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Case Study: Surgical Site Mucormycosis treated with Negative Pressure Wound Therapy with Instillation

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I. Introduction

Mucormycosis (previously called zygomycosis) is a rare but serious angio-invasive infection caused by a group of fungi called mucormycetes. Spores of these ubiquitous fungi (commonly found in soil, fallen leaves, compost, animal dung and air) can be inhaled and then infect the lungs, sinuses, and extend into the brain and eyes. Less often, infection may develop when the spores enter the body through a cut or an open wound. Mucormycosis is not a contagious disease, it cannot be spread from one person to another. Mucormycosis mainly affects people who are immunocompromised, or patients already infected with other diseases. High risk groups include people with diabetes (especially diabetic ketoacidosis), solid organ transplantation, neutropenia (low neutrophils, a type of white blood cells), long-term systemic corticosteroid use, and iron overload (hemochromatosis). The risk is high for people living with HIV, and those using immunomodulating drugs, including the anti-fungal voriconazole in some high-risk groups. Clinical presentation is classified according to the organ involvement. It can be rhino-orbital cerebral, pulmonary, cutaneous, gastrointestinal, or disseminated. Mucormycosis is an aggressive, life-threatening infection requiring prompt diagnosis and early treatment. Treatment usually consists of antifungal medications and surgery.

Surgical site Mucormycosis is even rare. **The Fungus involved in our case of surgical site mucormycosis was Apophysomyces Elegans**. *Apophysomyces elegans* mostly resembles those from genus *Absidia*. However, its bell-shaped (although not conical) apophyses (outgrowth), the existence of its foot-cell like hyphal segment, rhizoids produced opposite to the sporangiophores upon cultivation on plain agar, the darker and thicker subapical segment, and inability to sporulate on routine culture media help in distinguishing *Apophysomyces elegans*.[3]

Apophysomyces elegans is a thermotolerant fungus: it has been found to grow favourably at temperatures of 26 °C and 37 °C, and it grows rapidly at 42 °C. Its colonies are fluffy and cottony in appearance. The surface of the colony is white initially and turns to a brownish-grey or yellowish-cream as the culture ages, while the underside is white to pale yellow in colour.[3][4]

Infection is usually acquired via traumatic implantations associated with soil or decaying vegetable matter (such as from accidental injuries or insect bites). Invasive soft tissue infections can develop on burns or wounds which are contaminated by soil. Unlike other zygomycosis, the affected host is usually otherwise immunocompetent. *Apophysomyces elegans* infections present most commonly as necrotizing fasciitis and/or osteomyelitis.[6][8][9].

II. Case Presentation

Ketanbhai 43 year old male pateint presented to Shalby Hospital with history of RTA while riding two wheeler causing injury to right arm. Patient had severe pain and swelling in arm. X ray suggestive proximal humerus communited fracture.

Preop investigations done and after fitness, patient operated for humerus platting using PHILOS (Proximal humerus interlocking system) via deltopectoral approach. Post operative stay was uneventful. Patient was discharged with dry dressing after 4 days.

After 7 days, Patient complained of redness and pain in stichline and there was pus coming out from stitch line. Patient had history of 2 times dressing changes outside in mean while.

Patient was immediately called. Pateint exhibited high grade fever on presentation, severe pain in stichline. Pus coming out from stitchline.

Figure 1 Infected Stitch Line on presentation

Immediately stitches opened and pus sent for culture meanwhile empirical Antibiotics Cefoperazone sulbactam and Amikacin started.
Pus culture came out to be MRSA sensitive to Linezolid and Vancomycin, So Linezolid and Vancomycin started .
Wound was non responsive to Linezolid and Vancomycin
There were punctate spots of pus coming from surrounding skin and Dressing was foul smelling. Blackish discharge was seen in VAC cannister.
Worsening of wound was observed. So further investigations done which reveal CRP 679mg/L, white blood cells 27.3×10^9/L, neutrophils 15.2×10^9/L, lymphocytes 1.0×10^9 /L.

Figure 2 Worsened wound on follow up

Due to such atypical presentation, excised affected skin was sent for biopsy and culture. KOH mount showed aseptate Hyphae, confirming Mucormycosis infection
Inj. Amphotericin was started immediately.
Patients and relatives counselled about the disease and then immediate wound debridement was planned. In operation theatre all visibly affected tissue was removed surgically with a normal 1 cm margin.
Very next day wound Assessed and Considering the wound size (30*15*3 cm) and patient comorbidity, V.A.C. VERAFLO™ Therapy with V.A.C. VERAFLO™ Dressing was recommended for wound management, and dressing applied over it.

Figure 3 Wound seen post debridement

Further Fungal specific culture showed Apophysomyces Elegans
After 2 VAC veraflo cycles wound granuted to an extent that it can be covered with Skin graft.

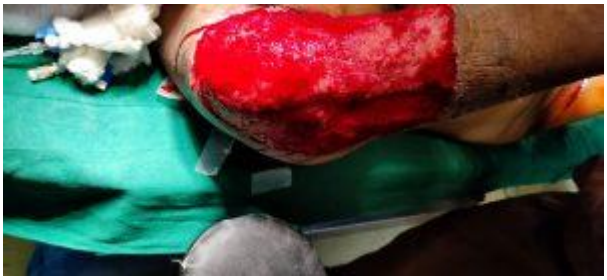

Figure 4 Granulated wound after 2 VAC Cycles

Figure 5 Immediate Post skin grafting

Figure 6 Settled Skin graft on follow up.

Skin Graft settled over a period of time, Patient was then put on oral antifungal treatment for four more weeks.

III. Discussion

Ketanbhai 43 year old male pateint presented to Shalby Hospital with history of RTA while riding two wheeler causing injury to right arm. Patient suffered humerus fracture for which platting was done, patient sent home and then after patient complained of surgical site pain and discharge. On investigations it was found to be mucormycosis infection. Debridement was done and VAC veraflo applied. VAC veraflo helped clearing of wound faster and also promote granulation tissue formation faster. Thus decreased hospital stay by reducing time to wound coverage.

It is clear to see from Figures 3-4 the effects of only 12 days of Veraflo in removing slough and promoting granulation tissue. Furthermore, his length of stay was shorter than one would have expected if using only conventional dressings, only 28 days post-op.

The current consensus is for saline as the first choice of instillation solution in NPWTi (Kim et al, 2019). There exists some debate over whether this holds true for infected wounds. While the wound had positive fungal cultures, most of the infected tissue had been removed during surgery and concurrent intravenous antifungal treatment were being administered.

IV. Conclusions

Veraflo system allowed such an extensive, infected wound to be cleaned and granulated to such an extent it was closed within three weeks of debridement. Using conventional dressings would have taken months, increased the length of stay, would likely have increased the risk of further infection and necessitated further surgeries for debridement or washout. The Veraflo system is a useful tool to have in the healing of MUCORMYCOSIS wound

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