

USING A CASTOR OIL-BALSAM OF PERU-TRYPSIN OINTMENT TO ASSIST IN HEALING SKIN GRAFT DONOR SITES

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Skin graft donor sites are partial-thickness wounds that are commonly managed with gauze-type dressings. As such, they often cause more pain and difficulty in healing than the graft-recipient site. A retrospective study was conducted to ascertain the effects of using a castor oil-balsam of Peru-trypsin containing ointment on skin graft donor sites in 36 consecutive patients (16 female, 20 male). All donor sites were epithelialized after 11 days (range 6 to 11 days, mean 8 days) and no wound complications were observed. Given these healing results and product ease of use, this particular formulation has become the facilities' current treatment of choice and further study is indicated and warranted.

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Skin graft donor sites frequently are more painful after surgery than the areas receiving the skin grafts. Bleeding may occur from the donor sites, and dressing changes may cause even more pain. Donor sites may heal slowly and become infected or malodorous.¹

Despite the frequency of the skin graft procedure, no standard approach to treating donor sites exists. Donor site treatment may be poor because patients and caregivers focus on the area grafted and because donor site care is painful. To this day, a common method of managing donor sites includes leaving a dressing such as petroleum gauze or tape adherent to the wound for days or weeks. The dressings usually dry out, defeating the goal of moist wound care, and can become incorporated into the wound bed, causing pain and bleeding when removed.¹

In the authors' practice, initial experiences with castor oil-balsam of Peru-trypsin ointment in partial-thickness wounds donor sites, as well as dissatisfaction with use of standard dressings such as petroleum gauze or dry gauze alone, prompted use of the castor oil formulation. A 6-month retrospective study was conducted to ascertain the effects of this change on wound and patient outcomes.

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Materials and Methods

Product description. The castor oil-balsam of Peru-trypsin ointment (Xenaderm™) was manufactured by DPT Laboratories, San Antonio, Tex., for Healthpoint®, Ltd., Ft. Worth, Tex. According to the manufacturer, the ointment is formulated to promote healing and provide protection from harmful stimuli such as urine or feces. The actual ingredients are trypsin (90 units/g), balsam of Peru (87.0mg/g), castor oil (788 mg/g), safflower oil, and aluminum magnesium stearate.

The ointment is indicated for use in partial-thickness wounds and provides a moist base for the healing tissue. Trypsin, a proteolytic enzyme that cleaves polypeptides at arginine and lysine residues, and other proteolytic enzymes have been used in wound care for some time as debriding agents.² In general, their debriding efficacy is dose-dependent. Trypsin is frequently used for mild specific surface debridement.

One of trypsin's primary uses in biological science today is in the preparation of cell concentrates from culture. This enzyme helps free up the cells from a culture medium surface without adversely affecting their viability. It also helps disrupt the extracellular adhesion involving fibronectin and other components of the extracellular matrix. In general, trypsin is employed in wound care as a mild debriding agent that, at the concentration employed, does not affect cell viability.³

Trypsin is a discriminating proteolytic enzyme in terms of the number of chemical bonds that it will attack. Chemists interested in determining the amino acid sequence of proteins have made good use of this fact; trypsin is widely employed as a reagent for the orderly and unambiguous cleavage of such molecules.⁴

The other ingredients in the ointment are basically moisturizing and protective substances that help provide a moist healing environment and reduce drying and topical trauma.^{5,6} Balsam of Peru has a long and colorful history. According to the literature, in pre-Columbian times the natives of the central Americas and Mexico put balsam-soaked cloths on their wounds. Today in South America, the balsam still is used to promote wound granulation, especially because it seems to act as both antiseptic and disinfectant. It has been used for skin ulcers and other wounds.⁷

Castor oil is one of the world's oldest commercial products and has been used as a skin conditioner for thousands of years.⁸ It often has been used as an ingredient to penetrate cornified epithelium.

Patient population. During the 6-month study period, data from 36 consecutive patients (age range: 41 to 89 years) with chronic wounds who had split-thickness skin grafts (1/10,000 to 1/15,000 inch thickness) taken from their thighs and applied to their lower legs or feet were obtained and included in this study. Except for one patient, all donor wounds and recipient wounds were on the same leg. Grafted areas ranged from 25 cm² to 410 cm² with an average of 105 cm²; specifically, lower leg areas ranged from 28 cm² to 450 cm²; whereas, ankle and foot areas ranged from 25 cm² to 100 cm². Sixteen (16) of the 36 patients were women and the majority (23) did not have diabetes mellitus. Ten (10) patients had a traumatic wound, seven had an infection, and six required a graft to repair a dehisced surgical wound. Thirteen (13) patients had diabetes and had wounds secondary to neuropathy (seven), pressure ulcer formation during hospitalization (four), and infection (two). Fifteen (15) of the patients' limbs had findings of ischemia in the limbs with wounds, but 14 had an ankle-brachial Doppler arterial pressure index of 0.6 or more, which is generally consistent with healing. One patient with a dehisced wound following removal of an infected vascular graft had an ankle-brachial Doppler arterial pressure index of 0.4. Fourteen (14) patients had a history of tobacco use.

All grafts were performed in the operating room under surgically sterile conditions. Thirty-one patients (31) were given prophylactic antibiotics (cephalothin) at surgery only. Five (5) patients whose recipient sites contained

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KEY POINTS

- Many clinicians continue to use gauze-type products to dress skin graft donor sites, despite dozens of studies indicating that they heal more expediently and with less pain when covered with moisture-retentive dressings.
- The results of this retrospective chart review also suggest that products that reduce the loss of moisture and do not stick to the wound are better than gauze, which is left to dry on the wound bed.
- Randomized controlled clinical studies to compare the effects of this treatment regimen to moisture-retentive dressings are needed to facilitate the much-needed development and adaptation of standards of donor site care.



Figure 1
The top photograph shows the skin graft donor site at day 0, and the bottom photograph was taken 6 days later. The castor oil-balsam of Peru-trypsin ointment was used daily in this patient. The site is about 90% epithelialized (bottom photo).



Figure 2
These photographs show the skin graft donor site at day 4, (top) and 10 days later (bottom). The castor oil-balsam of Peru-trypsin ointment was used daily for 10 days in this patient. The site is totally epithelialized (bottom photo).

methicillin-resistant *Staphylococcus aureus* received vancomycin at surgery. All grafts were successful (95% to 100% initial graft take). All patients provided informed consent for their procedures and treatments.

Donor site treatment. After bleeding was well controlled by pressure and occasional focal cauterization, the donor sites were dressed at surgery with castor oil-balsam of Peru-trypsin ointment and a thin layer of plain nonadherent gauze and tape. After 2 days, the sites were cleaned with a mild detergent wound cleanser and/or saline. Thereafter, daily wound dressings consisted of applying a thin layer of castor oil-balsam of Peru-trypsin ointment and nonadherent gauze for at least 4 days, followed by the daily application of a thin layer of castor oil-balsam of Peru-trypsin ointment only until healing. Twenty (20) patients also had nonadherent gauze applied; 16 patients received no other covering.

Treatment continued until the site was fully epithelialized as judged by inspection under 2.5 x magnification. Often, within the healing time frame, many patients felt comfortable enough to apply the ointment to themselves. Subsequently, the treatment evolved to application of a moisturizing cream or lotion.

Results

All donor site wounds were epithelialized after 11 days (mean 8, range 6 to 11) (see Figures 1, 2, and 3). Age, sex,

comorbidity, or wound type did not affect time to re-epithelialization. Complications such as bleeding, infection, excessive pain, or nonhealing problems were not observed at the donor sites, and foul odor was not noted. Ten (10) patients reported a mild stinging with the application of the castor oil-balsam of Peru-trypsin ointment during the first 3 days. Most (26) patients felt that the donor site areas did not require use of prescription pain medicine after the first 5 postoperative days. Of the 36 patients, 30 indicated they had not used their pain medicine (acetaminophen-codeine combination) for donor site pain after the fourth postoperative day. Most patients (33 out of 36) were able to treat their own donor sites independently or with minor assistance after 6 days. No topical or systemic allergic-type reactions were observed.

Discussion and Limitations

Problems with split-thickness skin graft donor sites include pain between and during dressing changes. As a result, many surgeons apply a gauze-type donor site dressing and leave it on for days. Of course, this also results in infection, foul odor, and even more pain when the dressing has to be removed after being fully incorporated in the healing site, as it does not always fall off easily.⁸⁻¹⁰

The problem of donor site treatment is not trivial, as this site frequently causes more pain to the patient than the grafted site.¹¹⁻¹⁴ Delayed healing in the donor site area

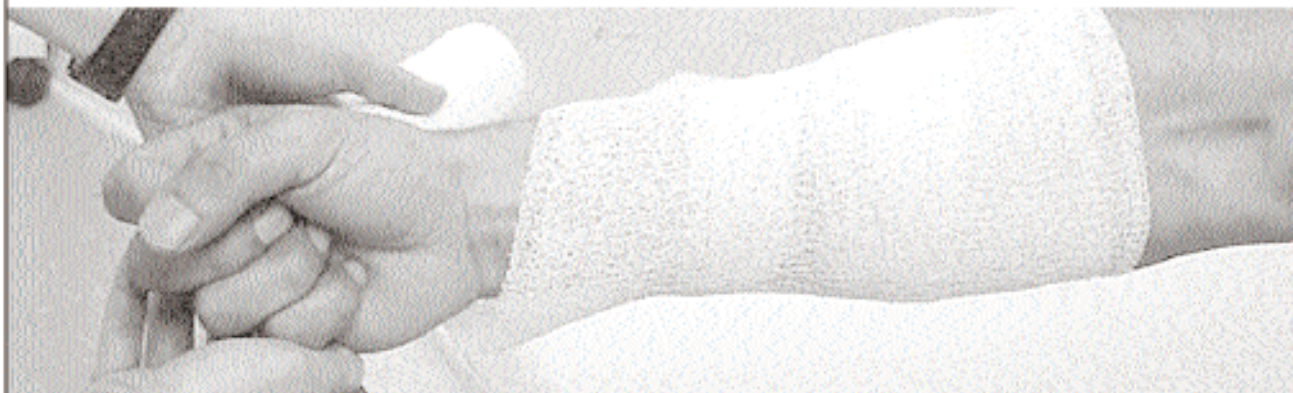


Figure 3

A donor site at 3 weeks that was treated with castor oil-balsam of Peru-trypsin ointment beginning at surgery and stopping when fully epithelialized at day 9.

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