

Abstract

Cervicofacial necrotising fasciitis is a rare, life-threatening condition characterised by rapid progression of infection along fascial planes leading to subcutaneous tissue necrosis. It is associated with a high mortality rate. We present a case of a 63-year-old male with poorly controlled insulin dependent diabetes mellitus, who developed extensive cervical necrotising fasciitis, due to an odontogenic source of infection. Despite early initial intervention, a subsequent rapid progression of infection occurred, leading to necrotising fasciitis. This case highlights the successful use of NovoSorb Biodegradable Temporising Matrix (BTM) as a dermal substitute to reconstruct the resulting skin defect and prevent scar contracture over the neck. The unique aspects of this case, including the extensive nature of the infection and the innovative use of BTM, are discussed in the context of existing literature.

Keywords: cervicofacial necrotising fasciitis; biodegradable temporising matrix; dermal regeneration

Introduction:

Cervicofacial Necrotising Fasciitis is an aggressive, life-threatening soft tissue infection of the head and neck. Causative agents can be polymicrobial or monomicrobial. Lancefield Group A Streptococcus or Clostridium Perfringens are common monomicrobial sources. It presents unique management challenges including the risk of airway obstruction, damage to major neck vessels and extension into the mediastinum. The mainstays of treatment include early diagnosis and immediate surgical intervention to prevent further fascial spread of infection, reduce systemic inflammatory response and limit tissue necrosis. Diabetes mellitus significantly increases the risk of both the development and rapid progression of cervicofacial necrotising fasciitis.[1] Biodegradable temporising matrix (BTM) is a novel device used for dermal replacement in reconstruction of large and complex skin defects. It is comprised of an inner matrix consisting of polyurethane, polylactic acid (PLA) and polyglycolic acid (PGA) polymers. The outer silicone layer is delaminated after integration into the wound bed to allow secondary skin grafting to the defect.[2] This case report discusses the use of BTM in the management of extensive cervical necrotising fasciitis, a novel approach that facilitated a vascularised neodermis suitable for skin grafting.

Case Presentation:

A 63-year-old male presented to the emergency department unwell with dysphagia, dysphonia and trismus. Clinical examination showed a fluctuant, tender mass in the left submental space, and a firm floor of mouth on bimanual palpation. Initial blood results revealed a raised C-reactive protein (CRP) of 390 mg/L and a white blood cell count of $27 \times 10^9/L$. Computed Tomography with contrast of the head and neck revealed an ill-defined hypoattenuated area with some rim enhancement measuring approximately 4.4 x 2.8 x 2.6 cm, located in the submental space with associated infective changes beneath the mylohyoid muscle extending to the left submandibular space.

The patient was admitted to the intensive care unit (ICU), placed on the emergency theatre list and underwent incision and drainage four hours after presentation. Over the next three days in ICU, the patient's condition initially improved. There was minimal drain output, and CRP decreased from 390 mg/L on day 1 to 86 mg/L on day 3. On day 4 post op, while awaiting discharge from the ICU, the patient experienced a sudden worsening of pain accompanied by rapid cellulitis spreading from the submental area to the chest. Necrotising fasciitis was diagnosed clinically based on the patient's increasing pain, rapidly spreading cellulitis, palpable surgical emphysema, and skin necrosis at the initial incision site. Immediate surgical debridement was initiated with necrotic skin and subcutaneous tissue excised from the submental region extending to the chest wall. Intra-operative findings of necrotic fascia were noted and confirmed by histopathology. Debridement continued until healthy fascia was seen at the excision margin. Loculated subcutaneous abscesses were excised from the neck and submandibular area. No intra-oral extension was present, and chest musculature remained viable. Bilateral sternocleidomastoid muscles remained intact, covering the major cervical neurovascular structures. Microbiological analysis of the pus revealed Lancefield Group A Streptococcus and gram-negative bacilli.

Two days later, the patient returned to the operating room for further debridement and application of NovoSorb biodegradable temporising matrix (BTM) over the skin defect. This was secured to the wound with 3-0 Prolene stitches and covered with Acticoat 7™ dressings, which were changed weekly. After 6 weeks, the BTM had integrated successfully, and a capillary refill was present throughout the wound bed. After delamination of the silicone outer layer, a granulating neo-dermis was present and covered with a split skin graft. At six months' follow up, the grafts were well healed and there was pliable, mobile scar covering the patient's neck and chest. There was no contracture noted with extension and left lateral flexion of his neck.

Discussion:

Clinicians should have a high degree of suspicion for necrotising fasciitis when patients present with pain out of proportion and rapidly spreading cellulitis. In this case, the patient was predisposed to cervicofacial necrotising fasciitis by having poorly controlled diabetic status and poor dental hygiene contributing to the source of initial infection. Necrotising fasciitis can be stratified into four subtypes (I-IV), and in our finding of a polymicrobial origin, the infection is classified as type I necrotising fasciitis, the most common form to occur. [3] BTM is a synthetic biodegradable medical device that promotes the formation of a neodermis through cellular seeding, supported within a polyurethane open pore network. This compartmentalises wounds into smaller beds, giving structure while also allowing access to fibroblasts initially followed by keratinocytes. The matrix is sealed with a membrane to prevent infection while preventing moisture loss. [4] Due to the defect size and location there were many benefits to using BTM for the primary reconstructive method. It allowed additional cover over important neck structures that are not suitable for primary skin grafting, it mitigates scar contracture, it contours well with the neck, and it produces a pliable scar that should move well with neck motion. By facilitating neovascularisation and fibroblastic activity, the matrix provided a robust scaffolding for subsequent grafting. Other reconstructive options were considered, including a pedicled pectoralis major myocutaneous flap, however, concerns about tissue bulk and donor site morbidity negated this choice. Pedicled latissimus dorsi or trapezius flaps were unlikely to comfortably reach the entire defect and free tissue transfer was deemed not suitable as the large defect would have required a large and morbid donor area of tissue, with concerns over colour and contour match and the recipient vessels for anastomosis would have been inflamed and friable due to the inflammatory response. [5]

Conclusion:

Our case highlights the importance of early recognition and aggressive management of cervical necrotising fasciitis, particularly in comorbid patients with underlying risk factors. This successful use of NovoSorb Biodegradable Temporising Matrix (BTM) in the treatment of an extensive cervical defect represents a promising approach in the management of complex soft tissue infections, and wounds of other aetiology. By facilitating neovascularisation and fibroblastic activity, the matrix provided a robust scaffolding for subsequent grafting, and in our case, NovoSorb BTM offered a viable alternative to traditional reconstruction, particularly with a challenging and complex wound bed.

CRedit author statement:

Aaron Craughan: Writing – Original Draft. **Mel Corbett, Eoin Conlon, Seng Guan Khoo:** Investigation; Project Administration; Supervision; Writing – Review & Editing. **Jack Woods, Shane Cullen:** Investigation; Visualisation; Writing – Review & Editing.

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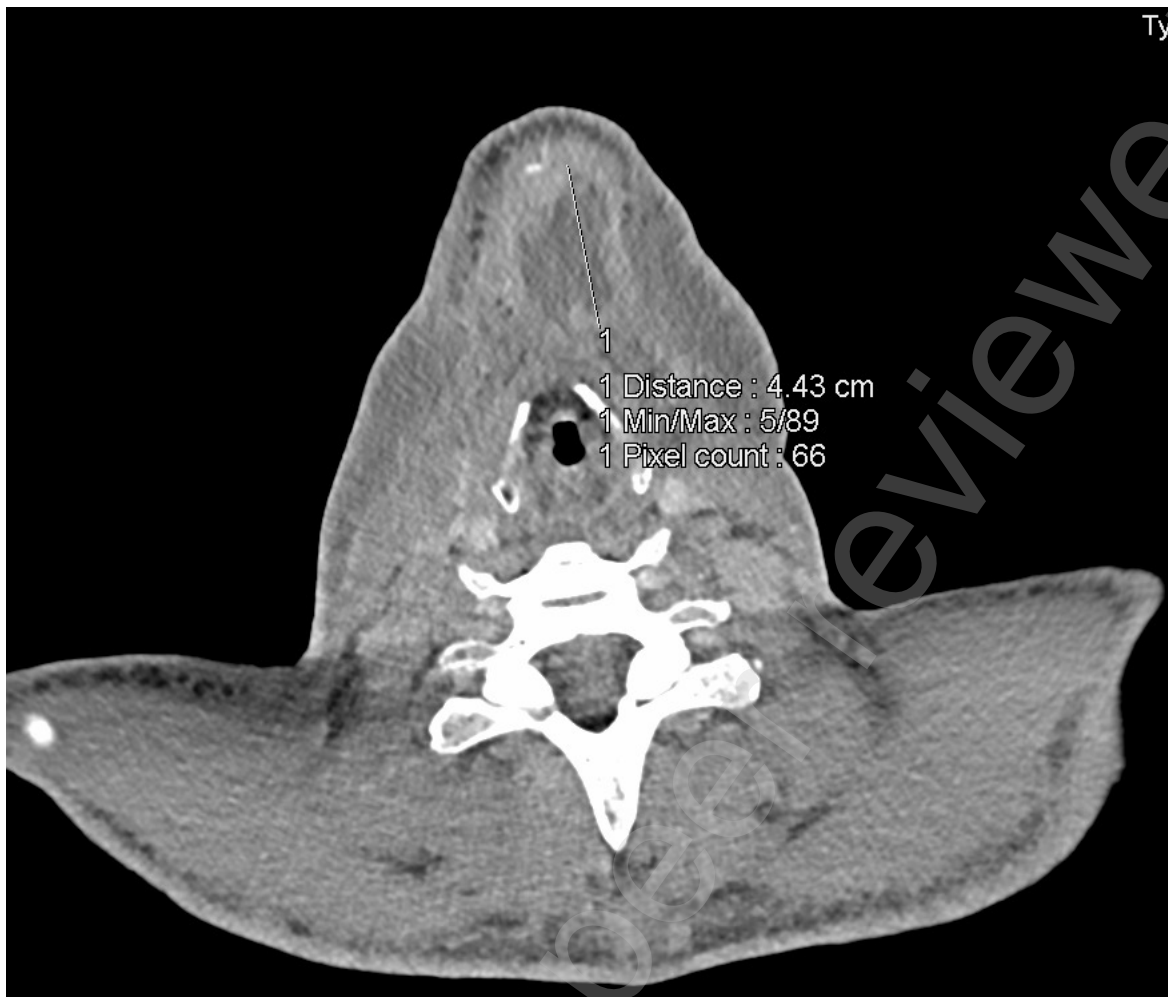


Figure 1: Axial View of Initial SR/CT of Head and Neck showing an ill-defined collection measuring 4.43cm across in the submental space under the mylohyoid muscle with fat stranding throughout the neck with extension around the left submandibular space

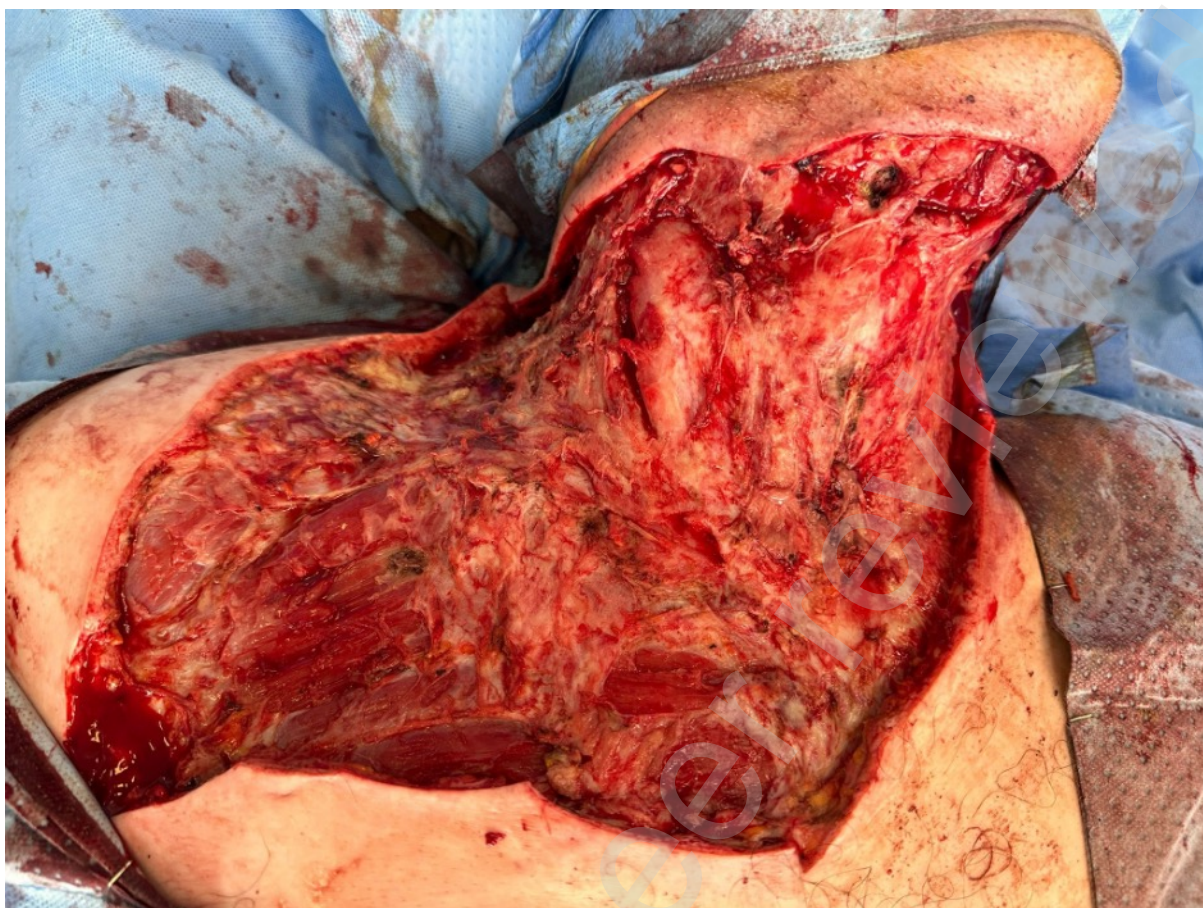


Figure 2: Second debridement following the diagnosis of necrotising fasciitis, from the mandible to the anterior and right anterolateral chest wall, to the level of the nipple and extending out to the axilla.



Figure 3: At 6 month follow up, the scar was well healed, with no contracture in extension and left lateral flexion of the neck.