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CASE REPORT
Pediatric/Craniofacial

Management of Recessive Dystrophic Epidermolysis Bullosa in a Newborn with Porcine-derived Extracellular Matrix

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Summary: Epidermolysis bullosa is a debilitating dermatologic disorder affecting the adhesive capability between the epidermis and dermis. The severe recessive dystrophic variant is caused by mutations in COL7A1, the gene encoding type VII collagen which is the major structural protein of the anchoring fibrils linking these 2 skin layers.1 The management of recessive dystrophic epidermolysis bullosa (RDEB) remains complex with no curative therapy. We present herein the novel use of a porcinederived extracellular matrix dressing to effectively treat extensive erosions in a newborn. (Plast Reconstr Surg Glob Open 2019;7:e2471; doi: 10.1097/GOX.0000000000002519; Published online 12 November 2019.)

REPORT OF A CASE

Dermatology and plastic surgery evaluated a female newborn with RDEB. Prenatal targeted genetic testing confirmed the presence of mutations found in her older affected sibling (c.6527dupC and c.3140-1 G>C), and no further genetic testing was obtained. Nine percent total body surface area of the bilateral lower extremities (BLEs) had skin erosions (Fig. 1). After day 6 of life with parental consent and hospital Institutional Review Board approval, Cytal Wound Matrix 3-Layer (ACell, Inc, Columbia, MD) was applied to the BLE wounds once and secured with Mepitel One (Mölnlycke Health Care, Gothenburg, Sweden). Adaptic nonadhering dressings (Acelity, San Antonio, TX) coated in 0.1% gentamicin ointment were then applied. The lower extremities were wrapped with Kerlix (Cardinal Health, Dublin, OH), cast padding, and placed into full leg splints for immobilization. Application of Cytal to the feet was difficult due to patient movement, and best attempts at application were performed but limited. The procedure was performed in the pediatric intensive care unit with minimal morphine and versed due to her age and condition. Gentamicin serum levels and kidney function tests obtained before application and at day 2 postapplication were undetectable and within normal limits. Five days after the procedure, the dressings

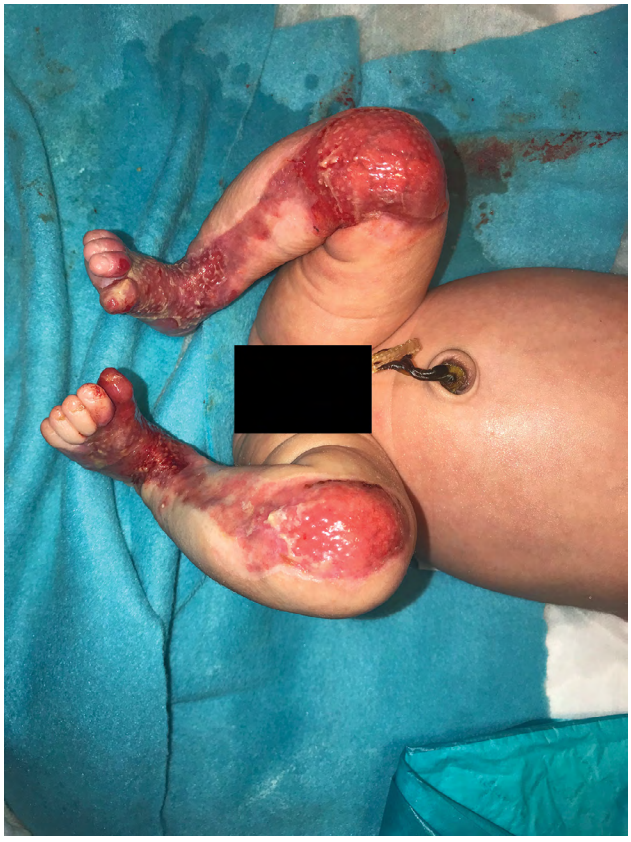

Fig. 1. Right lower extremity with extensive erosions before treatment.

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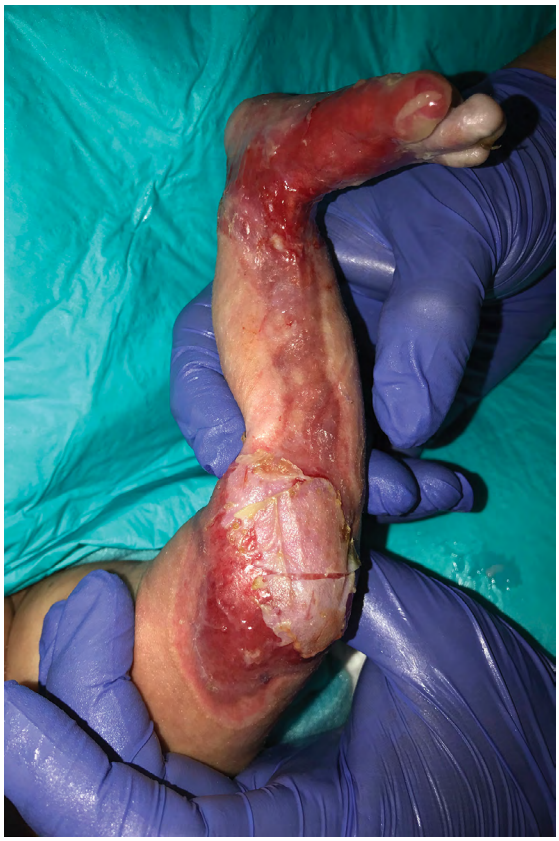

Fig. 2. Postprocedure day 5 with improvement of wounds except the dorsum of feet where shearing occurred during attempted application and dressing placement.

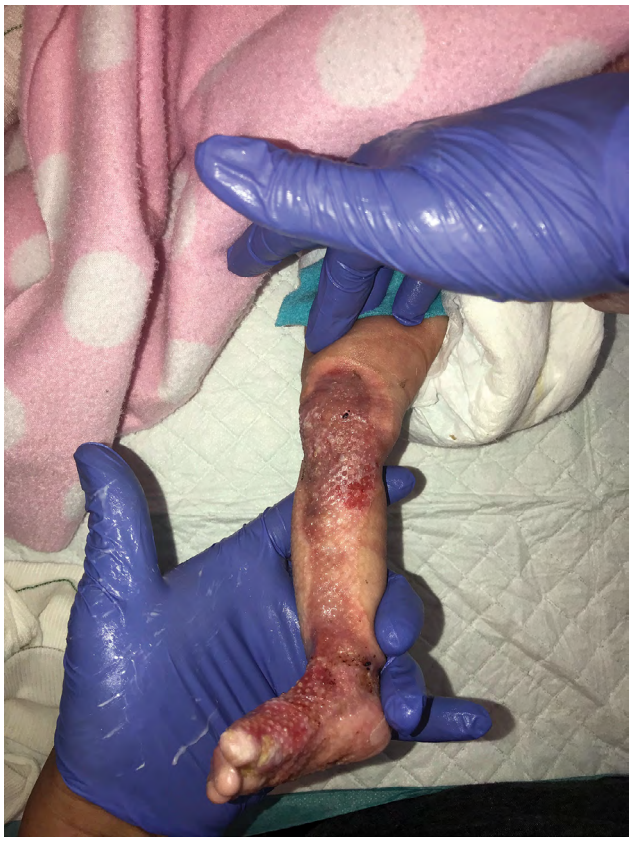

Fig. 3. Reepithelialization to leg but open areas to dorsum foot where patient movement precluded good application of Cytal seen at day 19.

were removed with resolution of ulcerated areas and epithelial budding in all sites except the dorsum of the feet which continued to have ulceration (Fig. 2). Treatment continued with daily BLE dressing changes of gentamicin/Mepitel/Adaptec for 1 month then alternating gentamicin and bacitracin monthly. At postprocedure day 19, almost all open areas had healed to the legs where the Cytal was applied (Fig. 3). At postprocedure day 54, remaining open areas to the feet where Cytal application had been limited due to patient movement had healed as well. One year out, the patient was noted to have a few small open areas on her legs (Fig. 4).

DISCUSSION

RDEB remains an incurable, rare disorder occurring in less than 1 million newborns.[2] Wound care remains the mainstay treatment to decrease pain, prevent infections, and improve healing. Many therapies have been evaluated with variable results.[3] Due to the large surface area and patient age, skin substitutes were desired for coverage. Her sibling had been treated at and outside hospital with Apligraf (Organogenesis, Canton, MA). Cytal Wound Matrix 3-Layer dressing compared with Apligraft offers the advantages of decreased healing time, lower cost ($70–100 versus $1,700), and easier storing capabilities.[4,5] Cytal Wound Matrix contains epithelial basement membrane from porcine urinary bladder and collagens including collagen VII. Recent studies show that topical application of gentamicin can induce type VII collagen in individuals with *COL7A1* gene nonsense.[6] The 2 variants tested in our patient based on the sibling's genetic studies did not have a known premature stop codon; however, we chose gentamicin as we could not rule out an additional nonsense mutation and for its role as moisturizing agent and infection prophylaxis.

At the initial dressing change at day 5, significant improvement was noted in the legs with almost complete adherence of Cytal to the ulcerations on her knees and shins. However, ulcerations remained on the dorsum of the feet which was not unexpected as the patient was not sedated and moved throughout the procedure. This made Cytal application challenging in this location, serving as the major limitation of this and other skin substitutes. Although the remaining open areas did eventually heal over time (54 days noted to have closure dorsum feet), the wounds treated with Cytal had closure of ulcerated areas as early as 5 days suggesting Cytal is superior to wound care alone. At 1-year follow-up, new open areas were noted, which reflects the nature of RDEB, a disease with high risk of skin breakdown with minimal friction. Thus, the main benefit of early Cytal application in this patient is the reduction in her overall wound care burden.

We report herein the case of a patient with RDEB treated with Cytal and gentamicin ointment with healing

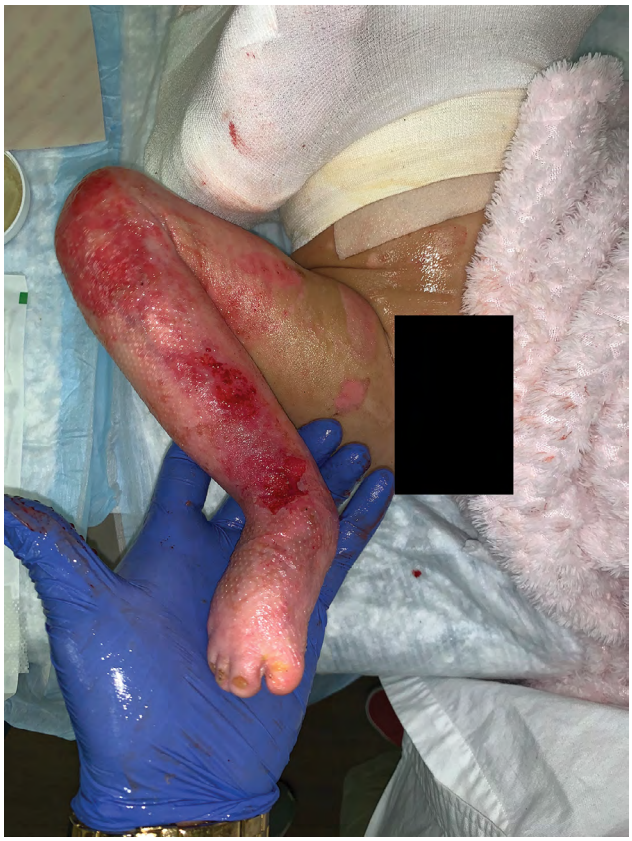

Fig. 4. One-year follow-up with small, scattered open areas showing continuous nature of disease.

of her wounds. We conclude that Cytal is an option to assist with wound management in this challenging population in whom treatment other than skin grafts is clearly desirable. Future studies are needed to examine the expression of COL7 after treatment with porcine-derived extracellular matrix dressing and to determine whether the beneficial effects noted in our patient are reproducible in other patients with RDEB and in other subtypes of EB.

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