DOI: 10.21088/jd.2582.3582 10125.3

RFP Journal of Dermatology
Volume 10 Number 1, January - June 2025

CASE REPORT

Role of Prolotherapy in Wound Bed Preparation in Grade 4 Ischial Pressure Injuries

Sriram V.S.[1], Ravi Kumar Chittoria,[2] Amrutha J.S.[3]

HOW TO CITE THIS ARTICLE:

Sriram V.S., Ravi Kumar Chittoria, Amrutha J.S. Role of Prolotherapy in Wound Bed Preparation in Grade 4 Ischial Pressure Injuries. RFP Jr of Drea 2025; 10(1): 17-20.

ABSTRACT

Background: Hypoalbuminemia is prevalent in patients undergoing major abdominal surgeries and is associated with adverse postoperative outcomes, including prolonged hospital stays, higher infection rates, and increased mortality. The clinical impact of albumin supplementation in these patients remains under scrutiny.

Objective: This study evaluates whether albumin supplementation in hypoalbuminemic patients (≤3.0 g/dL) improves postoperative outcomes.

Methods: This retrospective study included patients who underwent major abdominal surgery between January 2021 and December 2024 at a tertiary care hospital. Patients with hypoalbuminemia were divided into two cohorts of 250 each: those who received postoperative albumin supplementation and those who did not. Outcomes measured included length of hospital stay (LOS), infection rates, ICU admission rates, and 30-day mortality.

Results: The albumin supplementation group had a significantly shorter LOS (8.1 vs. 11.4 days, $p < 0.001$) and lower infection rates (10% vs. 17%, $p = 0.02$). There was no statistically significant difference in ICU admissions or 30-day mortality between the two groups ($p = 0.58$ and $p = 0.19$, respectively). Multivariate regression identified albumin supplementation as an independent predictor of reduced LOS and infection rates.

Conclusion: Albumin supplementation in hypoalbuminemic patients post-major abdominal surgery improves recovery metrics by reducing LOS and infection rates

AUTHOR'S AFFILIATION:

[1] Senior Resident, Department of Plastic Surgery, JIPMER, Pondicherry 605006, India.

[2] Professor and Associate Dean (Academic), Head of IT Wing and Telemedicine, Department of Plastic Surgery and Telemedicine, JIPMER, Pondicherry 605006, India.

[3] Senior Resident, Department of Plastic Surgery, JIPMER, Pondicherry 605006, India.

CORRESPONDING AUTHOR:

Ravi Kumar Chittoria, Professor and Associate Dean (Academic), Head of IT Wing and Telemedicine, Department of Plastic Surgery and Telemedicine, JIPMER, Pondicherry 605006, India.

E-mail: drmanohar_dawan1234@yahoo.com

➢ **Received:** 24-04-2025 ➢ **Accepted:** 10-05-2025

without influencing short-term mortality. Future randomized controlled trials are necessary to validate these findings.

KEYWORDS

• Hypoalbuminemia <3.5 g/dL • Length of hospital stay(LOS) • Post-operative albumin levels • Albumin supplementation

INTRODUCTION

Pressure ulcers are associated with prolonged patient morbidity and high healthcare costs. Risk factors for sacral and ischial pressure sore development include prolonged pressure and shear over the bony prominences secondary to immobility or spinal cord trauma. Definitive management of such ulcers ultimately involves surgical repair in the form of advancement and/or rotation flaps or free flap reconstruction. Reconstruction is usually delayed by the need to optimise the patient-related factors as well as local wound factors. Wound bed preparation is an essential requirement before a major reconstructive surgery, as an inadequately prepared wound can result in flap failure, adding to the patient's morbidity and prolonging hospital stay.

Granulation tissue formation is a vital process in the healing of pressure injuries.[1] It is rich in fibroblasts, collagen bundles, tissue macrophages and capillaries which result in the proliferative phase of wound healing. Prolotherapy is a treatment modality that aims to stimulate the wound regeneration process by causing osmotic rupture of cells and increasing growth factor release. Commonly employed prolotherapy agents include hyperosmolar dextrose, phenol, glycerin, sodiummorrhuate, and ozone.[2] In this study, we report the use of hypertonic dextrose solution in the management of grade 4 ischial pressure injury.

MATERIALS AND METHODS

After getting the Departmental Ethical Committee approval, this study was conducted in a Tertiary Care Centre in the Department of Plastic Surgery. Informed consent was obtained. The patient was a 30-year-old male who had developed bilateral grade 4 ischial pressure injuries secondary to post-traumaticflaccid paraparesis. The ulcer had unhealthy granulation covering the underlying bone with significant undermining of the edges (*Figure 1*). He was evaluated for the same, tissue bits obtained for culture,and management was initiated with culture-sensitive antibiotic coverage and regular cleaning and dressing of the wound. However, the wound failed to show satisfactory healing and granulation.

Figure 1: Bilateral grade 4 ischial bed sore

The patient was then treated with a Prolotherapy regimen. This study used a solution of hypertonic dextrose (25% w/v) as the prolotherapy agent (*Figure 2*). After standard wound bed debridement, the hypertonic dextrose solution (25% w/v) was administered subcutaneously and intradermally to the wound margins and base, specifically targeting the undermined areas (1 mL/cm² of wound margin circumference) (*Figure 3*). The wound was covered with a sterile gauze dressing. Concomitant care, including regular dressing, position changes, and pressure of floading, was continued. The Prolotherapy sessions were repeated every 3 days for 3 weeks.

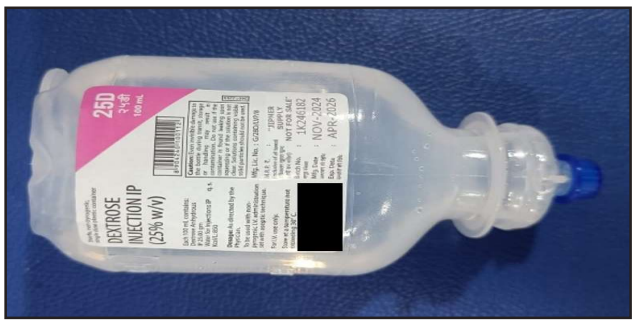

Figure 2: Dextrose solution (25% w/v) used for prolotherapy

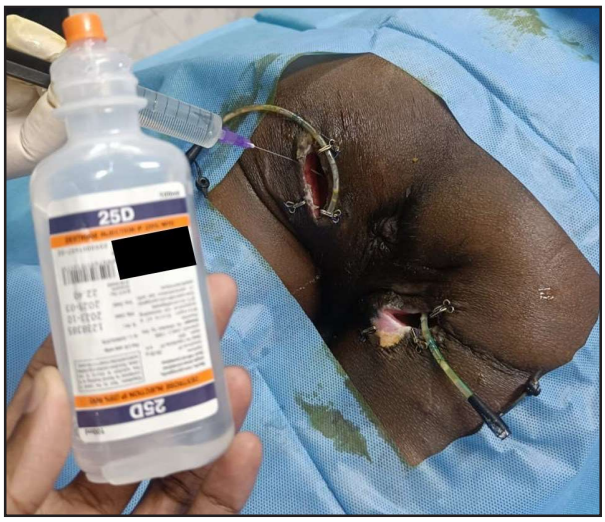

Figure 3: Prolotherapy agent being administered

RESULTS

The wound bed preparation was satisfactory with the appearance of healthy granulation and a decrease in wound size at the end of 3 weeks of prolotherapy (*Figure 4*). Increased capillary bleeding was noted during dressing beginning from the 1st week, indicating early neovascularisation. No local or systemic adverse events were observed during the treatment period.

DISCUSSION

Pressure ulcer occurs in areas of prolonged contact. The most common sites are-sacral region, heel, and occiput in the supine position, whereas the ischial region is the most common site in the sitting position. Once the pressure ulcer develops, it is often hard to treat. A complex multidisciplinary approach is frequentlyrequired for the management of pressure sores. Pressure injuries have been classified by the National and European Pressure Ulcer Advisory Panel (NPUAP/EPUAP) according to the depth and degree of ulceration in the skin and subcutaneous tissue.[3] Pressure ulcers are known to have decreased levels of cytokines that promote wound healing, such as platelet-derived growth factor (PDGF), basic fibroblast growth factor (bFGF), epidermal growth factor (EGF), and transforming growth factor-beta (TGF-β).[4] This necessitates the addition of adjunct measures to achieve wound healing.

Wound bed preparation is the management of a wound to promote natural healing or to facilitate alternative methods to achieve healing. The first description of this concept was given by Schultz *et al*. as a structured framework for use in the management of wounds.[5] This was followed by the TIME concept which described four aspects of wound bed preparation that need to be systematically addressed for optimal wound healing-Tissue, Inflammation/infection, Moisture imbalance, Epithelial edge.[6]

The term prolotherapy derives from the Latin word ''proles,'' meaning offspring or progeny and the English term ''therapy.''Prolotherapy involves the use of an irritant substance to promote growth of new tissue. The mechanism of action behind prolotherapy is not fully understood. It is assumed that the injected agent induces a local inflammatory process that triggers the release of growth factors.[7] Prolotherapy causes osmotic rupture of cells by cell dehydration, induces macrophages at the application site, and aids healing by stimulating the release of growth factors.[8] Prolotherapy may also have a direct role in stimulating collagen synthesis.[9] There is a lack of strong scientific evidence for the use of prolotherapy in chronic wound healing, as much of the data is extrapolated from its application in musculoskeletal pathology.[10,11] However, in vitro studies suggest that the cultivation of cells in high glucose culture medium can increase the expression of PDGF and TGF-beta.[8,12] Both of these are known to have pro-reparative effects on skin wounds and have been postulated as the potential mechanism through which prolotherapy promotes chronic wound healing.

CONCLUSION

Prolotherapy may have the ability to enhance wound bed preparation in chronic pressure injuries by promoting granulation and neovascularisation. Although there is insufficient data to support its efficacy, this therapy may serve as an adjunct to standard therapy for pressure sore management, especially in recalcitrant wounds where conventional methods have plateaued. We recommend designing randomised controlled trials to compare dextrose prolotherapy with standard care to further establish the efficacy, optimal dosing, and safety of this technique.

Conflicts of interest: None declared

REFERENCES

1. Sato T., Abe T., Ichioka S. Factors impairing cell proliferation in the granulation tissue of pressure ulcers: Impact of bacterial burden. Wound Repair Regen Off Publ Wound Heal Soc Eur Tissue Repair Soc. 2018; 26: 284–92.
2. Siadat A.H., Isseroff R.R. Prolotherapy: Potential for the Treatment of Chronic Wounds? Adv Wound Care. 2019; 8: 160–7.
3. Edsberg L.E., Black J.M., Goldberg M., McNichol L., Moore L., Sieggreen M. Revised National Pressure Ulcer Advisory Panel Pressure Injury Staging System. J Wound Ostomy Continence Nurs. 2016; 43: 585–97.
4. Cooper D.M., Yu E.Z., Hennessey P., Ko F., Robson M.C. Determination of endogenous cytokines in chronic wounds. Ann Surg. 1994; 219: 688–92.
5. Schultz G.S., Sibbald R.G., Falanga V., Ayello E.A., Dowsett C., Harding K., *et al.* Wound bed preparation: a systematic approach to wound management. Wound Repair Regen Off Publ Wound Heal Soc Eur Tissue Repair Soc. 2003; 11 Suppl 1: S1-28.
6. Harries R.L., Bosanquet D.C., Harding K.G. Wound bed preparation: TIME for an update. Int Wound J. 2016; 13: 8–14.
7. Bae G., Kim S., Lee S., Lee W.Y., Lim Y. Prolotherapy for the patients with chronic musculoskeletal pain: systematic review and meta-analysis. Anesth Pain Med. 2021; 16: 81–95.
8. Oh J.Y., Choi G.E., Lee H.J., Jung Y.H., Ko S.H., Chae C.W., *et al.* High Glucose-Induced Reactive Oxygen Species Stimulates Human Mesenchymal Stem Cell Migration Through Snail and EZH2-Dependent E-Cadherin Repression. Cell Physiol Biochem Int J Exp Cell Physiol Biochem Pharmacol. 2018; 46: 1749–67.
9. Wu T.J., Fong Y.C., Lin C.Y., Huang Y.L., Tang C.H. Glucose enhances aggrecan expression in chondrocytes via the PKCα/p38-miR141-3p signaling pathway. J Cell Physiol. 2018; 233: 6878–87.
10. Rabago D., Lee K.S., Ryan M, Chourasia A.O., Sesto M.E., Zgierska A., *et al.* Hypertonic dextrose and morrhuate sodium injections (prolotherapy) for lateral epicondylosis (tennis elbow): results of a single-blind, pilot-level, randomized controlled trial. Am J Phys Med Rehabil. 2013; 92: 587–96.
11. Scarpone M., Rabago D.P., Zgierska A., Arbogast G., Snell E. The efficacy of prolotherapy for lateral epicondylosis: A pilot study. Clin J Sport Med Off J Can Acad Sport Med. 2008; 18: 248–54.
12. Barrientos S., Stojadinovic O., Golinko M.S., Brem H., Tomic-Canic M. Growth factors and cytokines in wound healing. Wound Repair Regen Off Publ Wound Heal Soc Eur Tissue Repair Soc. 2008; 16: 585–601.