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Role of Prolotherapy in Leg Defect

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Research

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Abstract

Non healing wounds are the major problem all over the world. Many therapies have been introduced for the management of chronic non healing ulcers. It is always challenging to manage these ulcers. There is no well-established method that accelerates the wound healing rate. Prolotherapy is a method that involves injecting some irritant locally in the wound that is claimed to hasten the healing. This article discusses about the role of prolotherapy in leg defects.

Key Words: Prolotherapy, wound healing, leg defect

Introduction

There are 3 stages in adult wound healing: the inflammatory phase, the proliferative phase, and the remodelling phase. These 3 stages have to occur in sequentially to result in healing of wound. Wound bed preparation is a new concept and can be summarized with the acronym T.I.M.E, T for tissue: non-viable or deficient. I for infection/inflammation, M for moisture balance. E for epidermis which was changed later to E for edge. Large wounds often require a graft or a flap for wound coverage, which require the wound bed preparation. Prolotherapy is a procedure in which an irritant is injected or sprayed into the wound. The irritant injected will initiate an inflammatory reaction, which is thought to promote healing of wound. The most common prolotherapy agent used in clinical practice is dextrose, with concentrations ranging from 12.5Per Cent to 25Per Cent. Dextrose is considered to be an ideal proliferant because of its water solubility, a normal constituent, and can be injected safely into multiple areas and in large quantity. Hypertonic dextrose solutions will be dehydrating cells at the injection site, leading to local tissue trauma, which in turn attracts granulocytes and macrophages and promotes healing. We share our experience of using prolotherapy in the preparation of wound bed, in this article.

Methodology

This study was conducted in the department of Plastic Surgery at tertiary care centre after getting the departmental ethical committee approval. Informed written consent was taken from the patient. The details of the patient in study includes history of 17-year-old male patient with no known comorbidities with alleged history of road traffic accident thus sustaining an avulsion injury causing raw area over right knee, with fracture of right tibia (Figure 1). Following which he developed swelling, pain over the knee; insidious in onset and gradually progressive. He was known alcoholic and smoker. He underwent closed reduction and external fixation for the right tibial fracture. Following this, patient came to JIPMER for further treatment. After wound debridement of necrotic tissues, exposed tendons, soft tissues are prepared for skin cover. Wound bed preparation was done using Dextrose 25Per Cent solution as agent for prolotherapy (Figure 2). It was spread evenly on to the wound followed by gauze dressing. Repeated session of prolotherapy was given every three days (Figure 3). After multiple sessions of prolotherapy wound bed was prepared, wound was covered with

granulation tissue, and size of the wound also decreased (Figure 4).

Results

Over three months period with prolotherapy application, the wound bed was prepared and reconstruction was planned. No adverse local or systemic effect was noted with the use of Prolotherapy. The wound bed showed good granulation tissue (Figure 5).

Discussion

Multiple agents are being used in prolotherapy, few are irritants (such as phenol), chemoattractant (commonly sodium morrhuate), osmotic agents (commonly dextrose). Although the exact mechanism of prolotherapy is not clear, it is believed that the injection of hypertonic dextrose causes cell dehydration and osmotic rupture at the injection site that leads to local tissue injury. That will subsequently induce granulocyte and macrophage migration to the site, with release of the growth factors and collagen deposition. In vitro studies have shown that even concentrations as low as 5Per Cent dextrose have resulted in the production of several growth factors critical for tissue repair. Some of these growth factors include PDGF, TGF-β, EGF, b-FGF, IGF-1, and CTGF [1]. In Vitro studies have shown that the cultivation of cells in high-glucose culture medium can increase PDGF expression. PDGF has multiple pro-reparative effects in skin wounds, including the promotion of angiogenesis, extracellular production, and fibroblast proliferation. TGF-β expression is also Upregulated by high-glucose. TGF-β is involved in all steps of wound healing including inflammation, angiogenesis, fibroblast proliferation, collagen synthesis, matrix deposition, and remodelling, and wound epithelialization. Other growth factors Upregulated by high glucose include EGF, b-FGF, IGF, and CTGF, all having multiple preparative functions and improves healing in some animal wound models of impaired healing [2,3].

Some studies on prolotherapy suggest that there are direct effects on collagen synthesis. There is up-regulation of matrix in response to dextrose prolotherapy. Collagen type-I synthesis is increased in high-glucose cultivation of renal fibroblasts, in a TGF-β-mediated pathway. Changes in the cartilage matrix protein aggrecan is reported in chondrocytes cultured in high-glucose[4,5], and in patients who have received intraarticular injections of 12.5Per Cent dextrose. In our case, dextrose 25Per Cent was used as prolotherapy agent. It was used as adjunct to other modalities. There were no adverse effects noticed.

Conclusion

In this study, we found that prolotherapy has a role in the healing of the non-healing ulcer and can be used as an adjuvant therapy in leg defects. Definite conclusion cannot be made as it is a single case. Large randomized control trials are required to confirm the efficacy of Prolotherapy in leg defects.

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CONFLICTS OF INTEREST

None

DECLARATIONS

Authors' contributions

All authors made contributions to the article

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Not applicable

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CONSENT FOR PUBLICATION

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Figures

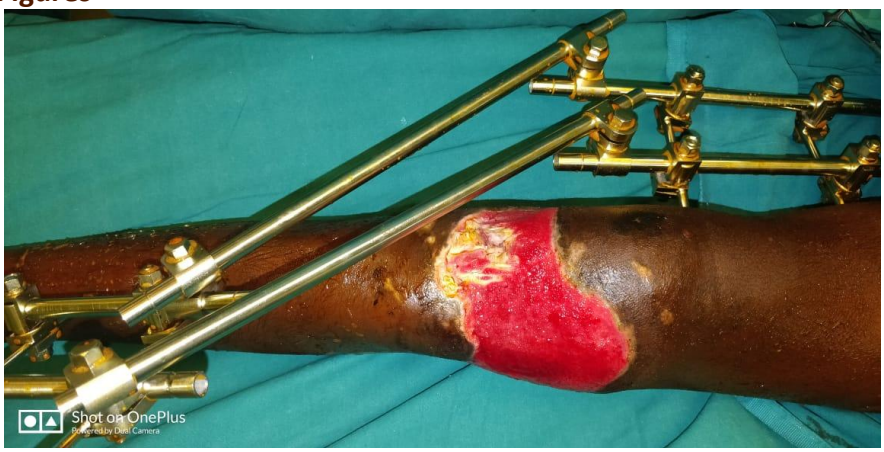

Figure 1: Avulsion injury showing raw area over right knee

Figure 2: Prolotherapy being applied to the wound.

Figure 3: 25D used as prolotherpy agent.

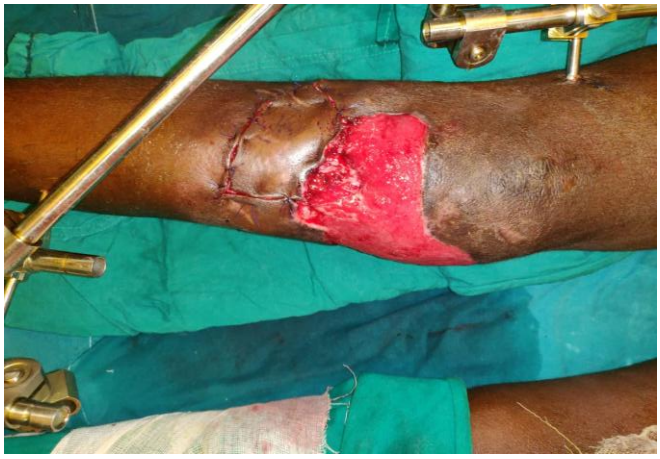

Figure 4: Post wound bed preparation with prolotherapy.

Figure 5: Healed wound

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