CASE REPORT

VACUUM-ASSISTED CLOSURE AND PRIMARY CUTANEOUS ASPERGILLOSIS IN A BURN - A MANAGEMENT DILEMMA!

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SUMMARY. The advent of vacuum-assisted closure (VAC) devices has changed many wound management practices by application of topical negative pressure. A 20-year-old male sustained 21% total body surface area circumferential full-thickness burns to both legs from knees to feet. The VAC dressing was used in the management of his wounds. The patient had persistent pyrexia and graft destruction and subsequently the wounds cultured *Aspergillus fumigatus*. The increasing popularity of the VAC dressing is well deserved in the management of complex burn wounds. This case highlights the fact that in the care of complex burn patients the development of opportunistic infections should be considered, especially in situations such as persistent pyrexia or following the breakdown of healed grafts, particularly during the use of topical negative pressure.

Introduction

Advances in medical and surgical therapies over the past few decades have changed patient care. The new technologies and treatment modalities have improved patient care but can cause devastating sequelae in immunocompromised patients. The advent of vacuum-assisted closure (VAC) devices, manufactured by Kinetic Concepts, Inc., UK (KCI, UK), has changed many wound management practices with the application of topical negative pressure. We report a case of *Aspergillus fumigatus* under VAC dressing resulting in graft destruction and persistent pyrexia in a burn patient.

Case report

A 20-yr-old male involved in a road traffic accident that tragically claimed the lives of all others travelling in the same and oncoming vehicles sustained 21% TBSA circumferential full-thickness burns to both legs from knees to feet (Fig. 1). He also sustained a fracture to the left ulna and left frontal bone.

Escharotomies were undertaken on the day of admission. Subsequently, tangential excision and split-thickness skin grafting to both lower legs and feet were performed. Burn wound swabs grew coliform, bacillus, and *Staphylococcus aureus*, and the patient was commenced on Vancomycin. This was changed to Co-amoxiclav and Clindamycin following microbiology advice. The left ulna was plated, while the left frontal bone fracture was managed conservatively. In the second week the patient spiked a low-grade temperature. The wound swabs cultured *Pseudomonas* and the antibiotics were changed to Tazosin and Clindamycin. Overall graft take was good with the exception of a few patchy areas of graft loss; exposed tendons were evident over the medial malleolus and tendo-
Achilles areas. Split-thickness skin grafting was performed in the areas of graft loss, and VAC dressing was applied over the exposed tendons. Continuous sub-atmospheric pressure of 125 mmHg was applied. The dressing was changed according to the patient’s clinical needs for 48-72 h and during dressing changes negative pressure was off for 20-30 min.

During the second and third week, he continued to spike temperatures of 38-39 °C and became tachycardic with occasional rigors. The white cell count and C-reactive protein were within normal limits. The patient was haemodynamically stable. Inspection during dressing change in the fourth week revealed graft destruction of previously healed areas, and the wound had blue, velvety discoloration under the VAC dressing (Fig. 2). The wound swabs cultured *Aspergillus fumigatus* but biopsy did not grow fungal species. The blood culture and echocardiogram were negative. We discussed with KCI, UK and they advised that fungal spores might grow during dressing changes owing to the moist environment (personal communication).

Subsequently, surgical excision of the wounds was undertaken and Voriconazole was commenced in view of the patient’s persistent temperature, after discussion with the microbiologist. The temperature settled. Further skin grafts to a few areas on the foot and ankle were performed. The patient had an uneventful but protracted recovery. All wounds healed well (Fig. 3).

**Discussion**

Advances in medical and surgical therapies over the past few decades have changed patient care. New technologies and therapies have helped to treat patients suffering from previously devastating or fatal diseases and non-healing wounds. As a consequence, these successes have resulted in an increase in the severely ill, immunocompromised, hospitalized patient population. These immunocompromised patients are vulnerable to several sources of nosocomial infection, including fungal species, which were previously considered to be low virulence or “non-pathogenic”.¹

*Aspergillus* spp. are ubiquitous, commonly occurring in soil, water, and decaying vegetation. Reservoirs in hospitals from which these fungi have been cultured include unfiltered air, ventilation systems, contaminated dust dislodged during hospital construction, carpeting, food, and ornamental plants.²

The predisposition for burn victims to develop cutaneous aspergillosis is probably related to physical disruption of the cutaneous barrier, to depression of several host defence mechanisms, especially immunosuppression (in major burns), and to other mechanisms such as impaired or decreased phagocytosis, bacterial flora disturbances due to the use of systemic antimicrobial agents, and hyperglycaemia from hyperalimentation.² Fungal infections in these patients are often severe, rapidly progressive, and difficult to treat or diagnose.¹ A successful outcome in the burn patient requires treatment with intravenous and topical antifungal agents, surgical excision to the level of non-invaded viable tissue, and in some instances amputation of the affected limb.²

Diagnosis of a fungal infection should be kept in mind when managing a complex and deteriorating burn wound, especially following the appearance of dark, ulcerated areas. Biopsy and histological examination are crucial as only 30% of histologically proven infections are confirmed with culture.¹ The initial manifestation of cutaneous aspergillosis may appear as macules, papules, nodules, or plaques. A patient with primary cutaneous aspergillosis developing in a wound generally presents with significant fever, a change in the character of the wound surface, swelling, induration, and tenderness. The rate of infection varies from indolent to fulminant, and the mortality rate is approximately 30 to 75%.²
The VAC dressing is one of the options in wound management and its increasing popularity is well deserved. Improved wound healing with the VAC dressing is thought to be promoted by the removal of interstitial oedema, the increase in local blood flow, and the stimulation of granulation tissue formation secondary to negative pressure application. The bacterial counts have also been shown to be reduced. Previous reports have shown that the VAC dressing proved beneficial in burn patients both for securing skin grafts and on exposed bone. We used a sub-atmospheric pressure of 125 mmHg because this was originally described in animal studies and also recommended in VAC therapy clinical guidelines. These guidelines recommend a 75-125 mmHg pressure setting for securing skin grafts, with the lower end of the range in areas of less shear forces or in patients who experience discomfort with high pressure; high pressure (125 mmHg) is recommended in high contoured areas or areas where more shear forces are present. High pressure also helps to hold grafts more firmly in place.

Primary cutaneous aspergillosis has been reported under occlusive dressings, such as adhesive tape-associated or catheter-related dissemination among HIV-infected patients. The cutaneous barrier disruption can occur owing to intermittent tape stripping of the stratum corneum of the skin during dressing changes, which can cause mechanical trauma to the skin, or trapping of Aspergillus pores under the adhesive tape can also play a role. In a prospective study of 130 burn patients managed either with open or with occlusive dressings, 30 developed fungal infections, the majority of which were Aspergillus and Candida spp. However, the study showed that fungal infections were more common with open dressings (25.5%) than with occlusive dressing (16.0%).

**Conclusion**

Although the vacuum-assisted closure dressing has been previously used in burns patients, to our knowledge this is the first report of Aspergillus spp. growth under such a dressing. Aspergillus sp. can rapidly progress to fulminant infections throughout the body with high mortality rates. We believe that in the care of complex burn patients the possible development of opportunistic infections should be considered, especially in situations such as persistent pyrexia, or following breakdown of healed grafts, particularly during the use of topical negative pressure.

**BIBLIOGRAPHY**


This paper was received on 15 December 2009.

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