# Managing Residual Limb Wounds With Elevated Vacuum: A Case Report

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## INTRODUCTION

In the past few years, negative pressure systems have become more accepted in assisting the wound healing process. Recent research studies have been completed to verify the positive effects of the vacuum healing method. Mirza et al. completed a study with 58 subjects that verified the effects of negative pressure healing difficult wounds (Mirza, 2011). Amputees often struggle with wound healing, and there are few options for treatment. Elevated vacuum can create negative pressure within the amputee's socket, allowing patients to stay in their prosthesis while healing (Beil, 2002). This case study provides evidence that elevated vacuum can help heal wounds in amputees; this hypothesis was tested by tracking the surface area of wounds over a period of time.

## METHOD

*Subjects*: Three transtibial amputees were involved in this study (Age 64.67 ± 7.33 years; 2 left and 1 right; and mass 213 ± 47 pounds; 2 diabetics). Each subject had a wound present on their distal end and was using the elevated vacuum.

*Apparatus*: The surface area of the wound was tracked over a period of time using the image processing software, ImageJ (164 ± 52 days).

*Procedures*: A picture of the wound was taken at each patient's appointment. The picture was a direct shot and had a ruler above or below the wound (14.67±6.33 pictures of each subject). The area was calculated twice by two researchers and the mean was used for data tracking.

*Data Analysis*: The ImageJ software allows surface area to be calculated. The data was recorded to track the surface area changes. A paired t test was used to calculate the P value to determine the statistical significance.

## RESULTS

The three subjects were able to continue activities of daily living by using elevated vacuum. The surface area of the wound reduced over time as shown in table 1. Two of the patients were able to close their wound completely while one reduced drastically in size. The first subject was able to completely close the wound after 187 days. The second subject had considerable changes by reducing the size by 96.6% in 112 days. The last subject's wound had complete closure after 193 days. These results are statistically significant with a P value equalling .0165.

| Participant | Days Tracking the wound | Start Surface Area in $cm^2$ | Last Surface Area in $cm^2$ |
|---|---|---|---|
| 1 | 187 | 1.551 | 0 |
| 2 | 112 | 2.397 | .081 |
| 3 | 193 | 2.411 | 0 |

Table1. Chart of patient progress.

## DISCUSSION AND CONCLUSION

The data collected offers support that amputees can heal their wounds while continuing prosthetic use. This is extremely important as it allows amputees to maintain their activities of daily living, which in the past was not possible. One suspected setback was the healing process may have been prolonged due to noncompliance with the patients. A compliant patient may have a shorter time during the healing process. This study verifies that patients with a wound are able to remain active in their socket during the healing process when using elevated vacuum.

## REFERENCES

Mirza et al. Eur J Plast Surg 2011; 34: 161-166
Beil et al. JRRD 2002; 39: 693-700

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