Wounds in Pediatric Age: Practical Approach of Extravasation, Surgical Wound, Pressure Ulcer and Burns

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Abstract

Wounds in pediatric age are due to injury by extravasation, surgical wounds, pressure ulcers, burns - chemical and thermal injuries, among others causes.

The objective of the treatment is clean the wound with reduction of microbial load, removal of organic/inorganic waste and facilitation of healing.

We can use antiseptics but they all have side effects and usage must be with very careful.

Polyhexanide and Betaine association is a product that cause fibrin reduction, is safe, reduce pain, can control infection, don’t interference with the growth of the granulation tissue and reduce the time of treatment.

When we use a wound dressing, we remove excess moisture, be impervious to bacteria, maintain temperature, allow gas exchanges, no toxic particulates or contaminants and when we remove the dressing need to be not traumatic.

Keywords: Wounds; Pediatric Age; Practical Approach

When we are talking about wounds, pediatric population is a very sensitive group. At this age the skin is susceptible to get more scars and secondary complications.

Common etiologies of pediatric wounds are: injury due to extravasation, surgical wounds, pressure ulcers, burns - chemical and thermal injuries, among others causes [1].

Extravasation: Extravasation is secondary of inadvertent leakage of vesicle/cytotoxic fluid from a vein/catheter into the surrounding tissue. Most of the lesions are in premature babies less than 26 week of gestational age. This skin necrosis happened in 40 - 60% of cases. The most frequent side is back of the hand, lateral side of the foot and head. The risk factors are thinner veins, venous fragility, thin epidermis and reduced subcutaneous tissue. Extravasation may result in severe injury: necrosis, flictena and severe damage to surrounding structures (compartment syndrome). There are some drugs that can cause extravasation: hyperosmolar solutions like Total Parenteral Nutrition (TPN), hypertonic glucose, hypertonic saline solution; calcium, potassium; vasopressors (dopamine, dobutamine, norepinephrine, epinephrine); mannitol; digoxin; aminophylline; phenytoin; vancomycin; thiopental. The treatment consist of stop the infusion and give a flush of normal saline [1].

Surgical wound: Surgical wound is important to check if the wound is closed by 1st or 2nd intention, the presence of drains and complications. If is a 1st intention wound, edges close very quickly and after 48 hours don't let bacteria to enter. If is a 2nd intention wound, edges are separate, the wound is left open to heal. Most of the complications are: bleeding, infection, dehiscence, formation of fistulas. Regular monitoring of surgical wounds is essential for early detection of complications and early treatment [1,2].

**Pressure ulcer:** This problem is less in pediatric age, around 5% in children in intensive care unit. The lesions are more frequent in the occipital region, in the sacrum region and in the feet. There are 4 categories of pressure ulcer (Table 1). The risks factors are: prematurity, change of perfusion, mechanical ventilation, change in nutritional stage, loss of mobility, motor problems, drugs that may change blood flow to the skin, urinary and fecal incontinence, internal care admission. Patients in wheelchairs should use a mirror to inspect areas they cannot see or have someone inspect them. Pressure relief, especially in bony prominences, is the main measure in preventing the onset of pressure ulcer. Efforts should focus on redistributing pressure to the skin either by repositioning or by using pressure relief devices. Do not use adult mattresses in pediatric patients, cushions or donuts since they concentrate the pressure in the surrounding areas and avoid massaging flushed skin because may increase the damage to the already damaged tissue [3,4].

**Burns:** Burns scald injuries represent 40 - 50% of burns, with a higher incidence in young children (0 - 2 years). Burns resulting from contact with flame, matches, gasoline, fireworks and aerosols continue to occur in the age group from 6 to 14 years. It mainly damages the skin (tissue destruction and coagulation of blood vessels). Burn can be classified in 3 types: 1- Surface Burns/1st Degree upper layers of the affected epithelium; intact basal layer (typical of sunburn, dry, hot, painful and hypersensitive). 2A- Superficial burns of the dermis/2nd degree superficial extend beyond the epidermis to the upper layers of the dermis; usually very flushed, painful and associated with blistering. 2B - Deep Burn of the Dermis/Deep 2nd Degree extends to the deeper layers of the dermis and may involve hair follicles or sweat glands; dry, white and with reduced sensitivity. 3- Full thickness/3rd degree burns, complete destruction of the epidermis and dermis; the lesion extends to the subcuticular layer; may involve muscle and bone; absence of sensitivity (not painful), appearance of “leather”. Water reposition and monitoring is of extreme importance!! Surveillance of the injury in the following 24 hours in case of discharge after an accident!!! The use of splints to prevent contractures are useful accessories in burned children; are usually placed at the 1st sign of contraction of the skin. In the acute phase, the head should be positioned in hyperextension (be careful not to allow the mouth to be open) and do not use cushions. For treatment we can use hydrogel, silicone dressings, biosynthetic dressings or antimicrobial dressings. The results are better than sulfadiazine [5].

**Local treatment:** The goal is clean the wound with reduction of microbial load, removal of organic/inorganic waste and facilitation of healing. We can use debridement of the wound and remove necrotic tissues. Can be autolytic using hydrogel, maltodextrin or polyacrylate with Ringer’s solution. Can be enzymatic or by surgery. Can be chemical using Dakin solution. The debridement can be biological with the use of larvae, with special appetite for devitalized tissue.

We can use antiseptics but they all have side effects and usage must be with very careful: Hypochlorite (Table 2), hydrogen peroxide (H₂O₂) (Table 3), iodopovidone (Table 4), chlorhexidine (Table 5) and cetrimide (Table 6).

<table>
<thead>
<tr>
<th>Categories</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>I</td>
<td>Non-bleachable erythema on intact skin</td>
</tr>
<tr>
<td>II</td>
<td>Partial loss of skin or flectena</td>
</tr>
<tr>
<td>III</td>
<td>Total loss of skin thickness (visible subcutaneous tissue)</td>
</tr>
<tr>
<td>IV</td>
<td>Total loss of tissue thickness (visible muscles and bones)</td>
</tr>
</tbody>
</table>

Table 1: Classification of pressure ulcers.

<table>
<thead>
<tr>
<th>Action</th>
<th>Side effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gram + and Gram -</td>
<td>Cellular toxicity</td>
</tr>
<tr>
<td>Some spores and viruses</td>
<td>Reduction of capillary perfusion</td>
</tr>
<tr>
<td></td>
<td>Toxic to granulation tissue</td>
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<tr>
<td></td>
<td>Prolongs the inflammatory response</td>
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<tr>
<td></td>
<td>Skin irritation, pain and discomfort</td>
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<td></td>
<td>Localized edema</td>
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Table 2: Hypochlorite.
Nowadays, we have a product with Polyhexanide and Betaine. This association causes fibrin reduction, is safe, reduces pain, can control infection, doesn’t interfere with the growth of the granulation tissue and reduces the time of treatment.

We use this combination in 50 patients with different kinds of wounds and found they inhibited bacterial colonization and reduced the need for antimicrobial usage in 90% of cases.

We have also other treatments like compression therapy, hyperbaric oxygen therapy, ultra sounds, low intensity laser therapy, ultra violet, growth factors, skin replacements, honey among some of the new technologies applications.

The important thing is to always use common sense based on scientific knowledge when we choose the treatment. One treatment that is good for one patient, doesn’t mean that it is indiced or enough for another patient.

When we use a wound dressing, we remove excess moisture, be impervious to bacteria, maintain temperature, allow gas exchanges, no toxic particulates or contaminants and when we remove the dressing need to be not traumatic [6-8].

**Conclusion**

Wounds in pediatric age are cause by injury due to extravasation, surgical wounds, pressure ulcers, burns - chemical and thermal injuries, among others causes. Antiseptics are not a good treatment choice. Polyhexanide and Betaine association, in our experience reduced the need for antimicrobial usage in 90% of cases.
Bibliography


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