A case report on the use of a novel polylactic acid dermal matrix for achieving wound healing of a 25-year-old pyoderma gangrenosum ulcer

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Background

Objective:

- Pyoderma gangrenosum (PG) is characterized by hard-to-heal wounds refractory to treatment. Here, we present our experience using a novel **polylactic acid (PLA) closure matrix** to promote the healing of a 25-year-old PG ulcer.

Background:

- PG is a **neutrophilic dermatosis** that presents as an inflammatory and ulcerative disorder of the skin.
- PG is characterized by **increased expression of pro-inflammatory cytokines**, including IL-1b, IL-6, IL-8, and TNF-alpha. This upregulation leads to increased activation of inflammasomes, dysregulation of the innate immune system, and recruitment and activation of neutrophils in the skin.
- One of PG's hallmarks are the appearance of **inflammatory skin lesions** that subsequently expands and breaks down rapidly to form ulcers that are unusually painful.
- PG ulcers also tend to show **pathergy**, which is the induction or exacerbation of PG in sites of trauma, which creates an enormous challenge for treating these wounds. Furthermore, even with appropriate treatment, they have a high recurrence rate.
- There is mounting evidence that **a novel PLA guided closure dermal matrix** can be used to treat these refractory and challenging wounds. This product shift the wound bed from inflammation into proliferation because the **lactate** released by it acts as a paracrine agent (lactormone) with potent signaling effects that include:
  - **Hypoxia mimicking** and triggering of **neo-angiogenesis**
  - **Cell survival and proliferation**
  - **Anti-inflammation**
  - **Wound pH acidification**
- Here, we present our experience using this **PLA closure matrix** to promote the healing of a PG ulcer that has been open for the past 25 years.

Clinical Case

- This case consists of a 72-year-old male with bilateral leg venous insufficiency, atrial fibrillation under anticoagulation and a story of PG ulcers.
- The patient had been followed up for wound care by the same physician for the past 25 years.
- Initially, the patient presented bilateral ulcers on the legs. However, after several years, the ulcers on the right leg were completely healed and have not recurred.
- In contrast, despite multiple attempts with the use of standard wound care, immunomodulatory therapies, negative pressure wound therapy, CAMPs, and other advanced wound treatments, the ulcer on the left leg had been persistently open during all the follow-up time.
- This wound had periods of relative improvement, stabilization, and flare-ups that led to tissue breakdown and increased ulcer size. Therefore, after multiple failed attempts to achieve healing, any treatment was considered palliative and was only performed to help improve the patient's quality of life.
- In 2023, a novel PLA closure matrix was launched into the market. This product contains 75% lactide, which exerts immunomodulatory effects on the wound bed, so we decided to try it on the patient to control the inflammation and promote healing.
- In combination with daily clobetasol 0.05% ointment, PLA closure matrices were applied bi-weekly.
- No systemic immunomodulatory therapy was used as it had proven ineffective in this patient before.

Results

- The wound care treatment protocol consisted on gentle cleaning with antiseptical solution, minimal manipulation of the wound bed (i.e. debridement), and absorbent dressing changes as needed.
- Surprisingly, **within 2 weeks of application, the wound shifted from fibrotic and sloughy into granular**. Additionally, the erythematous peri-wound areas reduced in size, and epithelial borders started growing.
- **Four weeks later, the wound size had reduced by over 50%**, even achieving bridges of fully healed skin.
- **Within 8 weeks, the wound had closed more than 90%**, and the repair tissue looked almost identical to non-injured skin, without any contracture or major scarring.
- T**en weeks later, the wound was fully healed** and has remained closed for the past 6 months.
- The patient reported a **remarkable improvement in his quality of life**:

"For the past 25 years, I have been very conscious of my wound. It exudates, it smells badly, and it is painful. My whole life circles around what I can and cannot do based on it. However, now, after 25 years of living like this, I now feel ready to use shorts again and hit some balls in the golf course."

Discussion

- This remarkable case exemplifies the powerful effects of a next-generation fully synthetic CAMP that leverages poly-lactic acid as a **lactate donor** to achieve wound healing.
- Lactate's main effects in wound healing effects can be summarized as **anti-inflammatory, pro-angiogenic, anabolic, and pH-stabilizing**.
- In the context of PG, this helps stabilize the wound's environment, lower the inflammatory environment, enhance the neo-vascularization and ECM production of the wound bed, and promote ulcer healing.

In summary, here we show that in combination with proper local anti-inflammatory therapy, PLA guided closure matrices offer an excellent alternative for achieving the healing of challenging PG ulcers.

References

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