

EFFECT OF TENSION THERAPY IN THE MANAGEMENT OF PRESSURE ULCERS - A CASE REPORT

Obafemi Awolowo University Teaching Hospital Complex, Ile-Ife, Nigeria.

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.*

ADEDOYIN AR, MSc (PT),
OLAOGUN MOB,
MSc (PT; MS (Kinesiology)),
OMOJOLA OF, BMR (PT),
ADENEKAN MK, BMR (PT).

KEY WORDS: PRESSURE ULCER, TENSION, PHYSIOTHERAPY.

INTRODUCTION

A pressure ulcer is defined as an ulceration of skin and deeper tissues due to unrelieved pressure, shear force(s) and frictional forces (Crenshaw and Vistness 1989). Other factors contributing to pressure ulcer occurrence include paralysis and sensory loss. Soft tissue atrophy, increased age, poor diet, smoking, anaemia, vitamin deficiency, hypoproteinaemia have been identified as predisposing factors of pressure ulcers (Constable and Pierce 1979).

Pressure ulcers have been studied widely (Delisa and Mikulic, 1985; Crenshaw and Vistness 1989). In a retrospective study of spinal cord injuries, it was found that 60% of patients having complete cervical cord injury developed a pressure ulcer.

The occurrence among geriatric patients increases as age exceeds 65 years. Pressure ulcers also occur in chronically ill and immobile patients. A higher incidence among men than women (ratio 6:1) has been reported (Crenshaw and Vistness 1989).

Pressure ulcers have been classified into grades, according to the severity of tissue damage (Delisa and Mikulic 1985).

- **Grade 1** - skin area with erythaema or induration overlying a bony prominence.
- **Grade 2** - A superficial ulceration that extends into the dermis.
- **Grade 3** - An ulcer that extends into the subcutaneous tissue but not into muscle.
- **Grade 4** - Deep ulceration that extends through muscular tissue down to the underlying bony prominence.
- **Grade 5** - An extensive ulcer with widespread extension along bursae into joints or body cavities e.g. rectum, intestine, vagina or bladder.

The expected healing rate is partially related to severity of tissue damage. Conservative management of established

pressure sores involves control of skin maceration, correction of nutritional deficiencies, removal of necrotic tissue, control of infection and encouragement of soft tissue repair (David et al 1981)

Physiotherapists use various modalities in treating pressure ulcers. These include, electrical stimulation; infra-red ray therapy; short-wave diathermy; ultra-violet radiation; ultrasound; hydrotherapy, contrast baths; laser therapy and iontophoresis. Most of these methods require equipment that is expensive and may require special skills to operate. The use of tension in the treatment of some conditions is not new (Mason and Allen, 1991). Tension is used in the treatment of some medical and orthopaedic conditions. However, little attention has been given to its use in wound healing. Considering the economic impact of pressure sores, greater attention should be given to cost-effectiveness and clinically effective modalities. For instance, the projected cost per year of treatment of early occurring pressure ulcers in patients with spinal cord injuries was estimated to be \$66 million in the United State of America (Griffin et al 1991).

CORRESPONDENCE TO:

Adesoji Rufus Adedoyin
Department of Medical Rehabilitation,
Obafemi Awolowo University,
Ile-Ife,
Nigeria.
e-mail: radedoyi@yahoo.com

Taber (1988) defines tension as the process or act of stretching or a state of being strained or stretched. Goldstein et al (1996) exposed a surgically repaired pressure ulcer in the perineal region to some degree of sustained tensional force for a reasonable length of time through the use of passive mobilization exercises. The sore was reported to be completely healed after a few weeks of tension therapy. It has not been shown whether non-surgically repaired pressure ulcers will respond to tension therapy in the same way as surgically repaired pressure ulcers. The purpose of this study therefore, was to test the efficacy of tension therapy in the treatment of non-surgically repaired pressure ulcers.

PATIENT'S CLINICAL HISTORY

T.A. is a 15 years old secondary school boy. The patient noticed a swelling of his left upper jaw in May 1997. He was first treated locally by a traditional healer but without obvious improvement.

The patient arrived at Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife, Nigeria in the first week of June 1997. He was diagnosed with Burkitt's lymphoma with central nervous system metastasis. He presented with paraplegia, faecal and urinary incontinence. Cytotoxic drugs such as cyclophosphamide, 40-60 mg/day intramuscular injections were administered by the consultant physician. Methotrexate was administered intrathecally to control the cancerous growth and the patient was also placed on antibiotic therapy.

Physical Examination

The case file of the patient was reviewed and a full physical examination was carried out. He was dehydrated and ill-looking. He had developed grade 3 pressure ulcers on his ischium and greater trochanter. Both wounds were discharging pus. The edges were raised and hollowed craters were evident. There was flaccid paralysis of both lower limbs with atrophy of the muscles and trophic skin.

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 Pfaller 1993).

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

TREATMENT

The patient signed an informed consent form and the research protocol was approved before the commencement of this study.

The experimental wound was given tensional force. Tension therapy was administered using the procedure of Goldstein et al (1996). This was done by passive mobilization exercises carried out at the joint closest to the pressure ulcer. i.e. the right hip joint. A perpendicular non-destructive force was transmitted to the periphery of the wound until a significant stretch and blanching was noticed. The tension was maintained for 5 minutes and then released for one minute. The process was repeated for 4 times per treatment session, which resulted in 20 minutes of tension therapy. The tension therapy was given 4 days in a week for a period of 5 weeks. The surface areas of the wounds were taken every week for 5 weeks. The control pressure sore received the usual management.

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

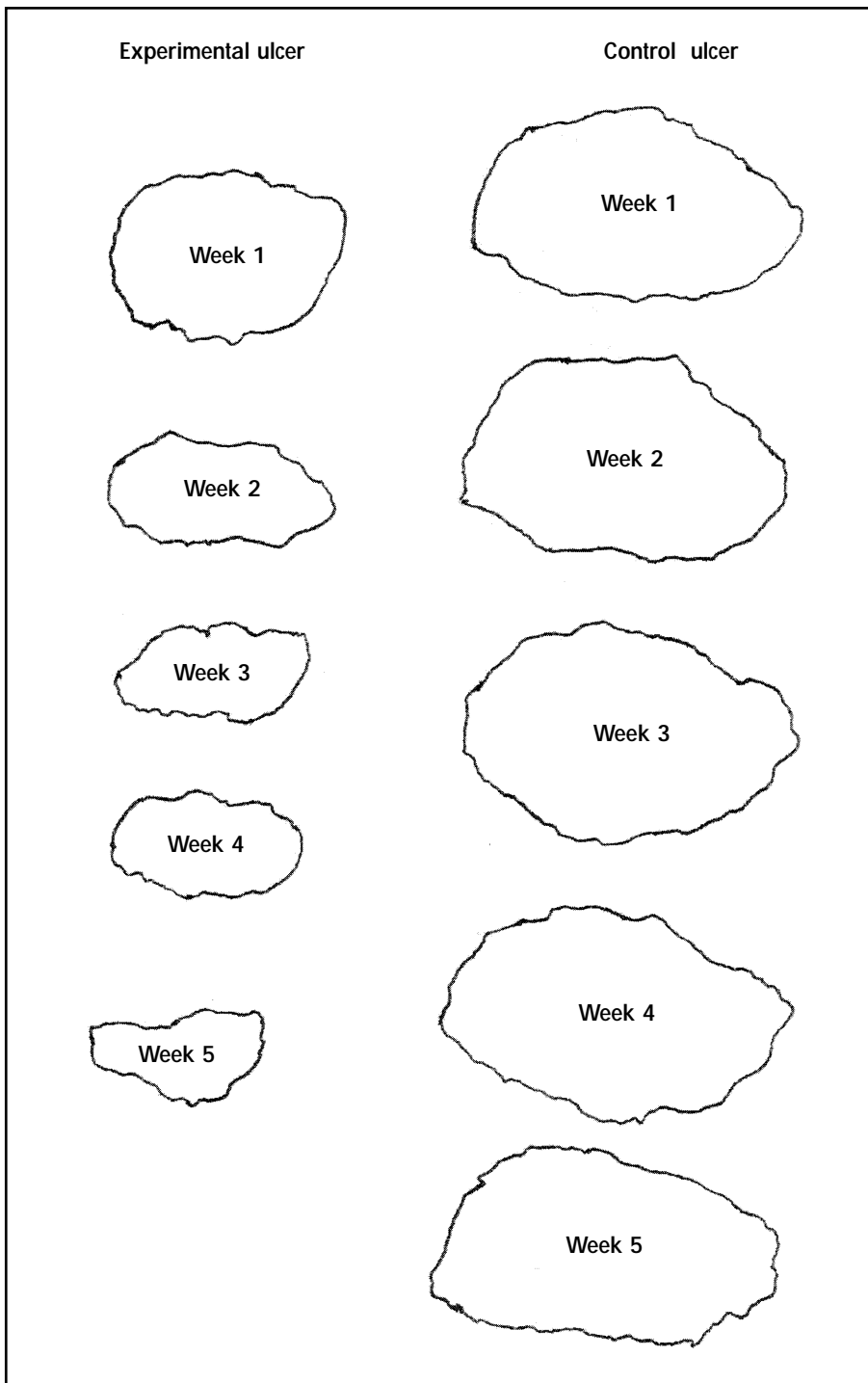
The primary purpose of this study was to determine the therapeutic effect of tension on the healing of pressure ulcers. After the application of tension therapy for a period of 5 weeks, the experimental ulcer healed up to 60.5% of the initial size at an average healing rate of 12.1% per week. During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

Weeks	Experimental Ulcer		Control Ulcer	
	Surface Area (cm ²)	Percentage Reduction	Surface Area (cm ²)	Percentage Increase
1	11.9	0.0	18.8	0.0
2	7.6	36.1	21.3	-13.3
3	6.5	45.4	23.5	-25.0
4	5.8	51.3	22.8	-20.7
5	4.7	60.5	22.5	-19.6

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



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

Bohannon RW, Ptfaller BA 1993 Documentation of wound surface area tracings of wound perimeter- Clinical report on 3 techniques. *Physical Therapy* 63:1622-1624.

Constable JD, Pierce DS 1979 Pressure sores. In Pierce DS, Wickel VH, eds. *Total care of spinal cord injuries*. Boston, Mass; Litle, Brown&Co.Inc.187-204.

Chrenshaw RP, Vistness LN 1989 A decade of pressure sore 1989: *Journal of Rehabilitation Research and Development* 26:63-74.

David RK, Priest DC, Wheatley DC 1981 Etiology factors in pressure sores: an experimental model. Archives Of Physical Medicine. Rehabilitation 62:492-497.

Delisa JA, Mikulic MA 1985 What to do if preventive management fails. Post Graduate Medicine 72:209 -220.

Ger R 1996 The use of external tissue expansion in the management of wounds and ulcers. Annals Of Plastic Surgery 38 (4): 352-357.

Goldstein B, Joan ES, Elizabeth B.1996 Pressure ulcers in spinal cord injury: Does tension stimulates wound healing? American Journal of Physical Medicine and Rehabilitation 75:130-133.

Griffin JW, Tooms RE, Mendius RA, Clift JK, Swaag RV, El-zeky F 1991 Efficacy of High voltage Pulse Current for Healing of Pressure ulcers in Patients with Spinal Cord Injury. Physical Therapy 71(6):433-442.

Mason ML, Allen HS 1991 The rate of healing of tendons: An experimental study of tensile strength. Annals of Surgery: 113:424-456.

Taber 1988 Tyler's Encyclopedia Medical Dictionary 6th edition F.A. Davis

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



JustPhysio introducing **Anton Shaw** with 10 years experience successfully recruiting locum physiotherapists to the UK

JustPhysio with extensive work opportunities throughout the UK, excellent rates of pay, conditions and full benefits package

Just call **Anton Shaw** on freephone
0800 990 946

justphysio

Lawford House, Albert Place, Finchley, London, N3 1QA, UK
Tel: +44 (0) 20 8371 3535 Fax: +44 (0) 20 8371 3530
email: anton.shaw@justphysio.co.uk
www.justphysio.co.uk



THINKING OF WORKING OVERSEAS?

Let us help **YOU** make it a reality! Opportunities for employment are increasing in New Zealand, Australia, Europe, USA and Canada.

Now is the perfect time to talk to our experienced **MATCH Group** consultants about work opportunities in your profession. With 8 independent brands, more than 15 years developing staffing solutions, **MATCH Group** is the UK's second largest healthcare staffing company.

Whether it is to enhance your career, travel the world, earn great money or a mix of all these things - the **MATCH Group** aims to offer something for everyone!

We look forward to hearing from interested

Social workers, Physiotherapists, Nurses, Doctors, Occupational Therapists, Radiographers, Speech Therapists, Audiologists, Pharmacists and Teachers.

Cape Town: 021 422 2895
Email: match.capetown@worldonline.co.za

MATCH GROUP 