
Helpful hints in neonatology wound care

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Summary

Wound care in paediatrics presents many challenges related to the particularities of this clientele which ranges from premature babies to adolescents. Wound aetiology in paediatrics may also be less well understood. This article will first review the skin physiology of premature infants. Those neonates represent a new clientele at risk and the characteristics of their skin should be considered when they present with wounds. Secondly, an overview of the most common wounds encountered in the paediatric setting will be discussed, including ulcerated haemangiomas, epidermolysis bullosa (EB) and pressure ulcers. Prevention and management strategies will also be considered.

Introduction

In one year, about 35 babies of less than 28 weeks' gestation are treated at Sainte-Justine's Hospital.

The healing process of the neonate's skin is similar to the adult's, but with the premature neonate we must contend with certain characteristics of the physiological anatomy of their skin, avoid traumatising treatments and also make therapeutic choices compatible with their skin.

Physiology of the premature neonate's skin

The skin of the premature neonate is translucent, red and has a gelatinous appearance (Figure 1).

The epithelium is less developed than in a full-term neonate. The stratum corneum has only a few cell layers and the dermal-epidermal junction is very fragile because of the immaturity of the anchoring structure. Because of the under development of the stratum corneum, the premature neonate's skin barrier properties are compromised which leads to an increased skin permeability¹⁻⁴.

Harpin and Rutter demonstrated that in premature neonates, substances applied topically are percutaneously absorbed, so there could be risks of systemic toxicity^{1,2,4}. Trans-epidermal water loss⁵ commonly occurs in premature neonates because of the immaturity of their skin and, finally, their compromised skin barrier puts them at greater risk of infection^{1,2,4}.

Figure 1. Premature neonate's skin.



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The importance of a good hand washing technique for everyone in contact with the premature neonate is essential. To bathe the neonate, we use a neutral soap in order to avoid altering the skin's acid mantle. Premature neonates who are less than 30 weeks' gestational age have an emollient cream such as (Aquaphor™) applied topically four times a day^{2,6,7}. In a study completed in 1998, it was demonstrated that adult levels of maturation were evident at 30 to 32 weeks' postconceptional age⁷ regardless of the infant's postnatal age².

Therefore, protective skin care practices should be used until maturation is complete which will generally happen at 31 weeks' gestational age.

Types of wounds found in premature neonates

The following wounds have been observed among premature neonates:

- Tearing of the epithelium.
- Friction and shear wounds.
- Burns related to chemical agents or thermal causes.
- Skin lesions secondary to latex exposure.

Some of these wounds can be avoided by taking preventive measures that take into account the specificity of a neonate's skin. Among these preventive measures, it is recommended to use adhesive tapes sparingly and, when needed;

- Use hydrocolloid dressings or skin barrier sheets as a base for securing tubes, catheters and monitoring devices. These barriers should be left in place for more than 24 hours to avoid traumatising the skin upon removal.
- Avoid using products that contain alcohol or toxic substances because of burn risk and transepidermal absorption. When needed, antiseptics solutions should be

used sparingly and thoroughly rinsed off the skin when the procedure is complete.

- Avoid the use of skin sealants and ostomy protective pastes on patients with an ostomy as they usually contain alcohol. Select ostomy appliances that incorporate the less aggressive hydrocolloid skin barriers or apply a skin barrier to the skin before fixing a drainable ostomy appliance in order to protect the peristomal skin from adhesive agents and contact with effluent.
- Avoid products that increase the adhesion of dressings, such as bonding agents and mastic gums. These products could create a stronger bond with the epidermis than the bond that exists between the dermis and the epidermis.
- It is recommended to use lukewarm water to remove adhesives rather than solvents that contain noxious substances^{2-4,6}.

Thermal injuries

We should be aware that pulse oximeter and PO₂-PCO₂ probes can cause first and second degree burns to a premature neonate (Figure 2). It is best to change the probe site every 2 hours and to use the lowest effective heat^{4,6}.

Silver sulfadiazine (Flamazine™), the classic burn treatment, is not recommended for use in premature neonates. Silver sulfadiazine is likely to cross the skin barrier and cause undesirable side effects. Using Flamazine™ is in fact not recommended during the first month of life, even for a full-term neonate⁸.

The application of hydrogels to aid autolytic debridement should also be avoided as long as the skin is permeable, as some hydrogels contain propylene glycol. In this instance, a thin hydrocolloid dressing such as Duoderm Extra-Thin™ (ConvaTec) to aid autolytic debridement of the wound would be an excellent choice.

Figure 3 illustrates the burn injury on the dorsum of the neonate's foot taken 3 days after the first application of Duoderm Extra-Thin. It illustrates how quickly the epithelial cells of a premature neonate are renewed. In addition, by using a very thin product, the infant's mobility is not restrained.

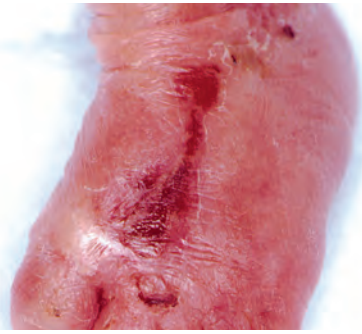
Chemical injuries

This first degree back burn was caused by an inadequate rinsing of the skin following the use of a 0.05 per cent solution of



Figure 2. Secondary dry necrosis of a pulse oximeter burn.

Figure 3. Same wound after 3 days of treatment.



chlorhexidine gluconate in 70 per cent of alcohol prior to the insertion of an umbilical catheter (Figure 4).

Experience has demonstrated that heat combined with pressure may increase the adhesion of an hydrocolloid dressing. For this reason, application of silicon gel non-adherent dressings such as Mepitel™ (Mölnlycke) are appropriate options. Silicone gel dressings keep the wound humid while applying very little tension on the fragile tissues when it is removed.

Blood samples

Premature neonates are subjected to the drawing of many blood samples generally taken at the heel by micro-method. In order to have the amount of blood needed, the care giver who takes the samples must massage the lower limbs and this may cause friction and shearing wounds (Figure 5).

As well as alternating puncture sites, the application of strips of a thin hydrocolloid to massage sites reduces injuries as well as treating any lesions. Many neonates have an arterial catheter inserted if frequent blood samples are required. This greatly decreases the incidence of shearing and friction wounds of the lower limbs in premature neonates.

Latex allergy

The use of latex products can lead to latex reactions which may present as topical lesions on neonates. Previously it was the practice for nurses to use a latex finger cot with a small cotton swab to gather urine samples. After 2 or 3 cases of wounds occurring on the penis, we connected them to the latex and changed our technique to take urine samples (Figure 6).

Other types of wounds

The lesions caused by epidermolysis bullosa (EB) on neonates and infants are a major challenge for care givers. These wounds may take years to heal (Figure 7). Patients afflicted with EB require constant care to prevent secondary infections. It is

imperative to select dressings that can protect the wound without provoking injury when removed.

Dressings that have best suited our needs are the silicone gel dressing (Mepitel™) and synthetic tulle gras (Adaptic™; Johnson & Johnson). Although these dressings are technically non-adherent, some parents have told us that the dressings had a tendency to stick to the wound. We now recommend the application of amorphous hydrogels (Intrasite™ gel; Smith & Nephew) on the wound and on the dressing when it isn't changed every day.

Ulcerative haemangiomas

Haemangiomas can be found anywhere on the body and they sometimes become quite a challenge when they ulcerate (Figure 8). Most of the time, we use a transparent film dressing to treat the ulceration. If the wound presents with fibrinous tissue, an

Figure 4. First degree back burn.



Figure 5. Friction and shearing wound.



Figure 6. Latex reaction.



Figure 7. Epidermolysis bullosa.



amorphous hydrogel is applied prior to the transparent dressing. It is recommended to protect the normal skin by creating a 'window' with a hydrocolloid dressing (Figure 9). This hydrocolloid 'window' can stay in place for many days and thus reduce skin injuries and pain when replacing the transparent dressing. Dressings are usually changed daily or every other day.

If the ulceration is near the anus, the situation becomes more complex (Figure 10). The use of skin barrier creams such as Triad Cream™, Sween in Canada, Coloplast in Australia is advisable. This particular product has properties similar to occlusive dressings and is ideal for areas difficult to treat with classical dressings.

Meningococemia

Meningococemia can present as devastating necrotic wounds (Figure 11). In these situations we have used amorphous hydrogels and silver sulfadiazine cream for autolysis of eschar and infection control respectively which, in some instances, has

reduced the need for extensive amputation and the development of secondary infection.

Conclusion

Other types of wounds such as dehiscence following surgical wounds, burns, extravasation wounds, pressure ulcers and excoriated buttocks are found amongst paediatric patients.

Wounds in paediatric patients can be complicated. It is important to consider the specific characteristics of neonatal and infant skin. Before applying any topical product on premature neonates, it is important to ask manufacturers or laboratories exactly what agents the product contains and any recommendations they may have concerning its use on premature neonates².

Most of the time, paediatric wounds will heal rapidly and, as is the case with adults, prevention is still the best treatment.

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Figure 8. Ulcerative haemangioma.

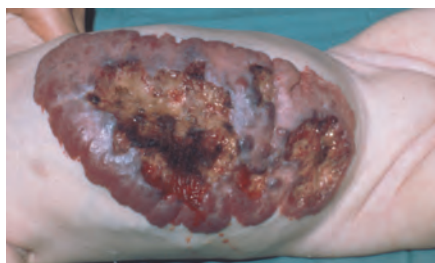


Figure 9. Hydrocolloid window.

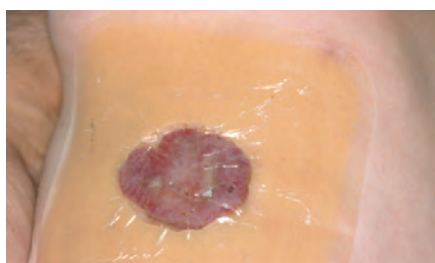


Figure 10. Haemangioma near the anus.



Figure 11. Meningococemia.

