

25. Adamson B, Schwarz D, Klugston P, Gilmont R, Perry L, Fisher J, *et al.* Delayed repair: The role of glutathione in a rat incisional wound model. *J Surg Res* 1996;62:159-64.
26. Halliwell B, Grootveld M, Gutteridge JM. Methods for the measurement of hydroxyl radicals in biomedical systems: Deoxyribose degradation and aromatic hydroxylation. *Methods Biochem Anal* 1988;33:59-90.
27. Gupta A, Singh RL, Raghuram R. Antioxidant status during cutaneous wound healing in immunocompromised rats. *Mol Cell Biochem* 2002;241:1-7.
28. Balin AK, Pratt L. Dilute povidone-iodine solutions inhibit human skin fibroblast growth. *Dermatol Surg* 2002;28:210-4.
29. Laudanska H, Gustavson B. In-patient treatment of chronic varicose venous ulcers. A randomized trial of cadexomer iodine versus standard dressings. *J Int Med Res* 1988; 16:428-35.
30. Homann HH, Rosbach O, Moll W, Vogt PM, Germann G, Hopp M, *et al.* A liposome hydrogel with polyvinyl-pyrrolidone iodine in the local treatment of partial-thickness burn wounds. *Ann Plast Surg* 2007;59:423-7.
31. Sinha R, Agarwal RK, Agarwal M. Povidone iodine plus neosporin in superficial burns – a continuing study. *Burns* 1997;23:626-8.

**How to cite this article:** Honnegowda TM, Kumar P, Padmanabha Udupa EG, Sharan A, Singh R, Prasad HK, Rao P. Effects of limited access dressing in chronic wounds: A biochemical and histological study. *Indian J Plast Surg* 2015;48:22-8.

**Source of Support:** Nil, **Conflict of Interest:** None declared.

## Commentary

# Biochemical and histological study of granulation tissue to evaluate the effect of limited access dressing in chronic wounds: A comparative study

Every once in a while, a concept is introduced that changes our perspective to the problem at hand. Healing of a problem or chronic wound continues to baffle the investigators as to why the normal, healing trajectory of the wounds gets deviated or even, arrested.<sup>[1]</sup> Conventional viewpoint subscribes to the effects of infection, nutrition, blood supply, venous stasis, edema, previous radiation to the wound region and presence of co-morbidities like diabetes among many others being responsible factors in such wounds.<sup>[2]</sup> With the advent of negative pressure wound therapy (NPWT), it was realised that many of these factors could be suitably modified to aid the healing process.<sup>[3]</sup> Limited access dressings (LAD), an innovation arising in our own country, is claimed to achieve the similar goals of NPWT with the added advantages of ability to inspect the wound at all times, being affordable and potential to be applicable in not-so-sophisticated settings.<sup>[4]</sup>

That the reports of enhanced healing of problem wounds by LAD exist in the literature is beyond question,<sup>[4,5]</sup> what is interesting that the biochemical basis for healing of such wounds has been investigated. It seems intuitive that the LAD causes enhanced healing of the wounds because of increased healing potential. What is this healing potential in an unclosed, unhealed wound? If indeed such treated wounds exhibit granulation tissue showing increased levels of antioxidants, decreased levels of oxidative stress and greater amount of collagen deposition, we would have a viewpoint that is both scientific and refreshing.

The authors have attempted to objectively analyse the quality and formation of granulation tissue by using biomarkers hydroxyproline and total protein (quantity of granulation tissue); reduced glutathione, glutathione peroxidase and catalase (markers of antioxidant levels) and malondialdehyde (marker of oxidative stress). Using these objective criteria, they compare the efficacy of LAD with conventional dressings in the quality of granulation tissue and also correlate the same with histologic analysis. The authors need to be congratulated for meticulous biochemical and histologic study that required them to go back to the laboratory in the true spirit of surgeon-scientist. The granulation tissue in

### Access this article online

Quick Response Code:



Website:

[www.ijps.org](http://www.ijps.org)

DOI:

10.4103/0970-0358.155264

the LAD group had higher levels of antioxidants, lower levels of oxidative stress in the wounds and greater amount of collagen deposition. Thus, they conclude that LAD exerts more beneficial effects on the developing granulation tissue in the chronic wounds compared with conventional dressings. This, then should be a reflection of the increased “healing potential” of the wounds.

The authors, however, do not mention the complete re-epithelialisation or closure of the wounds under study. Though it may have been out of scope of their study, the sine-qua-non of healing remains the complete closure of the wound. Just as better local control of breast cancer (radical mastectomy vs. breast conservation therapy) may not translate into increased survival, better quality of granulation tissue may not necessarily mean faster closure of the problem wounds. We do have the evidence of better profile of biomarkers in LAD group at day 10 after initiating the study, it would have been very interesting to know about the total time taken for closure of the wounds in both the groups. It would have substantiated the clinical utility in striving to achieve a better biochemical profile in problem wounds. Perhaps, it is a topic for study and investigation in future.

**Air Mshl Anil Behl, Pauline Babu,  
Pallab Chatterjee**

Department of Plastic & Reconstructive Surgery, Command  
Hospital Air Force, Bengaluru, Karnataka, India

**Address for correspondence:**

Air. Mshl. (Dr.) Anil Behl,  
Department of Plastic & Reconstructive Surgery, Command Hospital  
Air Force, Bengaluru, Karnataka, India,  
E-mail: anilbeh154@hotmail.com

## REFERENCES

1. Robson MC, Steed DL, Franz MG. Wound healing: Biologic features and approaches to maximize healing trajectories. *Curr Probl Surg* 2001;38:72-140.
2. Mustoe T. Understanding chronic wounds: A unifying hypothesis on their pathogenesis and implications for therapy. *Am J Surg* 2004;187:65S-70.
3. Joseph E, Hamori CA, Bergman S, Roaf E, Swann NF, Anastasi GW. A prospective randomized trial of vacuum-assisted closure versus standard therapy of chronic non-healing wounds. *Wounds* 2000;12:60-7.
4. Kumar P. Limited access dressing. *Wounds* 2008;20:49-59.
5. Kumar P. Exploiting potency of negative pressure in wound dressing using limited access dressing and suction-assisted dressing. *Indian J Plast Surg* 2012;45:302-15.

**How to cite this article:** Behl A, Babu P, Chatterjee P. Biochemical and histological study of granulation tissue to evaluate the effect of limited access dressing in chronic wounds: A comparative study. *Indian J Plast Surg* 2015;48:28-9.

**Source of Support:** Nil, **Conflict of Interest:** None declared.

## Announcement

### iPad App



Indian Journal of Plastic Surgery (IJPS) launches a dynamic app which optimizes the best in digital technology to enhance a print-like reading experience with multimedia links, videos and more.

- View abstracts, read full text, browse and get engaged in multimedia
- Complete content of each issue enhanced with iPad functionality
- Customized functions like search within an article and across the downloaded issues; highlight text and mark article as favorite
- Receive new issue notifications; convenient notification when a new issue is available

#### How to launch the app?

- Use the QR code
- Visit the App Store on your iPad and search for IJPS
- Download it from <https://itunes.apple.com/in/app/indian-journal-plastic-surgery/id726088047>

