

Managing an extravasation wound in a premature infant

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Extravasation injuries

Extravasation injury from intravenous infusion sites is one of the main iatrogenic injuries in neonatal care (Evans, 2005). Extravasation refers to the inadvertent delivery of substances that can cause blistering or infusates known to cause injury to tissue (Intravenous Nurses Society, 2000). Parental nutrition, drugs and elemental solutions are all potentially noxious to living tissue and after extravasation may cause serious damage to the skin and underlying tissues (Garland et al, 1992). This can be due to their high osmolarity or pH. Premature infants are particularly vulnerable to extravasation injuries because of the small calibre and fragility of their veins, as well as their immature skin structure. Wilkins and Emmerson (2004) estimated the incidence at 38 in 1,000 infants admitted to tertiary neonatal intensive care units.

Extravasation can cause devastating results in neonates, leading to pain, erythema, tissue necrosis and damage to underlying tendons. Surgical debridement, skin grafting or even amputation may be required. The formation of scar tissue that involves joint areas may result in contractures which require surgical intervention if limb function is compromised.

The management of these wounds can be complex as there are limited wound care products that are suitable for use with neonates. This case report illustrates the use of ActiFormCool® and ActiWrap (Activa Healthcare, Staffordshire) for neonatal wound management.

Consequences of prematurity

The skin of a premature infant is totally different to adults and full-term infants whose outer layer of epidermis — the stratum comeum — consists of 10–20 layers. An infant born at less than 30 weeks gestation

may only have 2–3 layers while an extremely premature infant of 24 weeks gestation may virtually have none (Lund et al, 1999). Premature infants are therefore predisposed to increased permeability to topical agents, with potential for toxicity and increased risk of damage to skin integrity. The significant differences in the skin structure of premature infants means that wound care products which are appropriate for use in adults may not be suitable for neonates.

Case study

A baby was born at 32-weeks gestation by elective Caesarean section due to maternal hypertension. He weighed 1.79kg and required ventilation for 72 hours. After 24 hours, the baby had sustained an extravasation injury to the dorsum of the left foot due to infiltration of total parenteral nutrition through a peripheral venous cannula. In premature infants there is a lack of subcutaneous tissue on the dorsum of the foot which results in easily visualised veins for peripheral cannulation but with an increased risk of severe injury when extravasation occurs. The initial wound assessment revealed an area of discoloured skin, no active lesion and no exudate.

Wound management

By 14 days the baby was becoming distressed during dressing changes. Crying, prolonged brow bulge and eye squeeze were noted. These behavioural features are viewed as reliable indicators of pain in neonates (Royal College of Nurses Institute, 2002). Paracetamol 28mg four times a day was commenced and 1ml sucrose syrup 33% was given orally with a pacifier during the dressing changes. Sucrose has been shown to promote the release of endogenous opioids (Rennie and Robertson, 2001), while sucking on a pacifier has been shown to reduce infant response to pain (Carabajal et al 1999).

On assessment the wound was sloughy with a small necrotic area. The exudate was moderate and the periwound was macerated. Inflammation and heat extended from the wound margins and an odour was evident (Figure 1).

A swab was taken which showed heavy growth of *Staphylococcus aureus*, proteus species, and moderate growth of *Clostridium perfringens*. Oral antibiotics were commenced (metronidazole 14mg and flucloxacillin 53mg both four times daily). ActiFormCool was applied to the wound because of its pain-relieving and non-adhesive qualities. The top film layer was left in place to maintain moisture levels in order to relieve pain and remove slough. In view of the peri-wound maceration, Cavilon No Sting (3M, Loughborough) was used as a skin protectant in order to prevent tissue breakdown. N-A Ultra (Johnson & Johnson Wound Management, Ascot) was applied on top of the ActiFormCool in case there was any lateral leakage of the exudate from under the hydrogel dressing. Initially, Tubinette 12 (Seton Healthcare Group, Oldham) was applied as a supportive dressing but dislodged during nappy changes and when breastfeeding. ActiWrap retention bandage was used because the cohesive nature of the bandage ensured the dressing remained in situ without being constrictive. It is latex free, soft and can easily be cut to an appropriate small size for neonates.

The dressings were changed daily due to the exudate levels. By the third day of use, the baby was not distressed and pain relief was not needed. Seven days after commencing treatment with ActiFormCool and five days of antibiotics, the exudate levels and inflammation were reduced. No odour was evident and the wound bed had debrided by autolysis. The wound showed signs of granulation (Figure 2). Dressing changes were decreased to every three days. Once the wound showed signs of epithelisation, Duoderm Extra Thin (ConvaTec, Ickenham) was commenced and the dressing changed weekly. At six weeks, the wound had healed (Figure 3). Unfortunately scarring was not avoided and the baby is currently being treated with Mepiform (Molnlycke, Dunstable). However, ongoing assessments by the hospital's plastic surgery team are showing improvements and they are optimistic that surgery will be avoided.

Conclusions

This case study illustrates the challenges of nursing a premature infant with an extravasation injury. The use of ActiFormCool and ActiWrap provided an effective solution to these clinical challenges. ActiWrap together with systemic antibiotics were successful in promoting rapid wound healing. ActiFormCool and ActiWrap facilitated atraumatic dressing changes. The use of ActiWrap as a supportive bandage ensured secure placement of the primary dressing which facilitated confident handling by the baby's parents during breastfeeding and nappy changes. Both dressings are user-friendly and made it easy for parents to carry out dressing changes which was particularly important when the baby was discharged from hospital. Both dressings have great potential for neonatal wound management. **WUK**

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Figure 1. Infected wound.



Figure 2. Signs of granulation.



Figure 3. Wound healed with residual scarring.