Exceptional Rarity Unveiled: Isolated Fungal Osteomyelitis of Great Toe by Fusarium Solani-Unprecedented Presentation and Exquisite Management Insights

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Osteomyelitis, Fusarium solani, imaging studies, pathogens

ABSTRACT
Fungal osteomyelitis is a rare but significant condition, often associated with immunocompromised states or severe systemic illnesses. This condition involves fungal pathogens, primarily Aspergillus, Candida, and Mucor species. Among these, Aspergillus is the most commonly implicated, especially in cases of vertebral osteomyelitis, although fungal infections involving bones like the distal phalanx of the toe are rare. In particular, Fusarium solani, though less frequently reported, has gained recognition for its role in causing localized osteomyelitis in both immunocompetent and immunocompromised patients. A case involving a 57-year-old male with no significant history of immunosuppression is presented. The patient developed localized pain and swelling in the left toe following a minor traumatic injury. Initial radiographic imaging revealed bone erosion, leading to a diagnosis of osteomyelitis. Cultures from bone biopsy identified Fusarium solani as the causative pathogen. This is noteworthy as the fungus, though commonly found in soil, water, and plants, rarely infects bone structures. The patient was treated with a combination of antifungal therapy, including voriconazole and surgical debridement. The rarity of Fusarium solani osteomyelitis and its unusual presentation in an immunocompetent host adds to the complexity of diagnosing fungal infections in osteomyelitis. Treatment typically involves a multidisciplinary approach that combines both medical and surgical interventions. The case highlights the importance of considering fungal pathogens, even in unusual clinical settings, especially when initial treatments fail to provide resolution. Early diagnosis and targeted therapy can improve outcomes, particularly in cases involving uncommon fungal pathogens such as Fusarium solani. This report emphasizes the need for awareness of fungal osteomyelitis in immunocompetent individuals and underscores the critical role of fungal cultures and imaging studies in guiding management.

1. Introduction

Fungal osteomyelitis is an infrequent but significant clinical entity, typically occurring in the context of immunocompromised states or severe systemic illness. The primary pathogens associated with fungal osteomyelitis include Aspergillus, Candida, and Mucor species. Among these, Aspergillus is frequently implicated, particularly in vertebral osteomyelitis, while cases involving the distal phalanx of the toe are exceedingly rare [1,2]. Fusarium solani, although less commonly reported, has been recognized in several cases of invasive fungal infections and warrants attention for its potential to cause localized osteomyelitis in both immunocompetent and immunocompromised hosts [3]. This article was previously presented as a poster presentation at the 2024 13th Annual Conference of Pondicherry Orthopaedic Association (PAOCON 2024) On Jan 7th 2024

Case Presentation

A 24-year-old male presented with a four-year history of persistent pain in his left great toe. Employed in a farm yard and often wearing slippers, he had no significant medical history or known immunocompromised conditions. Clinical examination revealed diffuse swelling and tenderness in the distal phalanx of the left great toe, without warmth or erythema. Radiographic findings of Figure 1 showed bony erosion and a cystic lesion in the distal phalanx, while MRI indicated irregular bony erosion and joint effusion involving the FDL tendon.

Figure 1: Pre operative Xray

The patient underwent an open biopsy and curettage of the distal phalanx (Figure *2*)

Figure 2: Intra operative curettage

Fungal culture confirmed an infection with Fusarium solani.(Figure 3)Postoperative management with oral itraconazole for three months resulted in significant clinical improvement. Follow-up evaluations at three months and one year showed resolution of symptoms and no recurrence,and no recurrence of any bony lesion or cystic lesion (Figure *4*) with the patient regaining full function of the toe.

Request No	960051	**Requested Date**	23-09-2023 / 11:05
INVESTIGATION	CULTURE - FUNGAL - [Report : 1]	**REPORT STATUS**	COMPLETED
MICROSCOPY	LPCB mount from culture plate showing hyaline septate hyphae fruiting bodies and conidia are not clear and matured		
TESTING METHOD	CULTURE		
CULTURE RESULT	PATHOGEN ISOLATED		
ISOLATE - 1	Fusarium solani		
GROWTH COMMENTS	Preliminary identification, Genus and species may vary,Further identification required based on maturation as it us slow growing fungi and Anti fungal therapy can be started based on patient symptoms		

Figure 3: Fungal Culture

Figure 4: 1 year post followup xray

2. Discussion

Fungal osteomyelitis is characterized by infection and inflammation of the bone due to fungal pathogens. The most common fungi involved are Aspergillus species, which are typically associated with systemic diseases and immunocompromised states. Candida and Mucor species are also notable causes but less frequently lead to isolated osteomyelitis compared to Aspergillus [4]. Fusarium species, including Fusarium solani, are less common in this context but have been documented in a number of cases with varying presentations. A review of literature shows that fungal osteomyelitis involving Fusarium solani is rare and often occurs in specific scenarios. For example, Tekin et al. (2019) discuss Fusarium infections predominantly in the context of disseminated disease and chronic granulomatous disease rather than isolated bone infections [5]. Similarly, Fusarium infections are frequently associated with significant predisposing conditions such as malignancy or severe underlying illness [6].

Gamaletsou et al. (2014) reported a case of Fusarium osteomyelitis in a patient with a history of minor trauma, aligning with the current case where a minor injury in a farm setting may have been a precipitating factor [7]. This highlights that even minor environmental exposures can lead to serious infections, particularly when the fungal load is substantial or the local defences are compromised.

Rabodonirina et al. (1994) documented cases of Fusarium infections in immunocompetent hosts, demonstrating that these infections can occur outside of typical immunocompromised scenarios [8]. This supports the notion that localized fungal osteomyelitis can indeed arise in otherwise healthy individuals, albeit rarely.

The management of fungal osteomyelitis involves surgical debridement and appropriate antifungal therapy. The choice of itraconazole in this case is supported by its efficacy against Fusarium species. Itraconazole, an azoleantifungal, is effective in treating infections caused by Fusarium due to its broad-spectrum activity and good tissue penetration [9]. The Infectious Diseases Society of America (IDSA) recommends a combination of surgical intervention and antifungal therapy for optimal outcomes [9].

The successful outcome in this case, with resolution of symptoms and no recurrence, underscores the importance of early diagnosis and aggressive management. This case contributes to the understanding of fungal osteomyelitis by demonstrating that even isolated infections by less common fungi like Fusarium solani can be effectively managed with appropriate treatment strategies.

3. Conclusions

Isolated fungal osteomyelitis of the distal phalanx of the great toe is an exceptionally rare occurrence, particularly in a young, immunocompetent individual. This case highlights the possibility of such infections arising in individuals without significant systemic illness or obvious risk factors. It underscores the importance of comprehensive diagnostic evaluation and a robust treatment regimen involving surgical debridement and targeted antifungal therapy. The successful resolution of this case demonstrates the efficacy of current management strategies and contributes valuable insights into the treatment of rare fungal infections.

4. Additional Information

Disclosures

Human subjects: Consent was obtained or waived by all participants in this study.

Conflicts of interest: In compliance with the ICMJE uniform disclosure form, all authors declare the following:

Payment/services info: All authors have declared that no financial support was received from any organization for the submitted work.

Financial relationships: All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work.

Other relationships: All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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