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Skin necrosis following calcium extravasation and otolytic wound debridement in a neonate: a case report

Yenidoğanda kalsiyum ekstravazasyonuna bağlı cilt nekrozu ve otolitik yara debridmanı: olgu sunumu

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Dear Editor,

Newborns have a high risk of extravasation in intravenous infusions due to their small vascular structure and immature skin. Calcium gluconate is widely used in the treatment of neonatal hypocalcaemia. However, the extravasation of this fluid into surrounding tissues can result in tissue damage that may lead to necrosis (1).

Freeing the necrotic tissue of devitalized tissues is critical in regaining skin's natural integrity and reducing the risk of secondary infections. For the debridement of tissue necrosis related skin ulcer, surgical, mechanical, autolytic, enzymatic and chemical methods are used (2). In this study, we aim the present the case of a newborn who developed skin necrosis due to extravasation of calcium and was treated with hydrogel treatment containing calcium alginate and sodium carboxymethylcellulose.

The second living baby of a 29-year-old mother who was delivered with caesarean section in the 28th week with a birth weight of 1350g was hospitalised in our Neonatal Intensive Care Unit due to prematurity and respiratory distress syndrome (RDS). On the 6th day of its admission, secondary to the extravasation of calcium infusion fluid administered through peripheral vascular access, the baby developed tissue necrosis of about 4x2cm in size on the right dorsal skin surface and subcutaneous tissues. We discontinued the infusion fluid; still, the patient developed skin ulceration with yellow crusts on the necrotic areas (Figure 1).

The patient was referred to the Departments of Dermatology and of Plastic Surgery, none of which recommended surgical debridement. We applied an autolytic debridement hydrogel of calcium alginate and sodium carboxymethylcellulose 90% of which was composed of pure water along with antiseptic wound care. During the wound care process, we did not observe signs of systemic or wound-area-related local infection that might lead to changes in the antibiotic protocol that was under way due to nosocomial sepsis prior to the onset of necrosis. On the twentieth day of the wound car, the necrotic tissue was replaced by a healthy granulation tissue. There was no significant cicatrisation that could lead to joint disability or effect aesthetic appearance (Figure 2).

Timely maintenance of skin and soft tissue necrosis, which can develop due to extravasation during the implementation of calcium infusion, a commonly administered method in Neonatal Intensive Care Units, and using the appropriate techniques for the treatment are essential for healthy tissue growth (3). An ineffective debridement of devitalized tissues in case of ulceration due to damaged skin and soft tissue necrosis is closely associated with an increased risk of secondary infection and nosocomial sepsis (4).

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Figure 1. Pre-treatment view of the calcium necrosis related ulcer.

Figure 2. Post-treatment view of the calcium necrosis related ulcer.

Surgical debridement allows wide excision of necrotic tissues while revitalised tissues are dissected from living tissue with the scalpel or forceps though these invasive interventions are often painful and require anaesthesia (5). In mechanical debridement, however, wet gauze applications (wet-damp, wet-dry, debridement by rubbing), hydro-debridement, and irrigation applications with saline are used (6). Enzymatic debridement calls for collagenase-containing preparations while chemical debridement necessitates slightly acidic solutions and 5-fluorouracil applications (6-8). In the autolytic debridement method, use of hydrogel is used based on the idea that moistened, softened dead dehydrated tissue is fragmentised by endogenous proteolytic enzymes with the help of dressings such as hydrocolloids and fat-containing ointments. The autolytic debridement is more time-consuming than surgery but it is also more advantageous since it is pain-free and tissue-selective (6). 90% of the hydrogel (PurilonR) we used in our case was made up of pure water mixed with sodium carboxymethylcellulose and calcium alginate. Alginates are obtained from seaweed and their most important feature is their ability to form viscous solutions at low concentration even in the presence of +1 monovalent cations such as sodium. They can also form a water-insoluble gel together with +2 multivalent cations particularly like barium, aluminium, and strontium (9). It is known that the contained calcium in alginates has a hemostatic and in vitro antibacterial effect and that it replaces the sodium in the ulcer, and drains sodium and water. Dressings comprising alginate fibers are widely used in dry and necrotic lesions. Similarly, practitioners prefer alginated-dressing-like hydro-fiber dressings containing carboxymethylcellulose in seriously exuded lesions. Containing polymer roofs, hydrogels are made up of water up to 90% and they are usually preferred in rehydrating the ulcer base in the yellow-dry and dry necrotic ulcers and ensuring effective autolytic debridement (6, 10).

In our case, we have seen that calcium alginate and sodium carboxymethylcellulose containing hydrogel treatment was effective in curing skin necrosis due to calcium extravasation. An effective debridement of devitalized tissue in the case ulceration will reduce the risk of secondary infections and nosocomial sepsis. Because it is a pain-free and less invasive intervention compared to surgical debridement, autolytic debridement, along with close clinical monitoring, should be considered at the first stage.

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