

# Progressive Post-traumatic Necrotizing Fasciitis in an Immunocompetent Adult Caused by *Apophysomyces elegans*

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## Abstract

A case of necrotizing fasciitis (NF) of the right upper limb caused by the fungi *Apophysomyces elegans* in an immunocompetent adult following polytrauma is reported. The probable portal of entry is abrasion with the environment being the source. Once clinically stable, the patient underwent surgical stabilization of fracture humerus and fracture clavicle. As the patient developed signs of NF in the right upper limb on the 14th post-operative day, empirical antibiotics were administered. Wound debridement was performed, and appropriate antibiotics were administered based on culture sensitivity. Since there was no clinical improvement, multiple wound debridements were performed. Amphotericin B was initiated empirically before the fungal culture report. As the wound was progressively involving the whole limb, the patient ultimately required shoulder disarticulation. Containment of the infection with early initiation of amphotericin B and extensive wound debridements gave a positive outcome in our case. Mucormycosis should be considered a possibility in cases of NF with the progressive course and inadequate response to antibiotics.

**Keywords:** Necrotizing fasciitis, Amphotericin B, Mucormycosis, mucorales, Immunocompetent.

## Introduction

Necrotizing fasciitis (NF) is a serious and fatal soft-tissue infection commonly bacterial in origin. Polymicrobial NF is seen frequently in immunocompromised individuals [1]. Fungal NF is unusual for an immunocompetent person. Trauma seems to be the initiating factor providing the source and portal of entry for organisms [2]. Early diagnosis and aggressive debridement combined with antibiotics and antifungals can improve the outcome and reduce morbidity. Untreated cases die of sepsis/multiorgan dysfunction syndrome [3].

*Apophysomyces elegans*, an emerging fungi ubiquitously present, belonging to

the order MUCORALES of the class ZYGOMYCETES, affects the immunocompetent individuals following trauma. The characteristic microscopic features are broad, pauciseptate with thin-walled hyphae. Angioinvasion with thrombosis and perineural invasion is special characteristics [4,5]. It is one of the rarest causes of mucormycosis that affects the skin and subcutaneous tissue in the tropical and subtropical climates [6]. A high index of suspicion is needed to diagnose this condition in cases of progressive necrosis of wound and the response to antibiotics being significantly minimal [7]. Amphotericin B administration, together with surgical debridement of necrotic tissues, is far more effective than amphotericin B administered solely [8].

We present a case of polytrauma patient developing NF in the right upper limb necessitating shoulder disarticulation.

The patient's consent was taken for the

use of clinical information and photographs.

## Case Report

A 35-year-old immunocompetent male was brought to the emergency room with an alleged history of a road traffic accident. After initial resuscitation and relevant investigations, the patient was admitted as a case of polytrauma with the right brachial plexus injury, right clavicle, scapula and humerus fractures, multiple rib fractures, right hemopneumothorax, bilateral lower lobe of lung contusion, hemoperitoneum, liver laceration, and T12 vertebrae fracture.

The patient was treated in the intensive care unit under mechanical ventilation for his cerebral edema and dyselectrolytemia. On the 21st post-traumatic day, open reduction and internal fixation of the right humerus and clavicle fractures were done. The abrasion on the posterior aspect of the right arm showed evidence of NF on the

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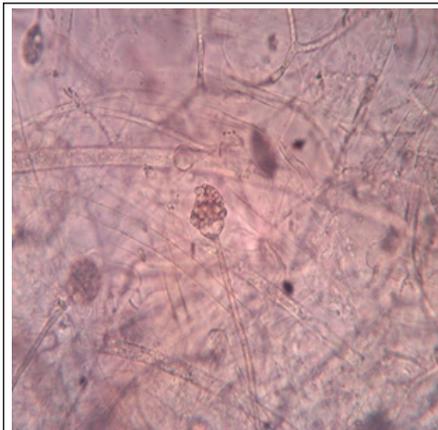
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**Figure 1:** On the 30th post-traumatic day, cephalic vein thrombosis is seen along the medial aspect of arm.



**Figure 2:** Necroses of fat tissues at the margins with induration of surrounding skin are seen. Muscles are relatively good.



**Figure 3:** Wet mount from water agar culture shows broad aseptate hyphae.

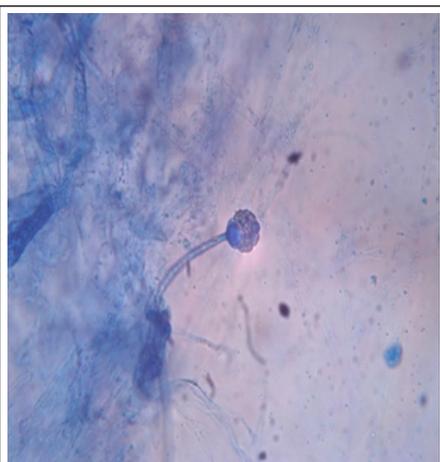
12th post-operative day. Wound debridements under loupe magnification showed the margins of the wound indurated with thrombosis of vessels at the indurated zones [figure 1]. Subcutaneous fat was dark yellow in color. Muscles were relatively good initially, later became necrosed [figure 2]. Tissue for bacterial and fungal culture and sensitivity was sent after each wound debridement and appropriate antibiotics were started. No clinical improvement was noted. While awaiting the fungal culture result, amphotericin B was initiated empirically from the 42th post-operative day. The wet mount and lactophenol cotton blue mount from the water agar culture were suggestive of *A. elegans* [Figure 3, 4]. The patient developed cardiac arrest on

the 44th post-operative day, revived as per advanced cardiac life support protocol, and maintained under mechanical ventilation. As the limb became swollen and turned black with an absent brachial pulse [ figure 5, 6], shoulder disarticulation was performed on the 45th post-operative day [figure 7]. All the necrotic tissues were removed exposing the right chest wall with intercostal muscles, glenoid of scapula, and acromioclavicular region of the right shoulder. Axillary artery and vein were ligated. In daily dressing, 5 ml of amphotericin B were applied topically, which were aspirated from his intravenous dose. Amphotericin B of 100 mg twice daily was administered for 30 days and antibiotics coverage for 2 weeks. Split

skin graft (SSG) cover over the right chest was performed 20 days after shoulder disarticulation [figure 8]. The patient was discharged on the 102nd day from the time of admission. A periodic follow-up of the patient was done to assess the wound healing [figure 9]. The SSG take-up was good, and no further discharge occurred from the wound site. Parascapular muscles strengthening and shoulder shrugging exercises were encouraged. The patient returned to his routine 4 months after the trauma.

**Discussion**

Zycomycotic NF is on raising trends with many literatures emphasizing its recognition, pathogenesis, microbiological features, management, and rapid spread, leading to death [9, 10,



**Figure 4:** Lacto-phenol cotton blue wet mount showing typical funnel-shaped apophyses.



**Figure 5:** The whole limb became black.



**Figure 6:** Axillary artery and axillary vein thrombosis are seen.



**Figure 7:** Following shoulder disarticulation.



**Figure 8:** Split thickness skin grafting was done on the 20th day post-shoulder disarticulation 75% of graft has been taken up.



**Figure 9:** Follow-up visit after 1 year.

11, 12]. Lakshmi et al. described the virulence of this lethal condition in a healthy adult male post-left inguinal hernioraphy developing *A. elegans* infection [13]. In a study conducted by Chakrabarti et al. in 1990–1999, 15.5% had cutaneous zygomycosis and there were 22.9% being apparently healthy hosts [14]. The diagnosis was made by characteristic histological findings and supported by mycological growth in culture. Early diagnosis of *A. elegans* is the key for successful outcome, as described by Cáceres et al. in a case of post-traumatic lower limb *A. elegans* treated with amphotericin B, thus avoiding amputation in a healthy male [15]. Management includes timely intervention with debridement or amputation with the administration of systemic amphotericin B. Late diagnosis correlates with bad prognosis [16].

In our case, the diagnosis was made clinically, supported by microbiological culture. The patient underwent seven wound debridements that revealed the thrombosis of the vascular pedicles and subsequent necrosis of the skin and subcutaneous tissues. Tissue for culture and sensitivity was sent after each wound debridement, one of that established as *Klebsiella pneumoniae* sensitive to colistin. However, there was no clinical improvement with colistin. In sabouraud dextrose agar culture medium, fungal growth was recognized, but did not sporulate. Special water culture technique was used to induce sporulation. Sporulation was observed after 6 days of incubation. Typical broad aseptate hyphae and funnel-shaped apophyses confirmed the type species as *A. elegans* [figure 3,4]

Since there was an inadequate response

to antibiotics, the fungal cause was thought of and amphotericin B was administered. However, the infection was advancing rapidly that necessitated the shoulder disarticulation. The moral support and encouragement from the patient's family maintained his quality of life during the 4 months of hospital stay.

### Conclusion

Mucormycosis should be considered in a post-traumatic NF and relevant investigations such as fungal culture should be sent ahead of time. The vigilant monitoring of patients, as well as prompt intervention, makes a significant difference in the outcome. We hope that this case exposes the progressive nature of this lethal infection and aids in preventing unfavorable effects.

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