Case Report of *Mycobacterium mageritense* Soft Tissue Abscess in Immune Compromised Patient with Inconclusive Gram Stain and Wound Culture

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INTRODUCTION

Rapidly growing atypical mycobacteria are non-motile, aerobic bacteria that are ubiquitous in both natural and nosocomial environments[1]. While the prevalence of these organisms is not well described[2], they have become an increasingly common source of localized skin and soft tissue infections, particularly in immunocompromised patients. Despite its ever-growing presence, this bacterium is difficult to identify due to late presentation of symptoms and negative results from conventional bacterial cultures and gram stains[3]. *Mycobacterium mageritense*, a non-pigmented rapidly growing atypical mycobacteria[4], is an example of a newly isolated source of cutaneous infections that is difficult to identify in laboratories. Repeat cultures from direct biopsy samples, supplemented by histopathological investigation are recommended for the most accurate diagnosis[3]. In addition to acid fast staining, "laboratories should hold on to routine bacterial cultures for a minimum of three days to ensure the recovery of these organisms"[4]. Due to the increasing prevalence of these infections, awareness of proper diagnostic technique is critical in effective treatment planning. Physicians should have a higher degree of suspicion for rapidly growing atypical mycobacteria, including *Mycobacterium mageritense*, in immunocompromised patients with abscess of unknown etiology.

CASE PRESENTATION

A 50 year-old woman with a past medical history of breast cancer presented to a chemotherapy session with a progressively worsening circular skin nodule on her right upper extremity over the last week. She complained of a warm, erythematous, fluctuant, 1.5 by 2 centimeter nodule on the lateral aspect of her right forearm. It had a central ulceration with mild overlying scale without any purulent drainage. There was no erythematous streaking towards the axilla or along the forearm distal to the lesion or palpable lymphadenopathy. She also endorsed intermittent fevers up to 103 degrees Fahrenheit but was generally nontoxic appearing upon presentation. Notably, the patient underwent right-sided modified radical mastectomy five months prior to presentation and had been actively receiving intravenous adjuvant chemotherapy via chest wall Metaport. Her oncologic course was uncomplicated and she had not been recently hospitalized.

DIFFERENTIAL DIAGNOSIS

Determining the etiology of skin and soft tissue nodules in immunocompromised individuals requires a broad differential given their uniform, and often nonspecific, appearance. Differential diagnosis includes infectious, inflammatory, and neoplastic entities. From an infectious perspective, furuncle versus abscess originating from a multitude of potential organisms including staphylococcal aureus, streptococcal species, sporotrichosis, endemic fungi, and other rapidly growing atypical mycobacteria, must be considered. Rheumatologic disorders such as sarcoidosis, lupus, erythema nodosum, and nodular vasculitis can also have similar presentations. Dermatologic malignancies, primarily squamous cell carcinoma and keratocanthoma should also be explored. Clinicians must carefully consider this wide array of possibilities in patients at risk for atypical infections[5].

OUTCOME AND FOLLOW UP

Upon presentation, the patient was admitted to the internal medicine service. General surgery was consulted for incision and drainage of the abscess. Empiric vancomycin was initiated after adequate drainage and sampling was performed. Gram stain of the abscess fluid revealed many polymorphonuclear leukocytes but no initial organism growth. Further investigation with culture on routine media and acid-fast stains of the abscess fluid revealed an acid fast non-tuberculin bacillus. This organism was later identified as *Mycobacterium mageritense*: a rare and rapidly growing atypical mycobacteria. Vancomycin was discontinued once sensitivities were available. The organism was susceptible to fluoroquinolones, sulfamethoxazole, linezolid, amikacin, and imipenem but resistant to clarithromycin. The patient was switched to oral levofloxacin and her infected area improved gradually. Antibiotics were discontinued at nine weeks with full resolution of symptoms.

DISCUSSION

Skin and soft tissue abscesses are frequent causes of hospital admissions. A step-wise approach to diagnosing the bacterial etiology of these infections allows physicians to narrow antibiotic coverage early and implement specific treatment guidelines. When certain organisms are found to have inconclusive gram stains and cultures, further investigation is warranted to avoid delay in implementation of preventive measures and treatment. With rapidly growing atypical mycobacteria, diagnosis is frequently complicated by inconclusive conventional identification procedures[1]. In this immunocompromised patient, *Mycobacterium mageritense* was identified as the source of her skin abscess through extensive laboratory support, including routine culture media and AFB staining. Due to the difficulty in diagnosing these organisms, many of these atypical infections may go unrecognized[4].

Skin and soft tissue infections often lay dormant, then spread under the intact skin surface[3] causing late-onset abscesses such as the one seen in this patient. Abscesses can be found in non-traumatized, virtually intact skin, which can make initial suspicion low. Local infections can manifest as cellulitis, ulcerations, or sinus tract infections[4]. The source of infection is often unknown[6], but has frequently been traced to prior skin trauma, exposure to contaminated water, medical procedures, surgeries, or implants[4]. The time lapse between initial inoculation, symptom onset, and clinical evaluation makes diagnosis difficult[4]. In this case, the nodule was noted during a chemotherapy session. She has many risk factors for infection including a compromised immune system, presence of a chest wall Metaport for chemotherapy, and compromised lymphatic drainage due to a previous modified right radical mastectomy.

Typical gram staining sensitivity and specificity for bacterial wound infections are 38% and 90% respectively[7]. Positive predictive value is found to be 83% and negative predictive value is 54% when cultures are used to identify bacterial etiology for wound infections[7]. For rapidly growing atypical mycobacteria, gram stains such as acid fast and periodic acid-Schiff[4], are even less sensitive and often misinterpreted. Sensitivity of acid-fast staining for nontuberculous mycobacteria is only 17.6%[8]. On the other hand, cultures from biopsy or swab specimens are more sensitive[3]. Biopsy samples may reveal "granulation tissue and neutrophilic abscess formation" that is more easily identified as mycobacteria in etiology[3], while anaerobic wound cultures can show the typical beaded gram-positive rods[6] that can be overlooked or mistaken for other gram-positive organisms. Acid-fast stains suggestive of non-tuberculous mycobacteria have been identified as positive after an average incubation period of three days, while routine cultures can take up to seven days to result[4]. For definitive identification of these organisms, molecular methods have been recommended[9]. Alternative diagnostic processes should be utilized in these cases, including PCR, which carries sensitivity and specificity of 52.9% and 96.2% respectively[8]. Physicians should be increasingly suspicious of rapidly growing atypical mycobacteria with any skin or soft tissue infection.

KEY POINTS

Physicians should have a higher degree of suspicion for rapidly growing atypical mycobacteria, namely *Mycobacterium mageritense*, in immunocompromised patients with abscess of unknown etiology. The literature regarding the risk of rapidly growing atypical mycobacteria in patients with inconclusive gram stains and cultures is growing. An ideal diagnostic technique is an initial acid-fast stain in addition to routine media culture. Bacterial cultures should be maintained for a minimum of three days to allow for recovery of these organisms. The difficulty in identifying Mycobacterium mageritense by standard laboratory testing should be understood in order to expedite diagnosis and treatment initiation, thereby improving outcomes.

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