CASE REPORT

Glove and PICO: a novel technique for treatment of chronic wound due to osteomyelitis of the hand

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SUMMARY

Chronic wounds on the dorsum of the hand are often challenging to treat. Vacuum-assisted closure has enjoyed widespread use in recent years for many difficult chronic wounds as an alternative to surgery.

Unfortunately, owing to the unique anatomy of the hand, it is usually very difficult to get a seal without significantly immobilising the hand. We report a case of a chronic wound on the dorsum of the hand as a result of osteomyelitis in a 37-year-old man, which was treated with Single Use Negative Pressure Wound Therapy, 'PICO' (Smith and Nephew Co, UK). We combined the PICO dressing with a rubber glove to get a good seal enabling appropriate suction without immobilising the hand. Once the wound bed was ready, the defect was covered with a reverse forearm flap.

BACKGROUND

Osteomyelitis of the hand and wrist is rare but can result in significant morbidity and functional loss. Management of osteomyelitis of the hand and wrist should consist of a combined surgical and medical approach to achieve the most favourable outcome. It can be caused by direct inoculation of pathogens, spread from adjacent tissue, or haematogenous spread.¹ In the hand and wrist, the majority of osteomyelitis cases are related to direct inoculation, including penetrating trauma and postsurgical infection. Chronic wounds can be usually explained by the coexistence of three major factors²: cellular and systemic changes of ageing, repeated ischaemia-reperfusion injury (often in the setting of underlying local ischaemia, bacterial colonisation with the resulting inflammatory host response).

Management of wounds due to chronic osteomyelitis of the hand consists of surgical debridement of the involved area combined with appropriate antibiotics and dressings to expedite wound healing. Many wounds are difficult to heal, despite medical and nursing care. Apart from the local biochemical factors mentioned above, there are patient factors like smoking, patient compliance, associated medical comorbidities and immunosuppression that affect wound healing. Negative pressure wound therapy (NPWT) speeds up wound healing by suctioning out excess exudate, reducing bacterial load, increasing tissue perfusion and mechanically reducing the size of the wound. However, the sheer size of the device can be a limiting factor and can lead to impaired quality of life and functioning leading to non-compliance. The larger NPWT systems may not be

ideal for patients who are confused and/or at risk of tripping over cables, etc.

PICO (Smith and Nephew) is a small, lightweight portable, negative pressure system, which consists of a dressing supplied with a small negative pressure pump.³ The system is ideal for chronic wounds that have a low exudate and for areas difficult to dress with a vacuum suction device such as the hand. It is challenging to get an adequate seal on the hand without covering up the fingers and immobilising them. We report a case of chronic osteomyelitis of the dorsum of the hand which was dressed with the PICO system along with rubber gloves; hence, adequate seal and suction was achieved without immobilising the hand, thereby leading to a far more superior result and improved patient compliance.

CASE PRESENTATION

A 38-year-old man of Asian origin presented to us with a chronic wound on the dorsum of his right hand. He is an ex-intravenous drug user and a smoker, smoking about 10 cigarettes/day and right-hand dominant. He is unemployed and lives with his wife and children. He initially presented 3 years ago with history of an abscess to the dorsum of his hand which had resulted from a minor abrasion. The abscess was treated by incision and drainage in theatre followed by empirical antibiotics for a week.

The swabs from the abscess grew mixed coliforms. The wound healed in the beginning but started to break down again after 2 weeks. He was seen off and on in our clinic and was advised surgical debridement. The patient was not compliant with follow-up appointments and was lost to follow-up for a few months. Two years after his initial presentation, he presented to A&E again with the same wound. This time the wound was much deeper than before and therefore needed investigations to rule out osteomyelitis of the metacarpals.

INVESTIGATIONS

X-ray followed by an MRI scan of the area showed evidence of osteomyelitis involving the middle finger metacarpal (figures 1 and 2). The wound was surgically debrided and samples were sent from the involved bone. The samples were however negative for bacterial, fungal as well as tubercular cultures. After satisfactory debridement, we applied INTEGRA Dermal Regeneration Template. Unfortunately, the patient was again lost to follow-up after discharge, and when he came back,

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Figure 1 X-ray showing a thickened cortex of the third metacarpal.

Figure 2 MRI showing evidence of osteomyelitis of the third metacarpal.

Figure 3 Wound after debridement.

the wound was infected and therefore needed further debridement.

TREATMENT

The wound was debrided and washed out (figure 3). Samples sent out to microbiology grew mixed coliforms. The wound was then dressed by the PICO system (figure 4). Initially, in order to get a good seal, the digits had to be included in the dressing and were immobilised, which was not ideal. Our clinical nurse specialist then suggested we try using a rubber glove on the hand and making an opening over the wound and then covering it with the PICO dressing (figure 5). That enabled the patient to use his fingers and improved his compliance with treatment (figure 6). The therapy helped in creating a healthy granulated bed which was then covered using a reverse radial forearm flap (figure 7).

OUTCOME AND FOLLOW-UP

The patient is still under follow-up. He is 3 months post-operative now. The outcome was measured as follows:

1. Complete wound healing (figure 8).
2. Absence of pain.
3. Improved Disabilities of the Arm, Shoulder and Hand score from 88 to 53.
4. Patient is independent at home and is happy with the result.

Figure 4 PICO dressing without the glove technique.

Figure 5 The glove and PICO techniques.

DISCUSSION

Osteomyelitis of the hand is a rare condition and challenging to treat. Once a pathogen is introduced into the tissue, it replicates and spreads along anatomical planes into areas of least resistance. While the intact cortex of the bone provides at least a mechanical barrier to pathogen penetration, the traumatised bone is easily infected. Local inflammation leads to increased tissue pressure, lower pH and oxygen tension, leading to the formation of microthrombi within the intraosseous vessels and bony necrosis. The sequestrum provides a safe harbour for pathogens because of lack of vascularity and thus poor drug penetration. When an infected sequestrum is present, non-surgical cure is nearly impossible.¹ Surgical debridement removes the necrotic tissue and the bacterial load. An adequate debridement must be followed by antibiotics according to sensitivity as well as appropriate dressings.

Figure 6 Wound bed after negative pressure wound therapy.

Figure 7 Reverse radial forearm flap to cover defect.

Vacuum-assisted closure is an adjunctive therapy that utilises negative pressure to remove fluid from open wounds through a sealed dressing and tubing which is connected to a collection container.⁴ The PICO system combines the advantages of NPWT and a portable light-weight device. PICO represents a new way of treating patients who would benefit from the application of NPWT. PICO consists of a small, portable pump with a lifespan of up to 7 days. The PICO pump generates an effective negative pressure of -80 mm Hg, yet it is small enough to fit discretely into a pocket.⁵

The PICO pump is connected to a specially designed dressing which (1) maintains the negative pressure across the wound bed,⁶ (2) removes the exudate from the wound bed through absorbency and evaporation.⁶ PICO is presented to provide a week (7 days) of therapy. In each carton, there is one pump plus two AA lithium batteries and two separately packed dressings complete with fixation strips. This enables a dressing change to be carried out within the lifespan of the pump if this is clinically necessary.

Figure 8 Final appearance of the healed wound.

At the end of the week, the pump and batteries may be recycled as non-clinical waste. Being single use, PICO can be kept on the shelf to allow easy access to the therapy when it is needed.

Our patient is a smoker who was constantly irregular with his outpatient appointments. It was therefore very important to keep his hand functional as we knew he would be non-compliant with hand physiotherapy. The portable PICO system, along with the glove technique, made it very simple for the wound to be dressed and he was happy that he could still use his hand. It made the patient more compliant, thereby letting the vacuum suction create a good bed for wound coverage.

Learning points

- ▶ Osteomyelitis of the hand is a rare and challenging condition to treat.
- ▶ It is important to keep the hand in a functional position when treating chronic wounds of the hand in order to maintain quality of life.
- ▶ Patient compliance plays a key role in managing chronic wounds.

Contributors NN was involved in clinical management of the patient and follow-up. DE devised the technique of 'Glove and PICO'. RHR carried out the surgery on the patient.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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