The usage of highly absorbent antimicrobial polyurethane foam in wound management of pyomyositis

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Intra-muscular abscess is a suppurative infection involving the skeletal muscle. Operative management remains the mainstay together with timely administration of systemic antibiotics. Timely usage of antimicrobial dressings assists the wound bed preparation for secondary closure.

Intra-muscular infection can be treated initially with systemic antibiotics treatment. If the infection is not treated in a timely way, it may evolve and lead to an organised collection formation or abscess (Stevens et al, 2005; Stevens et al, 2014). It is also known as "tropical pyomyositis" as it is more prevalent in the warmer climate, especially in immunocompromised patients with underlying conditions such as diabetes mellitus, malignancies and human immunodeficiency virus (HIV) infection. The wound management of a patient with intramuscular abscess of the thigh will be discussed in this case report.

Case presentation

The patient is a 44-year-old lady with underlying diabetes mellitus on regular subcutaneous insulin. Her diabetes was not properly followed up and she was known to have poor compliance with her treatment regimen.

She presented with a history of right thigh swelling for two weeks, preceded by a fall at home. Post trauma, she was still able to ambulate with bearable pain.

An emergency department visit brought about a diagnosis of soft tissue injury of the right thigh as no fracture was seen on the X-ray. However, the right thigh swelling kept increasing in size. The patient also started to develop fever. Prior to presentation, she was unable to walk without aid for five days due to pain over the right thigh.

Upon examination, the right thigh was swollen and tender with a huge indurated area of 15 x 38 cm at the lateral aspect. The distal pulses were normal. An X-ray of the right femur did not demonstrate any gas shadow to suggest gas gangrene. The patient was subsequently admitted with the provisional diagnosis of right thigh abscess with the differential diagnosis of soft tissue tumour of the right thigh. Complete blood count showed leucocytosis with total white cell count (TWC) of 20.2 x 109/L, raised erythrocyte sedimentation rate (ESR) level at 92 mm/hr and a C-Reactive Protein (CRP) of 199.5 mg/L.

Musculoskeletal ultrasound of the right thigh showed multi-focal areas of heterogeneous collection over the right proximal to mid-thigh with the largest foci sized 62 mm x 12 mm. There was also oedema of the skin and subcutaneous tissue over the right thigh. Fluid collections were seen between subcutaneous fat lobules with a "cobblestone" appearance more towards laterally and extending anteriorly.

Subsequently, Magnetic Resonance Imaging (MRI) of the right thigh was done and revealed features suggestive of myositis with possible multi-loculated abscesses along the intramuscular plane.

An extensive incision drainage and wound debridement were done on day three of admission, at which point the patient was initially treated as abscess of the right thigh and gluteal area with intravenous piperacillin/tazobactam. Intra-operatively, about 200 mL pus was found tracking underneath the iliotibial tract and posterior area of hip (involving the gluteal and short rotators muscles) *[Figure 1]*. Another two surgical debridements were required subsequently to remove the necrotic tissues and infected areas due to poor response to daily conventional dressing using povidone iodine packing everyday. Tissue culture subsequently grew *Staphylococcus aureus* and *Group B Streptococcus*, with sensitivity to ampicillin/sulbactam. Thus, the patient was switched to intravenous ampicillin/sulbactam.

Due to a poor wound healing response with conventional dressings, an advanced wound care dressing using highly absorbent antimicrobial

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Figure 1. Wound over right thigh after first operation.

Figure 2. Wound bed was ready prior to secondary closure.

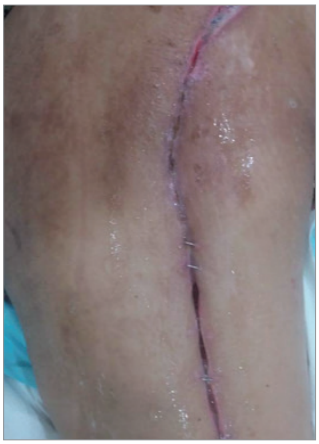

Figure 3. Complete closure of wound with no complication.

polyurethane foam was commenced. This only required every other day dressing change. This dressing absorbed the exudate whilst maintaining the correct balance of moisture to the wound bed to avoid maceration. At the same time, it contained silver, methylene blue, gentian violet and surfactant which also had antibacterial and antifungal properties, aiding in the reduction of antimicrobial load and prevention of biofilm formation. After two weeks, the wound bed was ready for closure *[Figure 2]*. The patient then had an uneventful recovery and the wound healed within a month *[Figure 3]*.

Discussion

Reduced host resistance to infection due to systemic factors is one of the main factors leading to the development of soft tissue infection (STI) of the lower limb (Lavery et al, 2006). STI in this immunocompromised population is often related to preceding trauma (Lavery et al, 2006). Diabetes mellitus and intravenous drug users are known to be some of the most prevalent risk factors for STI (Christin, 1992; Crossley, 2003). Furthermore, STI is often misdiagnosed or under-diagnosed in its initial stages (Crossley, 2003). The commonest sites for the presentation of STI are known to be in the lower limbs, inguinal and perineum areas (Glass et al, 2015).

Understanding the microbiology of STIs is crucial in the selection of appropriate empirical antimicrobial therapy to reduce associated morbidity and mortality (Sartelli et al, 2014; Esposito et al, 2016). The commonest microbes leading to STIs is *Staphylococcus aureus* around the globe, up to 90 percent of tropical cases and up to 75 percent of temperate cases. However, the prevalence of *methicillin resistant S. aureus* is increasing including community-acquired infection, leading to longer hospital stay and more expensive anti-microbial therapy. This directly translates into a higher financial burden on the healthcare sector (Esposito et al, 2016). *Group A Streptococci* is the second most common pathogen. Other pathogens include non-group A streptococci, pneumococci and gram negative enteric bacilli such as *Escherichia coli* as well as mycobacteria.

A modern dressing, which was a highly absorbent antimicrobial polyurethane (HAAP) foam, commercially marketed as Retro-Tech Dressing™ (RTD™) was used in this case to successfully treat STI. HAAP foam is impregnated with gentian violet, silver zirconium phosphate, methylene blue and surfactant. It is effective for difficult-to-heal wounds from various aetiologies such as venous leg ulcers, neuropathic ulcers as well as pressure ulcers. The foam matrix of the HAAP foam works via capillary action by drawing in the excess exudate thus maintaining a moist wound bed to enhance the healing process. The antimicrobial action of Gentian violet, silver zirconium phosphate and methylene blue act effectively in reducing the bacterial load in the wound and creating a conducive wound bed for healing (Ip et al, 2006; Perni et al, 2009; Wilkins and Unverdorben, 2013). Application of topical anti-microbial material in the dressing ensures the anti-microbial agent remaining in the dressing is released in a constant optimal concentration in order to minimise local tissue toxicity (Coutts et al, 2014).

Conclusion

STIs are debilitating and costly to the healthcare system. The clinical presentation can be extremely inconsistent, leading to misdiagnosis or delayed diagnosis. Both surgical drainage and adequate antibiotic therapy are the cornerstone to cure. Modern dressing serves as an important adjunct to facilitate and accelerate the process of wound healing. WAS