

# The use of negative pressure wound therapy in a non-healing breast wound

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## ABSTRACT

Delayed wound healing contributes to extended length of stay in health care facilities, increased costs for both the patient and the health care facility and impacts on the patient's quality of life. Barriers to wound healing include concomitant factors such as smoking, poor general health, poor nutritional status and the occurrence of infection. While the use of antibiotics and management of other factors may improve the rate of wound healing, non-responsive wounds prove to be challenging and benefit from timely adjuvant treatments such as negative pressure wound therapy (NPWT) to accelerate the healing process.

*Keywords: wound, dehiscence, negative pressure, dressing, healing.*

## INTRODUCTION

This case study describes the effect of negative pressure wound therapy (NPWT) on a non-healing breast wound and exemplifies the benefits of accelerated wound healing for both the patient and the health care organisation.

## BACKGROUND

This report involves a 57-year-old lady diagnosed with breast cancer following a routine mammogram. She was admitted to hospital for a wide local excision, mastectomy and sentinel node biopsy. The patient's medical history included hypertension, repair of bladder prolapse, hysterectomy and chronic back pain. The postoperative recovery period was uncomplicated. The patient was discharged on day two post-surgery but was readmitted six days after surgery with

a wound infection. Despite the presence of infection, the patient was afebrile and systemically well throughout her admission. NPWT was commenced eight weeks after the primary surgery. The wound subsequently healed four weeks after commencing NPWT.

## POSTOPERATIVE WOUND MANAGEMENT

Following the initial wide local incision and mastectomy, the presence of infection became evident by the sixth postoperative day. There was a moderate amount of haemoserous exudate with mild odour and the surgeon requested the application of a paraffin-gauze dressing. By the ninth postoperative day, the wound had dehisced and measured 20 mm in length x 10 mm wide to a depth of 15 mm. The wound bed comprised 25% slough and 75% granulation tissue with a purulent exudate. The surgeon inserted a needleless butterfly canula tube through the nipple suture line for wound irrigation and a referral was made to the dietitian to assess and improve nutritional intake in order to promote wound healing.

On the tenth postoperative day the wound was black in colour and the medial aspect had enlarged to 40 mm x 15 mm. The wound edges were pink and without exudate. The distal end was sloughy with a purulent exudate. The wound was dressed with a fibre rope dressing (Aquacel®) to debride the wound without damaging newly formed tissue<sup>1</sup> and a drain was inserted by the surgeon at the bedside.

By the fifteenth postoperative day, the wound dimensions had increased to 100 mm x 50 mm wide x 50 mm deep. The wound bed was covered in slough, so Prontosan® antiseptic gel was applied to assist with the removal of slough and exudate<sup>2</sup>. The wound was then packed lightly with Aquacel® and covered with an absorbent dry dressing. The wound care nurse advised that the wound would benefit from the use of NPWT but the surgeon was resistant to the idea.

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One week after commencing Prontosan® gel and Aquacel® rope (day 23), the patient returned to theatre for debridement of the wound. The wound was left open and dressings continued. Again, NPWT was discussed between the surgeon and the wound care nurse, but not applied. Intravenous (IV) flucloxacillin, which is a penicillin antibiotic<sup>3</sup>, was commenced. Four weeks postoperatively, a repeat mammoplasty was performed, with oral ciprofloxacin<sup>4</sup> prescribed postoperatively. The patient returned to theatre again on day 30 for closure of the lateral end of the wound and insertion of three Yeates drains to the distal aspect of the suture line. The medial aspect of the wound was left open, to which the surgeon requested insertion of calcium alginate packing. Unfortunately, further wound breakdown and infection developed around the medial inferior aspect of the wound.

On day 37 the drains were removed and antibiotics were ceased. The surgeon requested the continuance of calcium alginate wound packing. On day 42, the patient was reviewed by the microbiologist, by which time the lateral aspect of the wound was clean and had healed. The medial edges, however, had dehisced, with evidence of slough and soft tissue inflammation. Wound swabs grew *Pseudomonas aeruginosa*, *Staphylococcus lugdunensis* and enterococcus. The surgeon requested Aquacel® dressings and the patient was commenced on IV Tazocin, a penicillin antibiotic containing a beta-lactamase inhibitor<sup>3,4</sup>; and oral ciprofloxacin. The wound was scheduled to be reviewed again three to four days after commencement of these antibiotics.

### NPWT

Seven weeks after the initial breast surgery, the patient was reviewed by a second surgical consultant who suggested the use of NPWT. This consultant further discussed the case with a microbiologist who concurred with the consultant's preference for using NPWT. The tension suture in the medial aspect of the wound was removed and further debridement of slough ensued over the period of a week (Figure 1).



Figure 1: Seven weeks post-surgery — prior to removal of tension suture and debridement

NPWT commenced eight weeks after the initial surgery. A gauze dressing was applied. The patient was educated on how to manage the negative pressure device and was provided with product information should trouble-shooting be necessary. The patient was discharged the following day with home nursing services for ongoing wound management.

### WOUND ASSESSMENT POST-HOSPITAL DISCHARGE

One week after commencing NPWT, the wound had halved in size and measured 50 mm long, 30 mm wide and 45 mm deep. There was a small amount of slough, which was becoming less adhesive. Within two weeks of commencing NPWT, the wound dimensions had decreased to 30 mm long x 23 mm wide x 40 mm deep (Figure 2). The gauze dressing was ceased and a more simplified PICO™ single-use NPWT dressing was applied, with a wick situated in the wound. At four weeks post-commencement of NPWT the PICO™ was ceased (Figure 3).



Figure 2: Two weeks after commencing NPWT



Figure 3: Cessation of PICO NPWT

This patient had spent eight weeks in hospital with a non-healing wound. However, wound healing accelerated once NPWT was applied and the patient was able to be discharged, with complete wound healing occurring within six weeks of commencing NPWT (Figure 4). The patient has since commenced chemotherapy treatment post-surgery.



Figure 4: Six weeks post-commencement of NPWT, the wound was healed

## DISCUSSION

While existing evidence supports the use of advanced wound care practices in non-healing wounds such as dehiscent surgical wounds and diabetic foot ulcers<sup>2,5,6</sup>, practices such as NPWT have not traditionally been considered for management of tissue breakdown post-breast surgery<sup>7</sup>. To improve quality of life for women who have had a mastectomy, the goal of treatment has progressed from tumour removal to include planning for reconstructive surgery<sup>7</sup>. While there is a risk of wound breakdown with all surgical wounds, preservation of viable breast tissue is paramount for women who are considering reconstructive surgery at a later stage. More recent studies describing the use of NPWT for non-healing breast wounds<sup>7,8</sup> suggest this therapy is particularly beneficial to meet this goal. NPWT promotes rapid healing and preserves breast tissue in order to expedite necessary secondary treatments such as chemotherapy and breast reconstruction.

Although many clinicians are aware of treatment modalities for managing breast cancer, they may be unaware of treatments to promote wound healing<sup>7</sup>. The patient's surgeon in this case study repeatedly chose not to commence NPWT and did not provide the reasons for his decision. His surprise at the rate of wound healing was obvious and may indicate that he was unaware of current innovative wound healing measures such as NPWT. This evidence should be used by specialist wound nurses to encourage all clinicians to consider the use of such measures to promote wound healing and improve patient outcomes and experience.

## SUMMARY

Extended length of stay not only burdens health care facilities in terms of cost and bed-days, but also impacts on the patient's quality of life. Additionally, wound healing can potentially delay essential secondary treatments for breast cancer such as chemotherapy and breast reconstruction. This case study supports existing evidence that NPWT is a cost-effective means of accelerating wound healing and liberating hospital beds through reduced length of stay. When applied in a timely manner, NPWT improves quality of life by managing complications related to delayed wound healing; enabling early discharge and treatment in the home; and by reducing the number of dressings required per day<sup>2</sup>. Further, this study adds to the growing body of evidence supporting the use of NPWT in managing post-mastectomy wound breakdown and improves the opportunity for better quality of life for breast cancer sufferers.

## ETHICS APPROVAL

Low-risk ethical approval was obtained from the study hospital's Human Research Ethics Committee in accordance with the National Statement on Ethical Conduct in Human Research<sup>9</sup>. Written consent was obtained from the patient for the use of photography to illustrate wound progress.

## CONFLICTS OF INTEREST

There are no conflicts of interests.

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