

The Use of Topical Oxygen Therapy in Complex Surgical Wounds

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Patient 1



Image 1

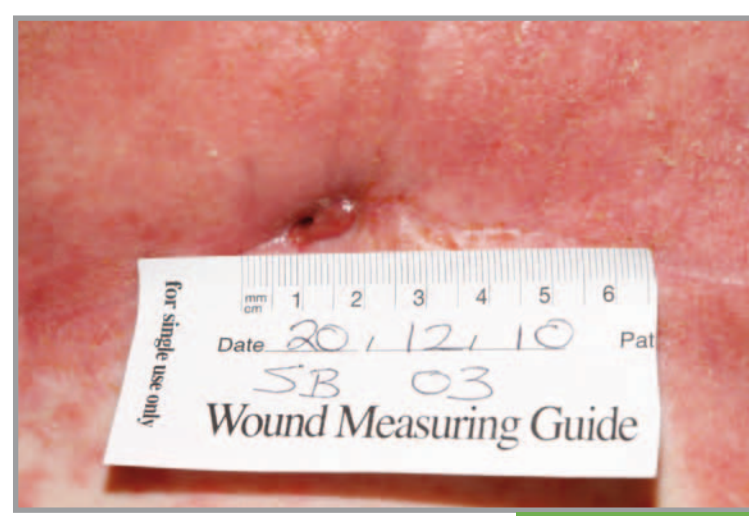


Image 2

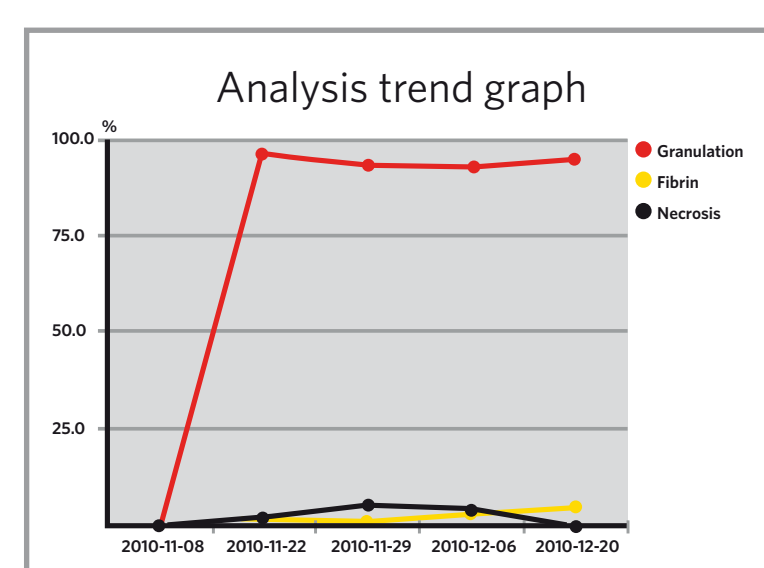


Figure 1

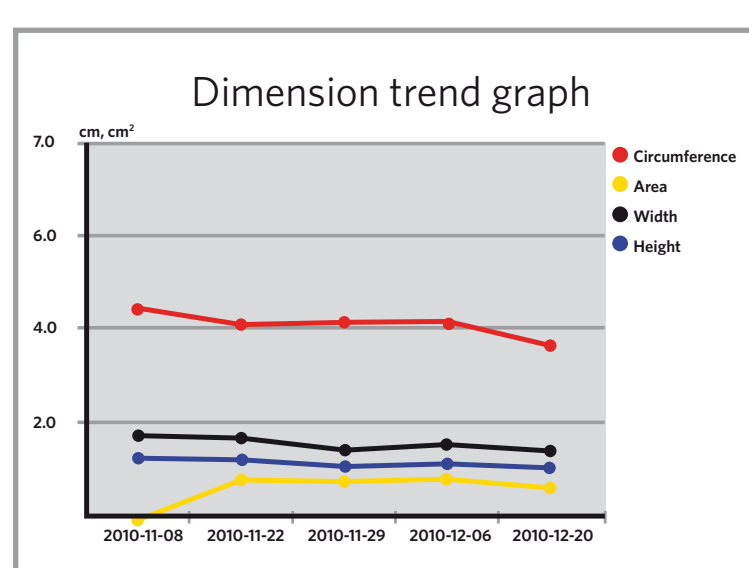


Figure 2

Figs 1 and 2: Demonstrates rapid increase in granulation tissue and progression to wound closure

Patient 2

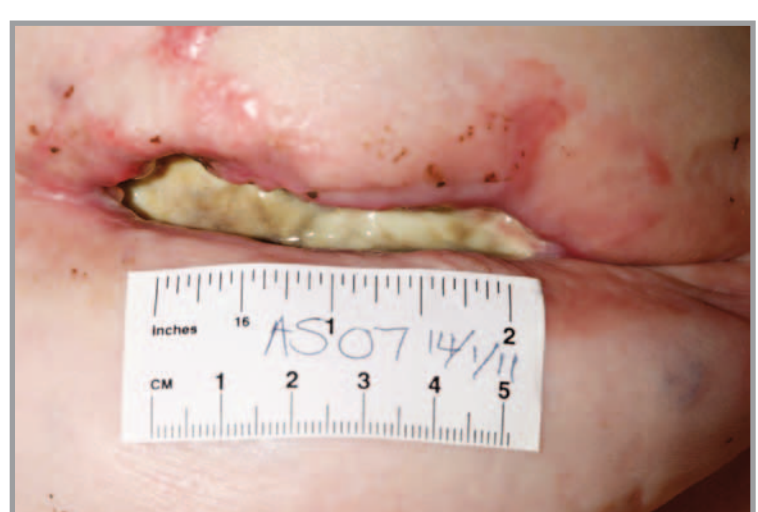


Image 3

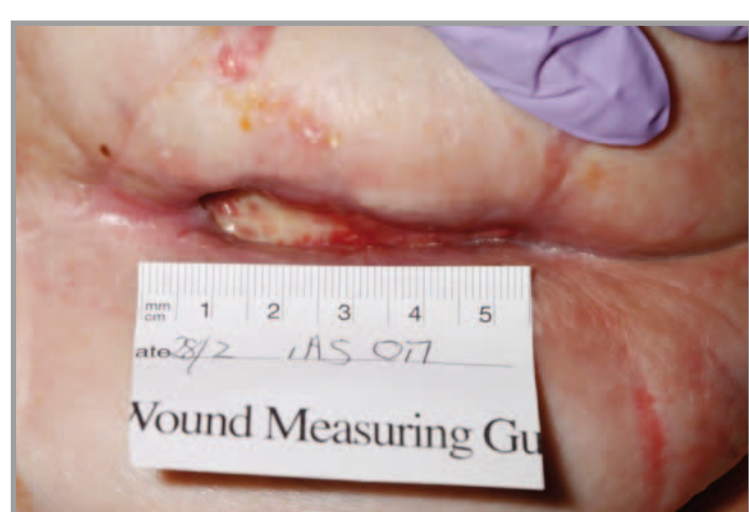


Image 4

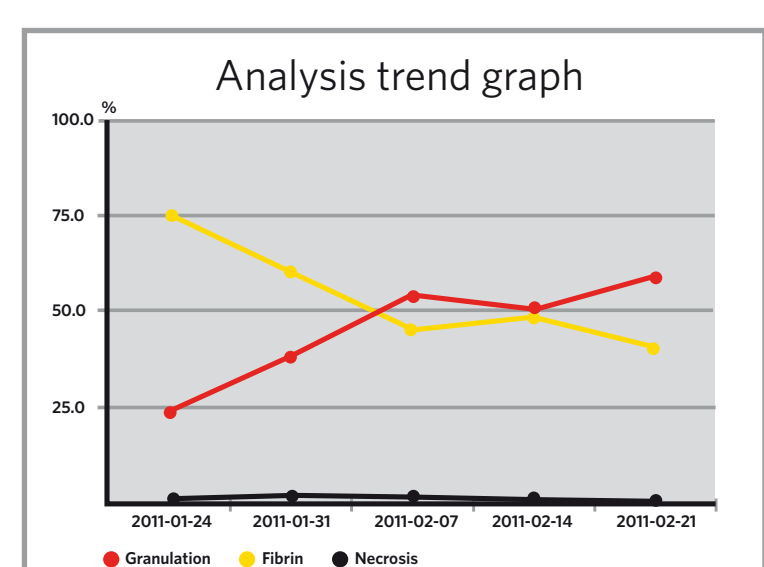


Figure 3

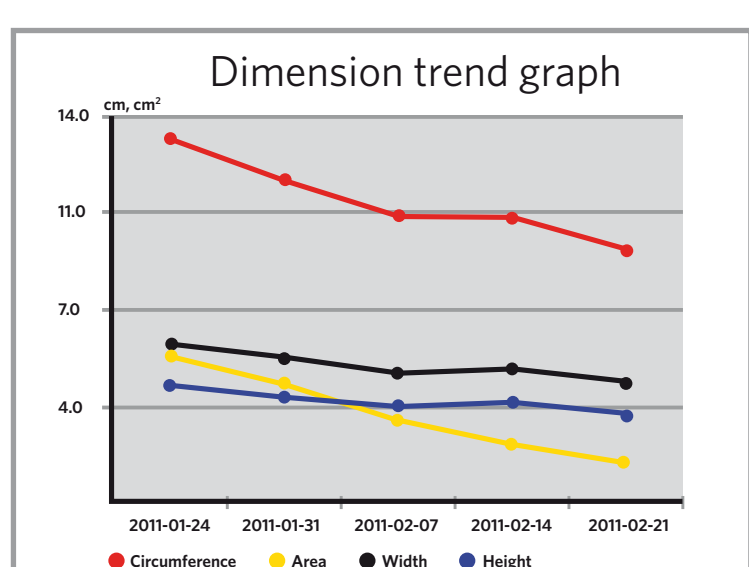


Figure 4

Fig 3: Demonstrates reduction in slough
Fig 4: Indicates reduction in wound size

Patient 3

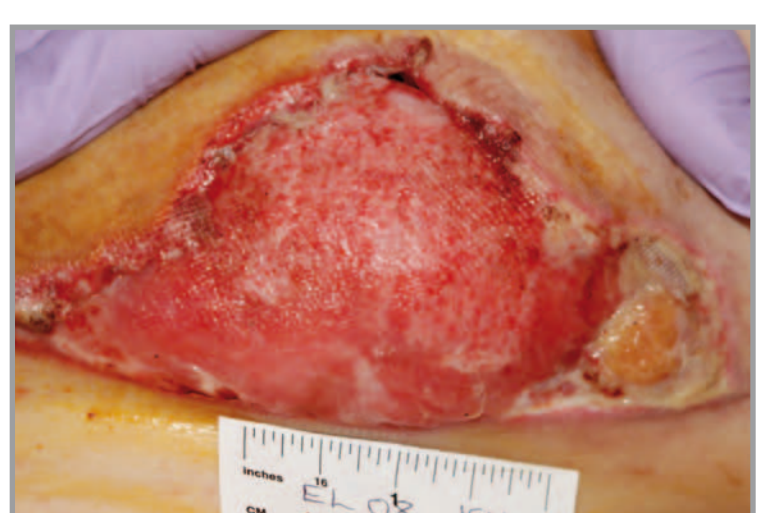


Image 5

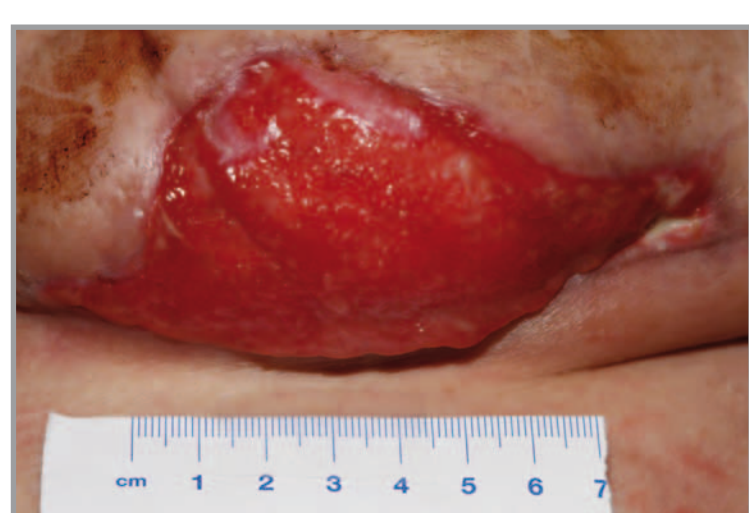


Image 6

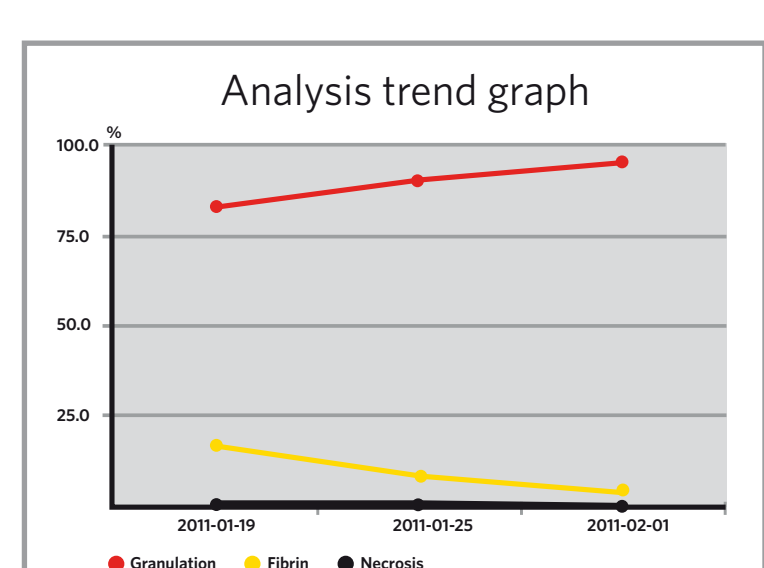


Figure 5

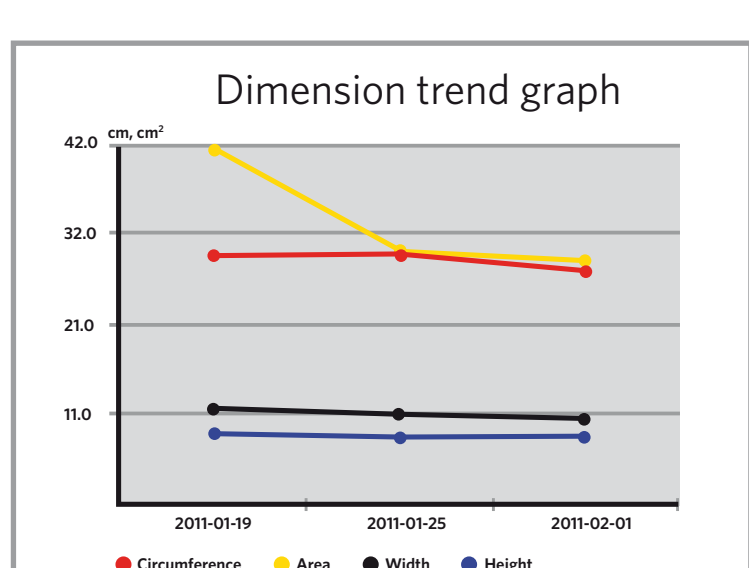


Figure 6

Fig 5: Demonstrates the increase in granulation tissue
Fig 6: Indicates reduction in wound size

Patient 4



Image 7



Image 8

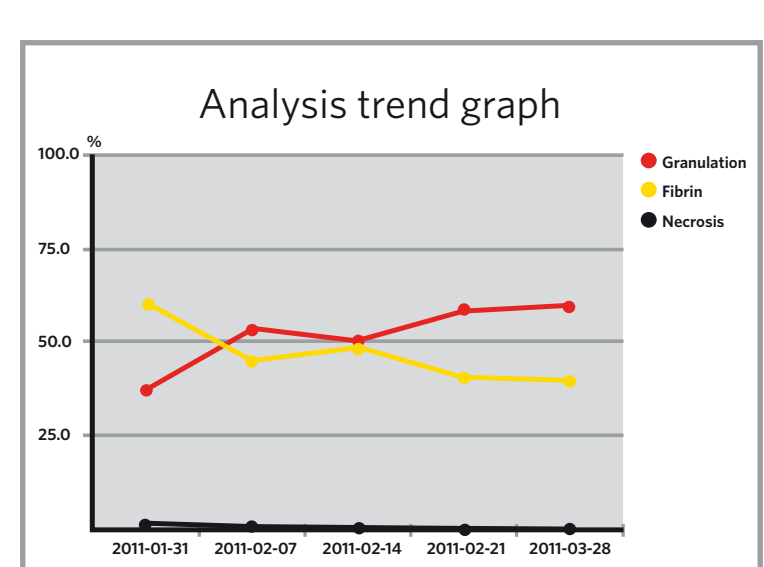


Figure 7

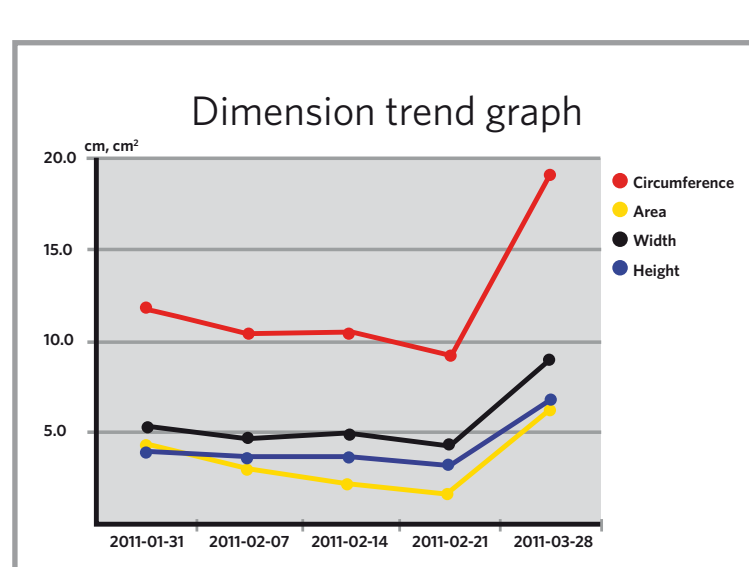


Figure 8

Fig 7 and 8: Demonstrates reduction in fibrous tissue

BACKGROUND

Topical oxygen has been used for a number of years to promote wound healing in hard to heal wounds. Recent studies suggest that it contributes to angiogenesis, extra-cellular matrix development and cell-motility within the wound healing process.¹

An evaluation of topical oxygen therapy was undertaken on a range of complex surgical wounds, which included post-mastectomy wounds which had dehisced following surgery. Pure humidified oxygen was generated in a small portable device, which was then delivered to the wound bed through a fine tube which connected into a specially adapted adhesive foam dressing. The device was powered by a small battery which was changed when required.

The patients could be treated as out-patients as the device was simple to use and light to carry, allowing them to maintain their activities of daily living. They could disconnect and reconnect the device for showering, there was no noise to disturb normal sleep patterns, and it was easy to use so that patients could be self caring.

AIM

The aim of the evaluation was to observe the use of topical oxygen therapy on 5 female patients who were referred to the Wound Care Service after developing wound complications post-mastectomy, and whose wounds were not progressing with advanced wound care dressings.

METHOD

Once the ladies had given consent to treatment, the topical oxygen therapy was commenced. They were educated on the use of the device and how to change the dressings. The patients attended the out-patient clinic for weekly dressing changes and assessment of wound progress - any additional dressing changes were undertaken by themselves or their partners without any problem.

The outcome of the evaluation included:-

- Assessment of wound progression through the use of digital photography and specialist wound measurement soft ware which demonstrated the reduction in wound size (Dimension Trend Graph) and an analysis of tissue type (Analysis Trend Graph) over the evaluation period.
- Patient satisfaction - comfort during wear, ease of use.
- The Clinician's opinion on the condition of the wound and the ease use of the device.

RESULTS

The wounds improved dramatically with the topical oxygen therapy in all 5 patients. It was observed that there was an initial increase in exudate and the development of healthy granulation tissue in the wound bed, which then progressed to closure. The progress of four patients is demonstrated in Images 1 - 8.

OUTCOMES

Patient 1

Patient 1 was a 50 year old female who had undergone a mastectomy for breast cancer one year previously. She initially had breast reconstruction surgery, but the implant was removed after the wound became infected and broke down. Further reconstructive surgery was undertaken, which resulted in wound dehiscence following a wound infection. This was treated initially with Negative Pressure Wound Therapy.

During the previous 6 months this lady had been readmitted to hospital and treated for repeated wound infections. She was extremely anxious at the length of time that the wound was taking to heal, and the impact of a continuously leaking wound was having a negative impact on her quality of life.

Prior to the application of the topical oxygen therapy, the wound measured 2.5 cm x 1.5 cm, and was 4cm deep with the wound bed containing 100% granulation tissue. At the time of the assessment (Image 1), an antimicrobial foam dressing was used to prevent further infection in the wound which was assessed as not improving. Treatment with topical oxygen therapy was started on the 25.10.2010. The patient attended the out-patient clinic weekly for re-assessment of the wound, where the topical oxygen was discontinued on the 20.12.2010 (Image 2). This went on to heal with a non adherent dressing in the next week.

Patient 2

Patient 2 was a 64 year old lady who had a dehisced surgical wound following breast surgery for cancer. The wound was static, despite the application of a nanocrystalline silver dressing used under an adhesive foam for almost 3 weeks. On assessment the wound measured 9cm x 3 cm and was 2cm deep (Image 3), with sloughy tissue in the wound bed. The aim of the therapy was to encourage autolysis of the devitalised tissue, which was a focus for infection in an area of the body where other forms of debridement were difficult or unacceptable to the patient.

The treatment with topical oxygen therapy was commenced on 14.1.2011, with an immediate improvement noticed at three days. The therapy was discontinued on the 28.02.2011 (Image 4) when the wound measured 3cm x 0.5 cm and was 0.3cm depth. The wound progressed to healing with a hydrocellular foam dressing.

Patient 3

Patient 3 was a 57 year old lady who had a mastectomy and muscle flap reconstruction and prosthetic implant following a diagnosis of cancer. Unfortunately the wound became infected resulting in the prosthesis being removed. The patient was extremely anxious for the wound to heal quickly. An assessment of the wound on the 19.1.2011 observed the wound to measure 12cm x 6cm (Image 5). The wound bed looked unhealthy and contained 75% granulation tissue and 25% slough (Image 5) the topical oxygen therapy was commenced with immediate improvement. The therapy was discontinued on the 8.2.2011 (Image 6), as the nursing team decided that the wound was healthy enough to continue with Advanced Wound Care Dressings. Ongoing management was then undertaken by the Community Nurses.

Patient 4

Patient 4 was a 70 year old lady who had surgery for breast cancer. This wound was a challenge in that because of the aggressiveness of the disease, she was also treated with radiotherapy and chemotherapy immediately after her mastectomy, which resulted in the wound site breaking down. After initial treatment with Negative Pressure Wound Therapy, the wound developed an area of hard leathery tissue which progressed down to the chest wall in a wound which measured 5.5cm x 2cm (Image 7). The aim of topical oxygen therapy was to gently rehydrate and remove this while encouraging the development of healthy granulation tissue. This was commenced on the 8.3.2011.

To date, the wound continues to progress (Image 8). The patient is extremely comfortable, and the wound has reduced to 3cm x 1.5 cm.

Patient 5

Patient 5 was a 68 year old lady who had previously had a mastectomy for breast cancer. The patient had been self treating the wounds which were discovered at a routine check up at the Breast Clinic. The two small wounds were re-assessed on the 16.3.2011 and measured (1cm x 1cm x 3cm deep: 2cm x 0.5cm deep). The wounds were exuding small amounts of exudate, the predominant tissue in the wound bed was granulation tissue, but the wounds were not progressing to healing. Topical oxygen therapy was commenced. The wounds were fully healed on the 16.4.2011.

DISCUSSION

This small evaluation suggests that topical oxygen therapy may be used in stimulating healing in "non healing" complex surgical wounds. Within this small cohort of patients the use of this therapy was successful, both in promoting healing and improving the quality of life in a group of very anxious females. It can also be introduced to promote autolysis of sloughy tissue prior to promoting wound healing. The evidence to date is promising, although this is a small preliminary evaluation. A larger controlled study is necessary to provide further information on this therapy.

REFERENCE

- Gordillo M. Sen C. (2003) Revisiting the essential role of oxygen in healing. The American Journal of Surgery. Vol.186, Issue 3. pp259-263