ABSTRACT: The purpose of this case study was to determine the therapeutic effect of tension on the healing of an open pressure sore. An in-patient of the Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife, Nigeria was chosen for the study. The patient had paraplegia secondary to Burkitt’s lymphoma and subsequently developed pressure ulcers on the sacrum and right ischium. The right ischial ulcer was randomly chosen as experimental and the other ulcer as the control. Tension therapy was administered to the experimental ulcer for 20 minutes for four days a week. This was achieved by applying passive mobilization exercises to the right hip joint. The tension was maintained for about 5 minutes and released for 1 minute. The process was repeated 4 times per treatment session. The control wound did not receive tension therapy. Both the experimental and control ulcers received conventional dressing. The study lasted for five weeks. The experimental sore reduced to 60.5% of the original surface area while the control ulcer did not show any appreciable healing but rather expanded by 19.6% of its original size. This finding indicates that tension therapy could be effectively used to accelerate healing of pressure ulcers.

KEY WORDS: PRESSURE ULCER, TENSION, PHYSIOTHERAPY.
Treatment Evaluation

The surface area of the wound was determined by the planimetric method. Cellophane sheets were first washed in a disinfectant and dried. The sheets were then sterilized by exposing both surfaces of each to high intensity ultra-violet rays for ten minutes at a distance of 50cm. The first sheet was spread over the ulcer. The second sheet was spread on top of the first sheet. The surface of the wound was traced with a marker by an observer who was blinded to the experimental procedure. The sheet, which was in contact with the wound, was discarded while the upper sheet was kept as a record of the surface area of the wound. The outline was transferred to metric graph paper. The area under the tracing was estimated by counting the number of small squares enclosed within the tracing. The surface area of the wound was then calculated from the following formula (Bohannon and Pfiffer 1993).

\[
\text{Wound Surface Area (cm}^2\) = \text{number of squares within the tracing } \times 0.0625\text{cm}^2
\]

RESULTS

At the end of the first week the experimental sore on the right ischial tuberosity and the control pressure sore on the sacrum were discharging pus. The edges of both wounds were raised; granulation tissue was only noticed at the edges. The outline of both wounds was traced (Figure 1).

By the end of the second week, pus discharge was drastically reduced on the experimental sore, the raised edges were flattened and the previously hollowed crater was level with the skin. There was increased proliferation of scar tissue around the periphery of the experimental sore. In the control sore, there was continuous pus discharge and soaking of the gauze used to cover the ulcer. There was an increase in the ulcer size. The edges remained raised and the crater was hollowed.

In the fourth week, the experimental sore was clean and nearly closed up. There was moderate discharge in the control ulcer but no obvious healing had taken place (Table 1).

The experimental ulcer healed up to 60.5% of the initial surface area while the control expanded by 19.6% of the initial surface area. The patient then asked for his discharge on the grounds of financial constraint.

DISCUSSION

The primary purpose of this study was to determine the therapeutic effect of tension on the healing of pressure ulcers. After the application of tension therapy for a period of 5 weeks, the experimental ulcer healed up to 60.5% of the initial size at an average healing rate of 12.1% per week. During the same period, the control ulcer increased by 19.6% of the original size.

The result of this study supports the work of Goldstein et al (1996) who successfully used tension therapy to treat surgically repaired pressure ulcers. Ger (1996) also used constant tension approximation devices to treat various wounds and ulcers having different aetiologies; diabetes; posttraumatic, iatrogenic causes, neuropathic; pressure sores, and collagen disease. Mason and Allen (1991) reported that when tissue is kept absolutely immobile, the resultant fibrous repair is weak, because absence of natural forces on the healing tissues causes collagen to be laid down haphazardly. It may be plentiful, but it is poorly engineered. Tension therapy therefore,
## Table 1: Percentage changes in surface areas of the experimental and control ulcers.

<table>
<thead>
<tr>
<th>Weeks</th>
<th>Surface Area (cm²)</th>
<th>Percentage Reduction</th>
<th>Surface Area (cm²)</th>
<th>Percentage Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11.9</td>
<td>0.0</td>
<td>18.8</td>
<td>0.0</td>
</tr>
<tr>
<td>2</td>
<td>7.6</td>
<td>36.1</td>
<td>21.3</td>
<td>-13.3</td>
</tr>
<tr>
<td>3</td>
<td>6.5</td>
<td>45.4</td>
<td>23.5</td>
<td>-25.0</td>
</tr>
<tr>
<td>4</td>
<td>5.8</td>
<td>51.3</td>
<td>22.8</td>
<td>-20.7</td>
</tr>
<tr>
<td>5</td>
<td>4.7</td>
<td>60.5</td>
<td>22.5</td>
<td>-19.6</td>
</tr>
</tbody>
</table>

Figure 1: Weekly tracings of experimental and control ulcers surface area.

Experimental ulcer

Control ulcer

Week 1

Week 2

Week 3

Week 4

Week 5

Week 1

Week 2

Week 3

Week 4

Week 5

helps the collagen to be arranged properly for healing to take place.

Fibrous healing is stronger if natural movements are encouraged. Gentle normal movements provide natural tension in the healing tissues and the resulting fibrous healing is much stronger. Intermittent tension causes collagen tissue to increase in thickness and strength. Lack of loading or tension of ligaments after immobilization however, decreases their strength and ability to absorb energy (Mason and Allen, 1991).

The improved healing rate of the pressure ulcer observed in this study might be attributed to the drugs administered to the patient, however, the patient had been on the drugs for five months before the commencement of the study and the ulcer had shown little tendency to heal within that period. It is therefore conceivable that the application of tension therapy may have accelerated the healing of the experimental ulcer.

**CONCLUSION**

The result of this study revealed an increase in the healing rate of a pressure ulcer following tension therapy in paraplegia secondary to Burkitt’s lymphoma. While our findings provide a rational base for recommending tension therapy in the clinical setting, the external validity is limited because a single subject design was used. Further studies with different causes of pressure ulcers are thus warranted. Based on the findings of our study, we recommend further studies using this technique.

**REFERENCES**


All correspondence to the editor must be addressed to:
Prof CJ Eales - Editor SASP Journal,
School of Therapeutic Sciences, Faculty of Health Sciences,
7 York Road, Parktown 2193
E-mail: ealescj@therapy.wits.ac.za, garstanglm@therapy.wits.ac.za