

ROLE OF CHITOSAN IN WOUND BED PREPARATION: A CASE STUDY

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ABSTRACT

Wound Bed Preparation (WBP) is an essential component before the wound is reconstructed by graft or flap. There are various aspects of Wound Bed Preparation (WBP) like Tissue, Infection, and Moisture & Edge management. Each component of WBP needs individual attention. Chitosan is a marine derived (shrimps) source with various wound healing properties. This case study discusses its application in Wound Bed Preparation (WBP).

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Keywords: Wound Bed Preparation (WBP), Chitosan, wound healing

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INTRODUCTION

Chronic wounds are defined as wounds that fail to proceed through the normal phases of wound healing in an orderly and timely manner^[1]. To make a wound heal, Wound bed Preparation (WBP) is essential. There are four components of Wound Bed Preparation (WBP) namely, Tissue, Infection/Inflammation, Moisture & Edge management. Each component of WBP needs separate attention & treatment. Unless the WBP is done neither wound heals nor can it be reconstructed. Usually while preparing wound bed, an agent or therapy which has multi-modality effects are encouraged to use so it is cost effective and time saving. On review of literature it is found that Chitosan which is marine source polymer has multiple wound healing properties. This article discusses about Chitosan, its properties and application in a chronic non healing ulcer of scalp.^[2]

CASE PRESENTATION:

A 3 year old male child presented with history of post traumatic (road traffic accident) chronic non healing ulcer of scalp of 6 weeks duration. Following trauma, patient was taken to local primary care centre and was managed with primary closure of wound, later patient developed low grade fever, associated with discharge from the wound. Sutures were removed and regular dressings were done. At the time of presentation to department of Plastic Surgery, the patient had a 4 x 2.5 cm chronic ulcer over frontal aspect of scalp defect with unhealthy granulation tissue with exposed bone (figure 1).



Figure 1: Chronic non healing ulcer over scalp

His Bates Jansen Assessment Tool (BJAT) score was 52 and Digital planimetry measurement was 5.73cm². On investigation, wound tissue culture was positive for pseudomonas aeruginosa. X-ray & bone scan ruled out underlying osteomyelitis.

As per the TIME concept of Wound Bed Preparation (WBP), the unhealthy granulation was debrided using hydrojet debridement. To control infection local application of Chitosan was used and secondary moist dressing was done (figure 2).



Figure 2: Chitosan application over the wound

After 3 applications of Chitosan Wound Bed got ready with appearance of healthy granulation tissue & wound culture became sterile (figure 3).



Figure 3: Healthy Wound Bed

Once wound bed got ready, it was reconstructed with skin grafting.

Discussion

Chitosan is a second most available bio polymer² after cellulose and it aids in wound healing. Chitosan is a linear polysaccharide, composed of β -linked D-glucosamine and N-acetyl-D-glucosamine (figure 5).

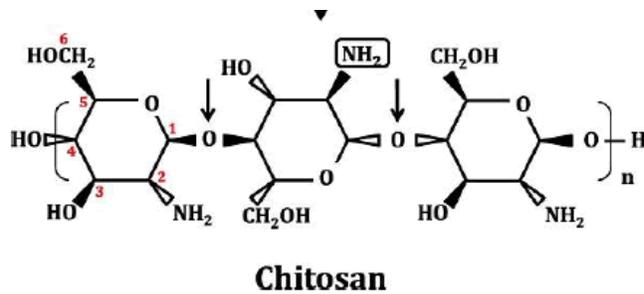


Figure 5: Biochemical structure of Chitosan

Chitosan effects wound healing by augmenting various steps in wound healing and it also has extrinsic property, which is made use as vector for transporting drugs at the wound site. Chitosan is a bio polymer, common source being crustacean shell. Since its discovery 200 years back, chitosan has been in use for its properties to enhance wound healing since then. Chitosan and its derivatives promote wound healing by enhancing activity of inflammatory cells like neutrophils, macrophages and fibroblasts. It also enhances tensile strength of wound.^[2] Following are the advantages of chitosan in wound healing:^[3-7]

1) Helps in hemostasis, stimulation of wound healing.

- 2) Nontoxic, anti-microbial, bio degradable and bio compatible.
- 3) Chitosan and its derivatives are used as source for delivery of anti-microbial and growth factors at wound site.
- 4) It has activity against fungi, gram negative and gram positive bacteria.
- 5) Chitosan has broad application in management of variety of wounds like burns wound, incisional skin wounds, surgical site infections, osteomyelitis, etc.

In our study we tested Chitosan for wound bed preparation for a case of chronic non healing ulcer of scalp. It was found to be effective but large randomized controlled trial are required to validate the role of Chitosan in wound bed preparation.

CONCLUSION

Chitosan with its properties of altering inflammatory mediators and other functions aids in wound bed preparation as noted in this

case study. Chitosan may be helpful in the armamentarium of wound management.

Conflict of Interest Statement-

There is no conflict of interest.

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