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CASE REPORT

A Case of Rare Facial Infection Caused by *Mycobacterium scrofulaceum*

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SUMMARY

Background: **In July 2024, our hospital confirmed a rare case of facial infection with *Mycobacterium scrofulaceum*. The patient visited our hospital due to pain and pus discharge from the right orbital incision for one month. The patient suffered multiple facial fractures due to trauma three months ago. He underwent systemic anti infection treatment and open reduction and internal fixation surgery at an external hospital. After the surgery, there was repeated swelling around the orbit, and the patient did not fully recover. One month ago, the infraorbital area was swollen again, locally ruptured, and purulent discharge was visible. After self-flushing and dressing change, the condition improved. Recently, there has been swelling around the eye socket again. In order to seek further treatment, he came to our hospital for treatment. Outpatient diagnosis: 1. Multiple space infections in the right orbit, temporal region, and skull base; 2. Postoperative open facial bone fracture.**

Methods: **CT (skull and neck), facial wound pus: bacterial culture and identification, acid fast staining, Gram staining, T-SPOT tuberculosis infection detection, identification of Mycobacterium species (DNA microarray chip method), Metagenomic Next-generation Sequencing (mNGS). Other related auxiliary examinations included blood routine, urine routine, liver function, kidney function, electrocardiogram, etc.**

Results: **CT (skull and neck) results: 1. After multiple fractures of the maxillofacial bone and anterior skull base, there is abnormal enhancement density shadow in the right maxillofacial region, indicating infection. Clinical laboratory tests: blood routine + high-sensitivity CRP (whole blood): white blood cell count 9.66 x 10^9/L, total neutrophil count 6.87 x 10^9/L, whole blood high-sensitivity C-reactive protein 46.21 mg/L, coagulation function: fibrinogen detection 6.61 g/L, D-dimer determination 1,231.52 FEU/L, inflammatory markers: interleukin-6 15.48 pg/mL, procalcitonin 0.037 ng/ml; Liver function test: total protein 85.2 g/L, globulin 44.4 g/L, aspartate aminotransferase 12.8 U/L. Facial wound pus examination: T-SPOT tuberculosis infection test: positive, with 40 antigen stimulated pore spots. Bacterial Gram staining: A small amount of Gram positive bacilli were found. Acid fast staining: acid fast bacilli detected ++: bacterial culture + identification: growth of mycobacteria ++, identification of mycobacterial species (DNA microarray method): *Mycobacterium scrofulaceum*, identification of Metagenomic Next-generation Sequencing (mNGS): *Mycobacterium scrofulaceum*. Clinical treatment plan: Chlorpheniramine 200 mg/d, Clarithromycin 0.5 g/d; Moxifloxacin 0.4 g/d, locally applied with 3% boric acid solution wet compress to enhance local wound dressing change. After 2 months of hospitalization, the patient's orbital swelling significantly improved, no obvious purulent discharge was observed locally, and the infection indicators significantly decreased. The patient improved and was discharged from the hospital.**

Conclusions: **This article reports a rare case of facial infection caused by *Mycobacterium scrofulaceum*. *Mycobacterium scrofulaceum* was quickly and accurately identified through mycobacterial strain identification (DNA microarray chip method) and mNGS. Reasonable treatment measures were adopted clinically, and the patient improved and was discharged. We hope that in the future, this study can provide assistance for the clinical diagnosis and treatment of *Mycobacterium scrofulaceum* infection.**

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KEYWORDS

Mycobacterium scrofulaceum, mycobacterial species (DNA microarray method), Metagenomic Next-generation Sequencing (mNGS)

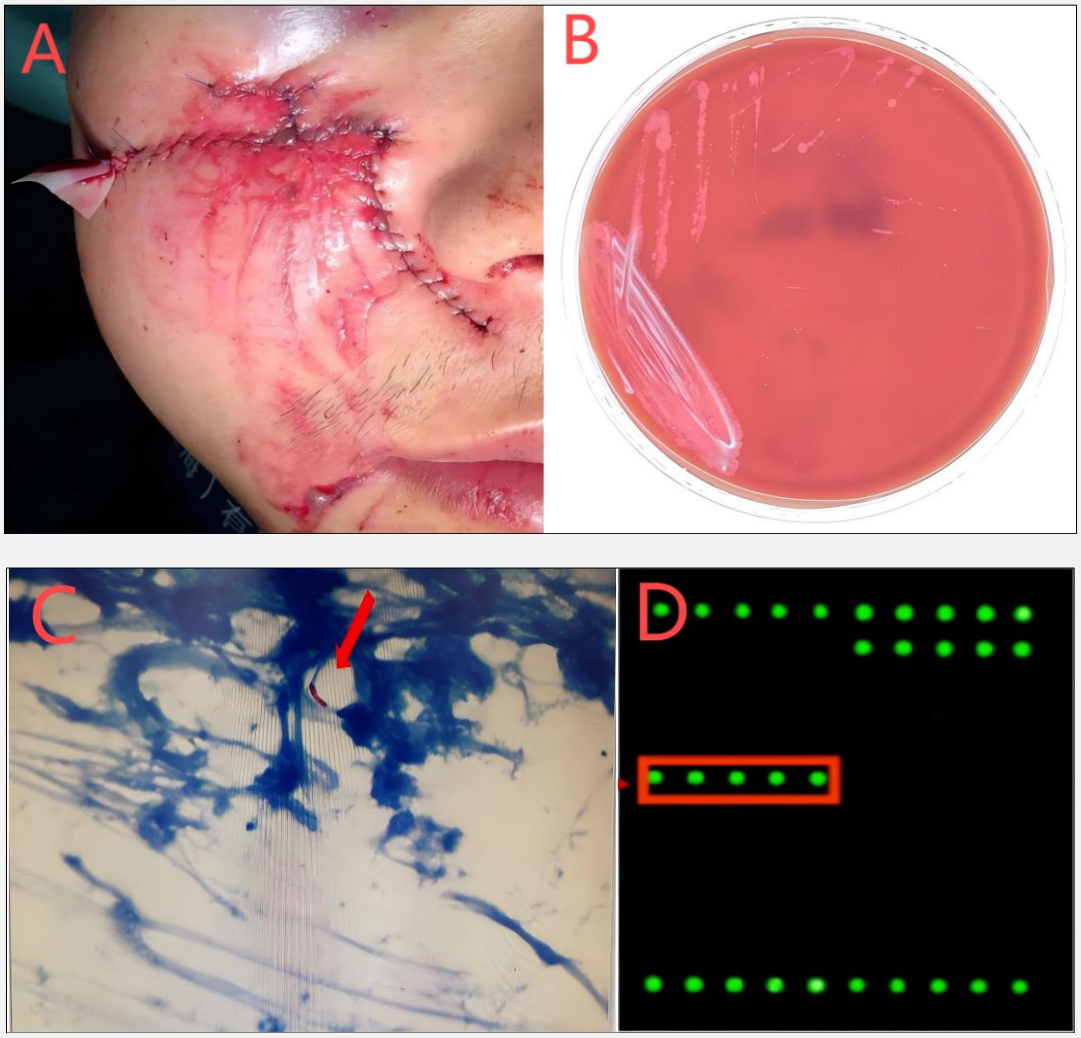
CASE PRESENTATION

Case

The patient, a 49-year-old male, visited our hospital due to "pain and pus discharge from the right orbital incision for 1 month". The patient had suffered multiple facial fractures due to trauma three months ago. He underwent systemic anti infection treatment and open reduction and internal fixation surgery at an external hospital. After the surgery, there was repeated swelling around the orbit, but the patient did not fully recover. One month ago, the infraorbital area was swollen again, locally ruptured, and purulent discharge was visible. After self-flushing and dressing change, the condition improved. Recently, there has been swelling around the eye socket again. In order to seek further treatment, he came to our hospital for treatment. Outpatient diagnosis: 1. Multiple space infections in the right orbit, temporal region, and skull base; 2. Postoperative open facial bone fracture. Immediately admitted to the hospital. Physical examination: The patient's facial features are asymmetrical, with multiple suture wounds visible on the right face and upper lip (Figure A). There is significant swelling and mild tenderness around the right orbit, and the right eye cannot be opened normally. There is significant swelling and redness in the right temporal, zygomatic, and infraorbital regions, with obvious pain when pressed. A rupture can be seen in the right orbital outer region, and obvious pus exudation can be observed when pressed. Oral cavity: Moderately limited mouth opening, with a maximum opening of about 2 cm. The oral mucosa is red and shiny, without congestion, swelling, ulcers, or new growths. CT (skull and neck) examination: 1. After multiple fractures of the maxillofacial bone and anterior skull base, there is abnormal enhancement of density shadow in the right maxillofacial region, indicating infection. There is fluid/blood accumulation in the bilateral maxillary sinus, ethmoid sinus, and nasal cavity, and significant swelling and gas accumulation in the soft tissues of the maxillofacial region. 2. Right eyeball contusion and laceration, damage to the inferior rectus muscle, and involvement of the right optic nerve tube. 3. Multiple lacunar infarctions in bilateral basal ganglia, lateral ventricles, and semiovale center and brain atrophy. Laboratory examination: blood routine + high-sensitivity CRP (whole blood): white blood cell count 9.66 x 10^9/L, platelet count 407 x 10^9/L, lymphocyte percentage 17.3%, total monocyte count 0.77 x 10^9/L, total neutrophil count 6.87 x 10^9/L, whole blood high-sensitivity C-reactive protein 46.21 mg/L, coagulation function: fibrinogen detection 6.61 g/L, D-dimer determination 1231.52 FEU/L, inflammatory markers: interleukin-6 15.48 pg/mL, procalcitonin 0.037 ng/mL. Liver function test: total protein 85.2 g/L, globulin 44.4 g/L, aspartate aminotransferase 12.8 U/L. Facial wound pus examination: T-SPOT tuberculosis infection test: positive, with 40 antigen stimulated pore spots. Bacterial Gram staining: A small amount of Gram-positive bacilli was found (Figure B). Acid fast staining: acid fast bacilli detected ++ (Figure C): bacterial culture and identification: growth of mycobacteria ++. Identification of mycobacterial species (DNA microarray method): *Mycobacterium scrofulaceum* (Figure D). Identification of Metagenomic Next-generation Sequencing (mNGS): *Mycobacterium scrofulaceum*. Clinical treatment plan: Chlorpheniramine 200 mg/d, Clarithromycin 0.5g/d, moxifloxacin 0.4g/d, locally apply 3% boric acid solution to wet compress on the swollen and red area, and strengthen local wound dressing. After 2 months of hospitalization, the patient's orbital swelling significantly improved, no obvious purulent discharge was observed locally, and the infection indicators significantly decreased. The patient improved and was discharged from the hospital. The doctor ordered continued anti infective treatment. Regular monitoring of blood routine, liver and kidney function, chest X-ray, electrocardiogram, etc. was conducted.

DISCUSSION

Mycobacterium scrofulaceum is a non-tuberculous bacterium widely distributed in soil and water [1]. *Mycobacterium scrofulaceum* infection is more common in children, with clinical manifestations including lung lesions and local lymphadenitis [2], mainly involving the submandibular gland and submandibular lymph nodes [3]. At present, there are few reports of infection with *Mycobacterium scrofulaceum* both domestically and internationally, and facial infections caused by this bacterium are even rarer. This article reports a rare case of facial infection with *Mycobacterium scrofulaceum*. The laboratory quickly and accurately identified the *Mycobacterium scrofulaceum* infection through strain identi-



Clinical and bacteriological images:
Figure A. Patient's facial wound condition.
Figure B. Growth of *mycobacterium scrofulaceum* in blood agar medium at 35°C, 120 hours, aerobic cultivation.
Figure C. Acid fast staining x 1,000.
Figure D. Identification results of mycobacterial species (DNA microarray method).

fication (DNA microarray chip method) and mNGS. Reasonable treatment measures were adopted clinically, and the patient improved and was discharged.

In this case, the patient is a middle-aged male who works as a brick well worker. The location of the patient's injury was at the bottom of the well, which is 7 meters deep. Therefore, the possibility of unconventional bacterial infection cannot be ruled out. In addition, the patient suffered severe injuries, multiple facial fractures, and deep wounds, which cannot rule out the possibility of bacteria entering the wound and potentially causing hidden bacterial infections. After surgical treatment in an external hospital, the patient's wound site continued to swell repeatedly, accompanied by purulent discharge, and he had not fully recovered. Therefore, it was highly suspected that there may be a special pathogen infection. We conducted special pathogen culture and identification on the pus from the patient's wound site and ultimately confirmed it as infection by *Mycobacterium scrofulaceum*. *Mycobacterium scrofulaceum* is a non-tuberculous bacterium that can form encapsulated inflammatory granulation tissue locally and can persist in the body for a long time [4]. The cure plan is surgical resection of the affected area and long-term

anti infection treatment [5]. It is considered that multiple facial fractures have not healed within three months after surgery, involving multiple important areas such as the orbit and skull base, and cannot be completely debrided. Therefore, surgical resection is not possible. Clinical anti infection treatment should be carried out first, and the subsequent treatment plan should be determined based on the condition after the local fractures are stabilized. *Mycobacterium scrofulaceum* infection is prone to recurrence and has a long treatment cycle [6] and requires medication for more than one year [7]. The clinical drug treatment regimen is: Chlorpheniramine 200 mg/d; Clarithromycin 0.5 g 2/d; Moxifloxacin 0.4 g/d. Apply a 3% boric acid solution to wet compress the swollen and red area locally, and strengthen the dressing change of the local wound. Chlorpheniramine can cause arrhythmia and QT prolongation. Regularly monitor blood routine, liver and kidney function, chest X-ray, electrocardiogram, and regular secretion culture during medication.

The clinical manifestations of diseases caused by non-tuberculous Mycobacterium and *Mycobacterium tuberculosis* are very similar [8]. The insensitivity rate of NTM to isoniazid and rifampicin, the first-line drugs for tuberculosis, is 83.7% [9]. In the early stage of infection, rapid identification of *Mycobacterium tuberculosis* and non *Mycobacterium tuberculosis* strains and development of targeted treatment plans is of great significance for clinical treatment [10]. mNGS technology has been widely used in pathogen detection in blood, respiratory tract, joint cavity, central nervous system and other fields [11]. The main advantages of this technology are unbiased sampling, minimal impact of antibiotic use on detection results, short detection cycle, and wide identification of known and unknown pathogens [12]. It is particularly suitable for the detection and diagnosis of rare, novel and atypical pathogens [13]. The Mycobacterium species identification kit (DNA microarray method) uses microarray technology to immobilize oligonucleotide probe molecules with known sequences on the chip substrate, and then hybridizes them with labeled nucleic acids in the specimen to be tested [14]. By detecting the hybridization signal intensity of each probe molecule, 17 clinically common Mycobacterium species can be quickly identified, accurately identifying the type of pathogenic bacteria [15]. In this case, the pathogens were detected using the two methods mentioned above, and the same results were obtained in a short period of time. Therefore, this case proves the practicality and reliability of the two detection methods in clinical pathogen identification.

In summary, this article reports a case of facial infection caused by *Mycobacterium scrofulaceum*. *Mycobacterium scrofulaceum* was quickly and accurately identified through mycobacterial strain identification (DNA microarray method) and mNGS. Reasonable treatment measures were adopted clinically, and the patient improved and was discharged. We hope that in the future, this study can provide assistance for the clinical diagnosis and treatment of *Mycobacterium scrofulaceum* infection.

Ethics Approval and Consent to Participate:
Ethical review and approval were not required for this study. The patient provided written informed consent to participate in this study.

Consent for Publication:
The patient provided written informed consent for study publication.

Availability of Data and Materials:
The original data and materials presented in the study are included in the article/supplementary material. Further inquiries can be directed to the corresponding author.

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Declaration of Interest:
The authors declare no competing interests.

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