavulanate potassium tablets (312.5 mg 3 times daily) were initiated orally for *Nocardia* infection treatment. After one week of therapy, the patient's facial swelling improved, the rash on the chest and abdomen subsided, and there were no reported gastrointestinal adverse effects.

Discussion

Complications related to injection lipolysis are infrequent, with clinical studies primarily focusing on infections, particularly those caused by non-tuberculous mycobacteria [6]. Yang *et al.* conducted a literature review on skin and soft tissue infections associated with non-tuberculous mycobacteria, revealing a significant number of cases linked to adipose tissue, including individuals who underwent lipolysis injections [7].

Nocardia species typically infect immunocompromised hosts through traumatic injury or inhalation, resulting in pulmonary nocardiosis, and may disseminate to other organs via hematogenous spread, causing severe disseminated infections [8]. In the case of our patient, who exhibited normal immune function and lacked underlying diseases that could serve as risk factors, it is probable that the infection was acquired through injection lipolysis.

The clinical manifestations of *Nocardia* infection are similar to those of mycobacterial infections. *Nocardia* can cause pustules, pain, swelling, erythema, ulcers, or tissue necrosis in the areas of skin injury or damage [9]. Our patient presented primarily with facial swelling and pain upon initial presentation to the hospital. Facial MRI and ultrasound examination of a single joint confirmed subcutaneous soft tissue infection with abscess formation. However, these manifestations are nonspecific, and therefore, a definitive diagnosis of *Nocardia* infection cannot be made based solely on these findings.

The diagnosis of *Nocardia* infection primarily relies on microbiological identification, requiring 48 hours to 3 weeks for organism isolation and culture, with characteristic colonies typically emerging within 3–5 days [10]. The delay in clinical diagnosis and treatment of *Nocardia* infection is attributed in part to the time necessary for culture and identification of the pathogen. However, in cases where there is a high clinical suspicion of *Nocardia* infection, initial diagnosis can be facilitated through Gram staining and weak acid-fast staining of specimens, aiding in the differentiation of *Nocardia* from other bacteria such as Actinomyces [11].

It is imperative to promptly initiate aggressive treatment in suspected cases of *Nocardia* infection due to the severity of the infection. Trimethoprim-sulfamethoxazole (TMP-SMZ) has historically been the preferred drug for treating *Nocardia* infection, with combination therapy potentially including additional drugs such as linezolid, third-generation cephalosporins, and imipenem [12]. Given the diverse antibiotic susceptibility patterns exhibited by different species of *Nocardia*, it is essential to accurately identify

Table 1. Antibiotic susceptibility of *Nocardia farcinica* isolates.

Antibiotic	Method	Results	Unit	Susceptibility	Inflection point
Levofloxacin	E-test	0.5	μg/mL	Susceptible	0.5–2
TMP-SMZ	E-test	1.6/30.4	μg/mL	Susceptible	2–4
Vancomycin	E-test	4	μg/mL	Susceptible	4–32
Linezolid	E-test	1	μg/mL	Susceptible	4–8
Amoxicillin-Clavulanic acid	E-test	1	μg/mL	Susceptible	8–32
Piperacillin-Tazobactam	E-test	32	μg/mL	Intermediate	16–128

E-test: epsilometer test; TMP-SMZ: trimethoprim-sulfamethoxazole.

the species type and obtain drug susceptibility results for the clinical isolate [13]. The mass spectrometry identification findings indicated the presence of *Nocardia farcinica* infection in the patient. Subsequent retrospective analysis demonstrated relatively low resistance rates of *Nocardia* to TMP-SMZ (5.4%), linezolid (0%), amikacin (2.9%), minocycline (9.4%), and imipenem (19.5%). Notably, *Nocardia farcinica* exhibited a significantly high resistance rate of 79.7% to third-generation cephalosporins [14]. TMP-SMZ was selected as the treatment modality for infection management and prevention of dissemination. Nevertheless, following a period exceeding one month of oral administration, the patient exhibited symptoms including fever, severe vomiting, generalized rash, and signs indicative of compromised liver function. Subsequently, the administration of TMP-SMZ was promptly ceased. This medication falls within the sulfonamide drug category and is associated with specific toxicological effects. Adverse reactions, such as drug-induced rash, may manifest in certain individuals following sulfonamide drug administration, with severe cases potentially presenting with exudative erythema multiforme and exfoliative dermatitis [15]. In addition, it can also cause severe liver damage, kidney damage, and gastrointestinal reactions.

Amoxicillin/clavulanic acid is utilized for the treatment of *Nocardia* infections and demonstrates favorable tolerability in clinical settings. While its bactericidal efficacy may not be as robust as TMP-SMZ, it can be considered as a viable alternative [13]. In vitro susceptibility testing revealed sensitivity of the isolated *Nocardia* species to amoxicillin/clavulanic acid. Consequently, we administered oral amoxicillin/clavulanic acid tablets to patients to improve clinical symptoms.

Conclusions

Currently, instances of *Nocardia* infection subsequent to injection lipolysis are infrequent, warranting attention from both healthcare providers and the populace at large. Timely identification of *Nocardia* infection by healthcare professionals and the judicious administration of antibiotics can significantly enhance patient prognoses. The general public should be cognizant of the potential hazards of infection linked to injection lipolysis.

Acknowledgements

We thank all members of the microbiology laboratory of Zhejiang Provincial People's Hospital for their help with the collection of clinical data, and other individuals who provided assistance during the manuscript writing process but were not named.

Data availability statement

Data available on request from the corresponding author.

Ethics approval and consent to participate

This study was supported by the Ethics Committee of Zhejiang People's Hospital (Ethics Committee Approval of Biomedical Research Involving Humans (Approval No.: 2022JS008) and was carried out in accordance with the ethical standards of the Declaration of Helsinki.

Consent for publication

Written and informed consent was obtained from the patient for the publication of this case report and any accompanying images.

Authors' contributions

All authors contributed to the study conception and design. MC, YJ, material preparation and data collection; WX, MC, data analysis; WX, YJ, manuscript writing—first draft; XH, figures; BZ, follow-up; YG, critical revision of manuscript versions for important intellectual content. All authors read and approved the final manuscript.

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Conflict of interest

No conflict of interest is declared.

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