

Case Report

A Single Case Report of Paraplegia with Sacral Pressure Ulcer Treated by Continuous Ultrasound Therapy

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Abstract

Pressure ulcers are important and common complications after paraplegia. The use of therapeutic ultrasound as an adjunct to wound healing has gained interest in recent years. An twenty five year old male reported with a two months history of a grade two, non healing, sacral pressure ulcer. Ultrasound therapy (UST) is simple, safe, without side effects, bedside procedure, inexpensive with positive wound healing results for difficult to treat non healing pressure sore. I hope that this article will encourage other wound care specialists to engage in further research in this area.

Keywords: Paraplegia, sacral pressure ulcer; continuous mode of ultrasound therapy; wound healing

INTRODUCTION

Pressure Ulcer, also called as Decubitus ulcers, was first seriously studied by “Jean- Martin Charcot”, a clinician in the 19th Century. [1-3] Pressure ulcer is a serious health issue, very painful, a significant physiological challenge, can shorten the life of patient, an emotional and financial burden to the patient. Pressure sore are important and common complications after paraplegia. An estimated 50–80% of individuals suffering from spinal cord injury develop pressure ulcer at least once in their life time. [4] Pressure ulcer are treated by using wound dressings, relieving pressure on the wound, Water beds/Alpha bed by treating concurrent conditions which may delay healing and by the use of physical therapy such as electrical stimulation, laser therapy and ultrasound. [1]

Ultrasound is now the most frequently used electrophysical agent worldwide, used at least daily for patient treatment by the majority of physiotherapists. [5] The aim of this study to investigate the effect of ultrasound therapy in sacral pressure ulcer with paraplegia. Limited clinical research is available and no consensus exists regarding the efficacy of ultrasound for treating pressure ulcer, particularly full thickness pressure ulcers.

CASE REPORT

A twenty five year old man presented with a two months history of a grade two, non healing sacral pressure ulcer. He was a farmer. He had history of fall from height. His past medical history, complete paralysis of both lower limbs, loss of sensation, urinary and bladder incontinence, loss of mobility and sacral pressure ulcer for past one month. His medical problems included spinal cord injury and severe depression. He has inability to walk since two months and was kept either in bed or carried in wheelchair.

He was diagnosed as a case of D11, and D12 wedge compression of spine with traumatic paraplegia (American spinal cord injury association impairment score: A- no motor or sensory function in the sacral segments) and sacral pressure ulcer. Five month back, he underwent placement of spinal fixation rods and plates from D11 to L1 level. A thoraco Lumbar-sacral corset was fabricated for him. Routine hematology and biochemistry investigations were within normal limits. He received antibiotics and vitamin supplements.

On physical examination, he is bed ridden and was unable to sit without support in the chair, had developed pressure ulcer over the sacrum. He has bedsore of 6.2 X 4.0 cm, the depth ranging from 10mm, grade II sacrum ulcer with necrotic slough according to European pressure ulcer Advisory panel (EPUAP) wound classification system (Figure 1). His albumin count 2.4 g/dL, haemoglobin 11.0 g/dL, temperature was 38 degree Celsius. There was no evidence of osteomyelitis. He was put on conservative treatment, consisting of water bed mattress, bed positioning, regular pressure relief, daily saline water dressing and appropriate antibiotics.

Outcomes

Wound measurements and digital photographs of wound beds were obtained weekly. Wound dimension monitored and depth measurements were obtained using a sterile, cotton-tip applicator and ruler. [6] Wound surface area was determined using Bates-Jenes wound assessment tool.

Treatment of Ultrasound Therapy

Continuous mode of ultrasound therapy (Electroson 709, Chennai) treatment was performed in sacral pressure ulcer region. The following protocols are applied: ultrasound machine with frequency of 3 MHz and spatial average intensity 0.8 w/cm² sound head, in conjunction with a coupling media of aquasonic ultrasound transmission gel was used. Ultrasound was applied to the outer surface, and edge of sacral ulcer region (Figure 2).

Before the treatment of CUS therapy, we splashed each wound by oxygen spray. Sacrum ulcer was cleaned using 2% hydrogen peroxide. The standard normal saline (NaCl) dressing was done. Ultrasound treatment time was 10 minutes per session 6 days a week, for six weeks. At the end of third week there was marked improvement in pressure ulcer i.e size, floor and wound margin reduced. There was no pus discharge after treatment (Figure 3). A healthy granulation tissue was noted. The patient made good progress and wound was completely healed within 42 days (Figure 4).

Table: 1 Parameter of Ultrasound therapy treatment [7]

- Ultrasound frequency: 3 MHz
- Spatial average temporal peak intensity: 0.8 W/cm²
- Pulse duration: 2 ms
- Duty factor: 0.2
- Spatial temporal average radiating surface area: 5.2 cm²
- Duration of treatment: 10 minutes per session for sacral pressure ulcer
- Duration of treatment: 6 weeks
- The indolent pressure ulcer, apart from routine therapy, continuous mode ultrasound therapy enhanced the healing of pressure ulcer in six weeks.

DISCUSSION

The purpose of the study was to assess the effect of ultrasound therapy in healing of sacrum pressure ulcer in patients with paraplegia. Infected sores heal more slowly than clean sores while no effect of ultrasound clean sores were observed ultrasound therapy appeared to improve the rate of healing of infected sores. It is non thermal effect produced by ultrasound that are most significant in the stimulation of tissue repair [8]

Paul et al [9] stated that ultrasound was effective in relieving congestion, cleansing necrotic areas and promoting healing with healthy, non-adherent skin approaching normal thickness. Cyclic vibration effect of ultrasound might induced a form of micro massage which by reducing edema, might facilitate repair, their requires further investigations. It is also stimulate protein synthesis

infact ultrasound initiates two processes which results in release of energy tissue: Surface cavitation (creation and dissipation of tiny bubbles in the tissues) and acoustic microstreaming that is movement of fluids along acoustic boundaries, such as cell membrane.

This biophysical effect that are non-thermal alternations in cellular protein synthesis and release, blood flow and vascular permeability, angiogenesis, and collagen content and alignment by various workers. It was quoted as follows: 1. General protein and collagen synthesis by fibroblasts 2. Fibroblast mobility 3. Fibroblast ultrastructure 4. Permeability of fibroblast membrane 5. Lysosomal fragility 6. Tensile strength and elasticity of scar tissue. 7. Modification of contraction in skin wounds.^[10]

With this parameters of ultrasound treatment (frequency 3 MHz, Intensity 0.8 W/cm², Pulse duration 2 ms, Duty cycle 0.2, effective radiating surface area 5.2 cm², Duration of treatment 10 minute per/session, Duration of frequency 6 weeks) pressure ulcer healed in time without side effects.

Our case study showed that continuous mode of ultrasound therapy treatment enhances healing of sacral pressure ulcer. This case study confirmed that continuous UST has a positive effect on pressure ulcer with paraplegia (Figure 4). No complications were observed with application of the continuous ultrasound. Further studies are needed to evaluate the efficacy of ultrasound therapy in pressure ulcers in spinal cord injury in a large number of patients.

CONCLUSION

Continuous mode of ultrasound therapy was effective in the treatment of patient with grade II pressure ulcer in paraplegic patient. Ultrasound therapy treatment of pressure ulcer is less expensive, more comfortable and can enhance wound healing process without side effects and complication. In my opinion without ultrasound therapy, it would have taken at least more than 100 to 120 days for complete healing of the ulcer.

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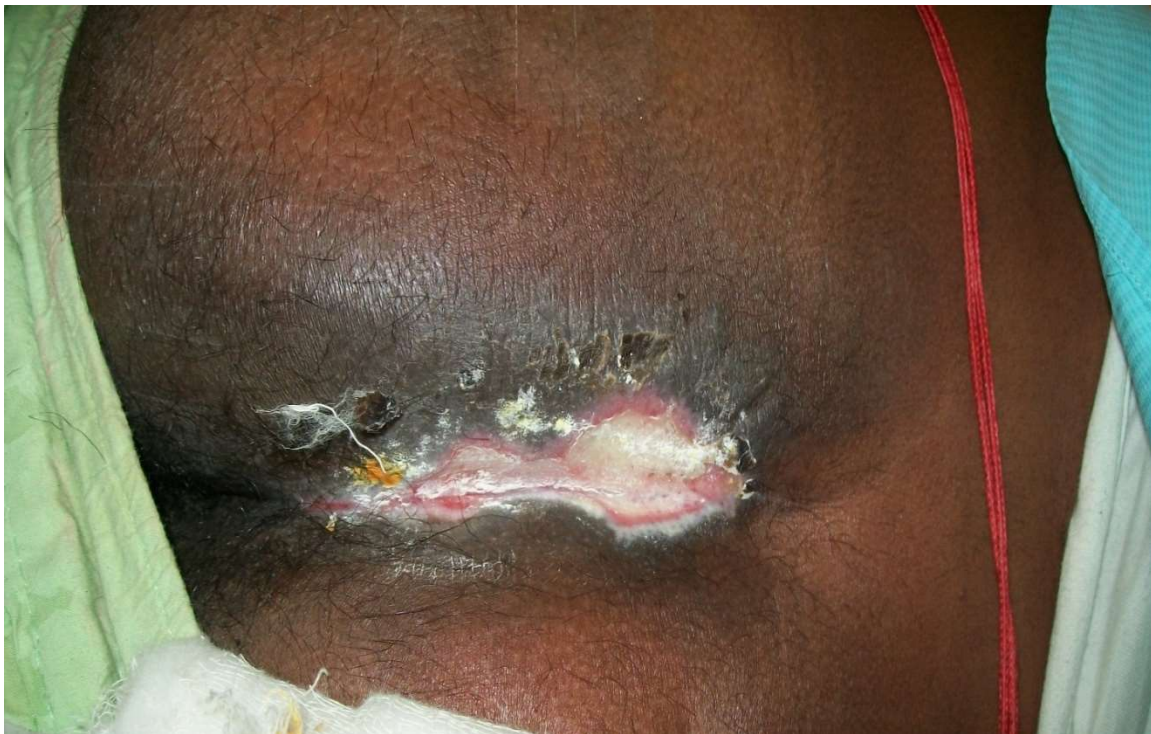
Figures:

Figure: 1 Before treatment, The sacral pressure ulcer presented as non- healing grade II pressure ulcer measuring 6.2 x 4.0 cm with erythema.



Figure: 2 The full thickness of sacral ulcer was treated with continuous mode ultrasound therapy



Fig: 3 Three weeks after the treatment of Continuous ultrasound therapy



Figure: 5 After six week of treatment, picture showing that sacral pressure ulcer are completely healed.