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The use of gauze-based Negative Pressure Wound Therapy to heal a wound in a child following orthopaedic trauma surgery

Introduction

The patient is a 10-year-old boy who was admitted to accident and emergency on 3rd July 2010. He was immediately identified as having an open fracture of his tibia and fibula on his right limb following playing on a trampoline. (The surgeons felt there may have been an existing small hairline fracture which allowed for such a bad fracture under such basic playtime conditions.)

Under General Anaesthetic the fractures were stabilised with 2 external fixators.

Wound History

The wound resulting from the fracture was central to the fixators and was approx 7cm x 4cm. The upper aspect of the wound had been approximated and was sutured. The suture line was approx 3cm.

1.5 cm of exposed bone was visible in the base of the wound.

Although a traumatic wound, the wound bed looked healthy and was 100% granulated with the exception of the exposed bone (Images 1 and 2).

Methods/Treatment

The Consultant Plastic Surgeon in agreement with the Tissue Viability Nurses decided to use Negative Pressure Wound Therapy (NPWT) on the wound. They felt this would be the best option to optimise wound healing and accelerate the rate of granulation tissue formation over the exposed bone thus allowing skin grafting to be performed earlier. In this Trust RENASYS[®] GO (Smith & Nephew) is the device used and both foam and gauze fillers are used depending upon the wound type. In this instance it was decided to use gauze as the interface mainly due to the fact that the patient was a child and the Tissue Viability Nurses felt that using gauze would be less painful for the patient than using foam.

The first application of NPWT was 7th July 2010. (Image 3) A small flat drain kit was selected. The wound was lined with the gauze non-adherent layer provided in the dressing pack. The main aim of this was to protect the exposed bone but by lining the whole wound it was hoped to reduce any small chance of anti-microbial gauze adherence at the following dressing change. The NPWT was set to -60mmHg due to the age of the patient and fear of potential discomfort. The first application required the moulding of ostomy paste around the pin site to ensure an adequate seal.

There were no alarm issues following the first application and the subsequent first dressing change was 48 hours later, Friday 9th July. Unfortunately this was traumatic for the patient so it was decided that all future dressing changes would be facilitated using Entonox[™].

The dressing changes continued twice per week and were facilitated with Entonox. The patient took control of the dressing change and the dressing was only removed when he felt ready. The increased control over the situation seemed to help him cope with the dressing change and any associated discomfort.

During the first 9 days of therapy (at the 4th dressing application) a 30% reduction in the amount of bone exposed was noted as well as a 40% reduction in the overall wound area. This rapid rate of wound progression continued and a further 4 days later when the NPWT had been *in situ* for 13 days, the exposed bone had reduced by 60% to 0.5cm. (Image 4).

On 22nd July the Tissue Viability Nurses decided to decrease the frequency of the dressing change to once per week.

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Four weeks after first application, on 5th August 2010 all bone was covered and the wound dimensions had reduced to 5cm x 4cm with visible epithelialisation at the edges (Image 5).

Although the bone within the wound was now covered with granulation tissue the team continued to apply the non-adherent gauze contact layer as this facilitated dressing removal. This was thought to be even more important when leaving the dressing in place for a longer period of time.

The team did the patient's dressing weekly for 3 dressings and although not standard practice this did not appear to have a detrimental effect on the wound bed. During this time it continued to granulate and epithelialise and after 3 more dressing changes the system was ready to be discontinued.

Outcome

The NPWT was removed on 10th August 2010 following a total of 35 days of therapy and 9 dressing changes. At this stage the wound was completely granulated and the patient underwent a partial thickness skin graft (donor site upper right thigh). The wound was dressed and the dressing held in place for 9 days. The donor site was dressed with JELONET[®] (Smith & Nephew) and secured for 12 days.

Conclusion

The patient's experience was positive. His experience was enhanced by him being in control of the dressing changes through a combined effort of Entonox and him assisting in the dressing removal with spraying of adhesive removal spray. The skin graft use to cover the wound has allowed for a good cosmetic appearance which the plastic surgeon is confident will reduce and fill an as the patient grows.

This case study shows that NPWT at -60mmHg with gauze interface can be appropriate care option for paediatrics.



Image 1: At first review



Image 2: At first review



Image 3: First application at Day 4 July 7th



Image 4: Day 21



Image 5: Day 28



Image 6: Day 42

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