A description of the use of Silver Nitrate ($AgNO_3$) for management of Persistent Tracheocutaneous Fistula

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Introduction

- Persistent tracheocutaneous fistula (TCF) results from squamous epithelialization of the tracheostomy stoma tract following tracheostomy decannulation[1,2]
- The primary risk factor for developing TCF is postulated to be duration of tracheostomy insertion[1-4]
- Most published management strategies focus on surgical interventions particularly in paediatric populations [1,2]
- Surgical interventions may pose unacceptable perioperative risk, especially in patients with complex respiratory insufficiency such as those with neuromuscular weakness

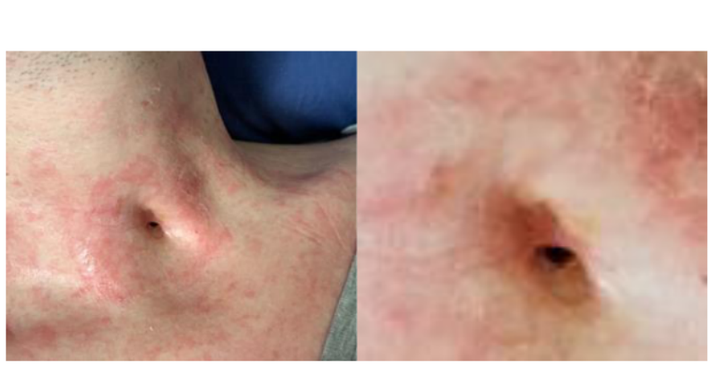

Figure 1: Persistent tracheocutaneous fistula 3-months post decannulation (pre-treatment)

Case Report

- A 41-year-old male with no prior medical history was diagnosed with severe Guillain-Barré syndrome requiring prolonged ventilation via tracheostomy
- After 374 days of invasive ventilation, the tracheostomy was removed
- Nocturnal non-invasive positive pressure ventilation (NIPPV) and mechanical insufflation-exsufflation (MIE) was required due to ongoing respiratory muscle weakness
- Three months following tracheostomy decannulation, a TCF persisted despite careful attention to occlusive dressings (Figure 1)
- The TCF had a deleterious effect on NIPPV efficacy and ability to effectively clear airway secretions despite MIE due to air leaking from the patent stoma

- A non-surgical management approach utilising silver nitrate ($AgNO_3$) was entertained given concerns about the patient's ability to tolerate intubation and general anaesthesia
- Silver nitrate is a caustic substance commonly utilised as a haemostatic agent and management of hypergranulation tissue[6,7]

- Silver nitrate may help disrupt the epithelial layer of the stomal tract allowing apposition of the dermal layers required for closure
- Silver nitrate was administered topically to the stomal tract twice weekly for a total of 52 days (Table 1)

Table 1:
Silver Nitrate Treatment Regimen

1. Remove previous dressing and clean fistula and surrounding skin with 0.9% saline
2. Spray fistula once with lignocaine 5% / phenylephrine 0.5%. Wait 2 minutes
3. Dip silver nitrate applicator stick into water or 0.9% saline. Gently shake applicator stick to remove excess liquid.
4. Insert silver nitrate applicator stick ~ 4mm into fistula & roll to cover skin edge. Caution should be taken to ensure liquid from applicator stick does not drip into the trachea. Repeat twice.
5. Apply 1cm portion of 2% lignocaine gel to fistula
6. Cover fistula with an occlusive waterproof dressing. Encourage the patient to support the dressing with their fingers when voicing or coughing to reduce air leak from fistula.
7. Repeat twice weekly until healed

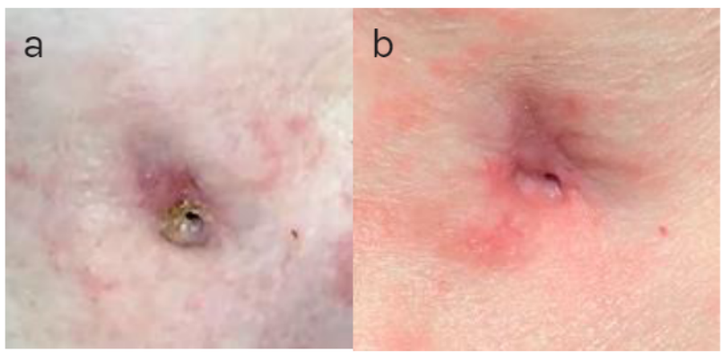

Figure 2: Progress of tracheocutaneous fistula at weeks 2 (a) and 5 (b) of treatment with topical silver nitrate

Results

- The size of the TCF progressively reduced (Figure 2), followed by complete resolution (Figure 3)
- Treatment was complicated by a single episode of self-limited small volume haemoptysis, attributed to the silver nitrate therapy
- Nocturnal NIPPV & MIE tolerance improved, with marked reduction in frequency of respiratory tract infections and improved subjective sleep quality
- This clinical improvement facilitated the transfer of the patient to a subacute rehabilitation facility 506 days following initial presentation

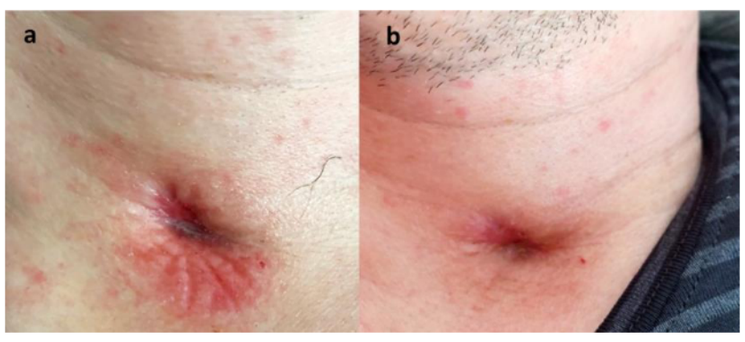

Figure 3: 2 weeks (a) and 3 months (b) after the final treatment with topical silver nitrate

Conclusion

- This non-surgical approach to closing a tracheocutaneous fistula using silver nitrate ($AgNO_3$) is not well-described in the literature
- Whilst generally a safe therapy, caution should be taken to ensure that excess $AgNO_3$ liquid does not inadvertently enter the airway during application[6,7]
- Silver nitrate represents an important and less invasive treatment option for persistent tracheocutaneous fistula for patients in which surgery poses unacceptable risk

Conflicts of interest: None to declare
Acknowledgement: Thank you to our patient and his family for consenting to and sharing the images in this report

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