External Tissue Expansion for Difficult Wounds Using a Simple Cost Effective Technique

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ABSTRACT

Objective: To study and discuss role of external tissue expansion and wound closure (ETEWC) technique using hooks and rubber bands. Materials and Methods: The present study is a retrospective analysis of nine cases of wounds of different aetiology where ETEWC technique was applied using hooks and rubber bands. Results: All the wounds in the study healed completely without split thickness skin graft (SSG) or flap. Conclusion: ETEWC technique using hooks and rubber bands is a cost-effective technique which can be used for wound closure without SSG or flap.

KEYWORDS: External tissue expansion wound closure (ETEWC), hooks, rubber bands

INTRODUCTION

One of the foremost duties of the plastic surgeon is to restore the lost tissue. And the dictum is to replace the like with like. In accordance with these principles, the technique of tissue expansion was introduced by Neumann[1] and popularised by Radovan[2] and Austad.[3] The recent advancement in tissue expansion is the external tissue expansion. In this article we are discussing a novel indigenous technique of external tissue expansion wound closure (ETEWC) using skin hooks and rubber bands.

MATERIALS AND METHODS

This study is a retrospective analysis of cases where ETEWC technique using skin hooks and rubber bands were performed during July 2012 to July 2014 in a tertiary care hospital (JIPMER, Pondicherry) in India. The inclusion criteria included all chronic non-healing wounds of more than three months duration with laxity of the surrounding skin and either unfit for surgery or not willing for reconstruction by skin graft or flap cover. Nine patients conformed to the inclusion criteria and were included in the study. Informed consent was taken. Easily available blouse hooks and rubber bands were sterilised and used for setting up external tissue expansion technique. Sterilisation of rubber bands was done with ethylene oxide gas. At bed side under local anaesthesia the skin hooks were sutured to the healthy skin edges of the wound using non-absorbable stitches. The hooks were fixed circumferentially around the wound. Then the rubber bands were applied over the hooks under appropriate tension to allow advancement of edges of the wound. The tension was maintained just enough as to avoid the cut through of the hooks. The necessary dressing and padding was done over the hooks. During the next dressing, new rubber bands were reinforced over the old ones to maintain the tension and continue advancement of the edges [Figures 1-4].

RESULTS

In our study cohort (n = 9 patients, 11 wounds), age of the patients ranged from 23 to 75 year (mean age
49.32 years). The male to female ratio was 3:1. The most common site was the sacral region. The most common aetiology was pressure ulcer followed by post traumatic non-healing wounds. The size of the wounds varied from $3 \times 2$ cm to $20 \times 10$ cm. Wound healing duration varied from 3 to 8 weeks [Table 1] [Figures 5-13].
DISCUSSION

Tissue expansion is based on the principle that all living tissues respond in a dynamic fashion to mechanical stress placed on them. Tissue expansion incorporates the phenomena of biological creep and physiological creep. Ever since the technique was introduced by Neumann and popularised by Radovan and Austad, the utilisation of this technique has been on the rise. These principles are not only limited to the skin but even been replicated in the bone. But the process of internal tissue expansion is not without complications. The most important factors are the prolonged duration, cosmetic deformity and the need for the field to be free of infection. Because of this, internal tissue expansion is of limited use for cover of raw areas. This paved the way for the development of external tissue expansion. Many techniques of external tissue expansion were published including negative pressure and other expansion devices like Wise Bands, DermaClose. The practical limiting factor of these commercially available devices is the cost. So we started using easily available, cost-effective (Rs 5/-)
materials like blouse hooks and rubber bands. These can be applied bed side by nurse or doctor. Using this device we were able to achieve results comparable with those of the commercially available devices. In future, we will plan controlled study with statistical analysis.

The main drawback of this procedure is that it cannot be used in inflamed and indurated skin around the wound. It cannot be used in areas without surrounding skin laxity.

CONCLUSION

ETEWC using hooks and rubber bands is easy to apply, cost-effective, can be applied bed side and results are comparable with commercially available ETEWC devices. A controlled, large sample size study with statistical analysis is required to substantiate the results.

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