A novel airway management strategy for cervical necrotising fasciitis secondary to Bezold's abscess

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ABSTRACT

We describe a rare case of cervical necrotising fasciitis caused by mastoiditis and Bezold's abscess. This case was complicated by a tracheostomy delaying wound healing. A novel strategy to repair the tracheostomy defect using Permacol™, an acellular porcine dermal substitute, and a local muscle flap not previously reported in the literature is described to allow the use of negative pressure wound therapy dressing. This technique may be employed in similar applications for non-healing tracheostomy wounds.

KEYWORDS

Necrotising fasciitis – Mastoiditis – Tracheotomy – Permacol™ – Negative pressure wound therapy

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Necrotising fasciitis is a rapidly progressive and potentially fatal polymicrobial infection. The disease occurs commonly in the abdominal and groin regions, with much lower incidence in the head and neck, which is likely to be due to a rich blood supply delivering a rapid immune response. A case series of cervical necrotising fasciitis (CNF) has identified the dental origin as the most common source of infection, associated with diabetes mellitus, smoking and alcohol abuse.¹ We present a rare case of CNF originating from mastoiditis, complicated by Bezold's abscess. We also discuss the associated challenges of managing a compromised airway and a novel airway reconstruction strategy not previously reported in the literature to allow the use of negative pressure wound therapy (NPWT) dressing.

Case history

A 49-year-old man presented acutely with left-sided acute mastoiditis complicated by Bezold's abscess, and necrotising fasciitis of the neck and anterior chest wall. The patient's co-morbidities included type 1 diabetes mellitus, chronic kidney disease, hypertension and peripheral diabetic neuropathy. He underwent cortical mastoidectomy and wide local excision of necrotic tissue to include sternocleidomastoid muscle and overlying skin as well as surgical tracheostomy in anticipation of prolonged intensive care unit (ICU) admission. The surgery resulted in an exposed segment of the left clavicle and a large anterior neck defect.

Postoperatively, the patient developed *Clostridium difficile* diarrhoea (which was treated successfully), left-sided inattention and generalised weakness due to a pontine infarct, and acute-on-chronic renal failure requiring

temporary renal dialysis. He underwent four neck debridement procedures in theatre, resulting in a loss of soft tissues (including healthy skin fascia and muscles around the tracheostomy site). A definitive procedure to provide soft tissue cover was delayed due to the increased risk of abscess formation from the copious respiratory secretions and continued purulent discharge. The prolonged intubation was due to the risk of aspiration

Permacol™ tracheal repair

During a multidisciplinary team meeting (including ear, nose and throat surgeons, plastic surgeons and intensivists), the decision was made to attempt decannulation of the trachea, followed by reconstruction of the stoma to enable step-down from the ICU and NPWT dressings to promote accelerated wound healing in the neck. The tracheal cartilage was then debrided and the subsequent defect measured approximately 1cm x 1.5cm. Permacol™ (Covidien, Dublin, Ireland), an acellular porcine dermal substitute, was cut into the shape of the airway defect and sutured on to the tracheal cartilage as an overlay graft using interrupted 3/0 polydioxanone sutures (Figs 1 and 2). The suture repair was augmented with Tisseel® (Baxter, Deerfield, IL, US) fibrin glue before the remaining strap muscles were closed over the defect. A negative pressure foam dressing was then applied over the wound for three weeks in total to promote neovascularisation of the Permacol™, and obturation and closure of the dead space of the neck (Fig 3).

After three weeks, rigid bronchoscopy was performed to inspect the trachea for any internal collapse prior to extubation. On extubation, there were no further airway concerns. However, other co-morbidities led to a total stay of

Figure 1 Defect in neck wound and tracheostomy

Figure 3 Wound following Permacol™ tracheostomy repair and local muscle flap procedure to allow negative pressure wound therapy dressing application

Figure 2 Permacol™ repair of tracheostomy

three months in the ICU. The neck wound healed by secondary intention using NPWT dressings (Fig 4).

Discussion

Clinicians are faced with a dilemma when dealing with the long-term airway in cases of CNF. As a result of infection, necrosis and oedema, the neck anatomy may be distorted, making awake local anaesthetic tracheostomy difficult. If

the patient has been successfully intubated, a surgical tracheostomy can be inserted in a more controlled setting. On the other hand, the presence of a tracheostomy in the field of necrosis may complicate matters: first, from the risk of pus aspiration into the airway and second, as a result of healing delay from soiling of the neck with respiratory secretions.

On reflection, we agree with the recommendations of Chen *et al*² and advise against tracheostomy in patients with CNF; instead, alternative airway strategies should be sought whenever possible. Nevertheless, there are well documented complications associated with prolonged intubation with an endotracheal tube. It is widely regarded as good practice to replace an endotracheal tube with a tracheostomy if ventilation is required for more than 7–10 days. Once the patient no longer needs ventilation and is ready to be decannulated, then the use of Permacol™ to reconstruct the tracheostomy defect (with a covering local muscle flap) would be a viable option for the surgical team.

The advantage of this technique is that it separates the airway from the wound, preventing aspiration, and enables the use of a NPWT dressing to cover a complex wound. This technique can also be considered in other cases where a non-healing infected tracheostomy wound requires reconstruction and use of a NPWT dressing, such as in wounds following laryngectomy.

Conclusions

This is the first case report of CNF caused by Bezold's abscess. We have demonstrated a novel technique for reconstructing a non-healing infected tracheostomy wound

Figure 4 Granulating wound one month following serial negative pressure wound therapy dressings

using Permacol™ porcine dermal substitute together with a local muscle flap and NPWT dressings. Tracheostomy insertion should be avoided in patients with CNF.

Key points

- > CNF is a locally destructive polymicrobial infection requiring prompt diagnosis and treatment.
- > Management would involve aggressive surgical debridement and antibiotic therapy.
- > Tracheostomy insertion may complicate the management owing to wound soiling and delayed decannulation.

- > Permacol™ repair covered by a local muscle flap is a novel technique to allow NPWT dressing for a non-healing infected tracheostomy wound.

References

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