

## **Clinical Evidence Abstracts**

**Effective management of incision and cutaneous fistulae with closed suction wound drainage.** Mark E Chariker, MD Katherine F Jeter, Ed.D. ET Tess E Tintle, BSN ET, John E. Bottsford, Jr., M.D.

This paper discusses the development in the 1980's of a closed suction wound drainage system that is effective in collecting drainage from the most difficult sites, obviates skin damage, improves wound granulation and contraction and minimizes the dressing and nursing requirement and dramatically reduces the cost associated with wound management and containment.

**The Vacuum Effect in the surgical Treatment of Purulent Wounds.** Russian Journal, Vestnik Khirurgii, 1986, September Authors: B.M.Kostiuchenok, I.I Kolker, V.A.Karlov, S.N.Ignatenko, L.I.Muzykant, T.C.Samykina. Department of Wounds and Wound Infection (Prof.B.M.Kostiuchenok, Head), Laboratory of Microbiology and Immunology (Prof.B.M.Kolker, Head), Department of Pathological Anatomy (USSR AMS Academician D.S.Sarkisov) of the A.V.Vishnevsky USSR AMS Institute of Surgery, Moscow Russian Journal; Vestnik Khirurgii, 1986, September.

Vacuum treatment was used in 116 patients with purulent wounds It was established that the vacuum treatment of purulent wounds was effective but after surgical treatment. It considerably decreased the amount of microbes in wounds tissues, had no harmful effects and improved clinical results of healing the wounds after putting early sutures.

**Vacuum Therapy in the Treatment of Purulent Lactation Mastitis.** Russian Journal: Vestnik Khirurgii, 1986, September Authors; Prof. Yu.A.Davydov, Assistant Professor E.V.Malafeeva, A.P.Smirnov, Candidate of medical Science V.B.Flegontov Department of General Surgery ( Prof.Yu.A.Davydov, Head) , Yaroslavi Medical Institute.

Treatment of lactation mastitis in 1986 in Russia was a surgical challenge. Patients typically required long treatment times, repeated surgery and a high proportion suffered complications. Two groups of women were compared with respect to bacterial analysis, wound closure times and clinical observations. Group 1 of 123 patients underwent wide excision surgery, Group 2 of 106 patients had similar surgery with addition of insertion of a drainage tube and TNP. The results of Group 1 showed hospital stay of 17 days, total duration of treatment 46 days, repeated surgery required in 37% and septic complication in 10% compared to Group 2 shoed hospital stay of 8.5 days, total duration of treatment 19 days, repeated surgery required on 5% and there were no septic complications.

It was therefore found that TNP therapy significantly reduced healing times, reduced bacterial burden and normalised the immunological profile.

### **The Bacteriological and Cytological Assessment of vacuum Therapy of Purulent Wounds.**

Vestnik Khirurgii, 1988, October (pp. 48 -52) Authors; Yu.A.Davydov, A.B. Larichev, K.G.Menkov department of General Surgery (Prof.Yu.A.Davydov, Head), Yaroslavi Medical Institute.

The therapy outcomes of 438 patients were investigated. Comparisons were drawn between those who received TNP and those who did not. Group 1 had 212 patients who had surgical debridement plus a passive drain to the wound site, Group 2 had 226 patients who had surgical debridement and TNP. Therapy started the day after surgical debridement and continued for 1 hour per day for 6 days. Tissue biopsies were taken of the wounds and a number of bacteria and cytology were compared. The results showed that the patients in Group 1 had increased bacterial levels and prolonged inflammatory reaction compared to those patients in Group 2 which had a decrease in bacterial levels and a cytological profile indication of a healing wound. It was therefore shown that TNP therapy resulted in shorter inflammatory process, reduced bacterial levels and a faster wound closure.

**Active Wound Drainage.** Russian Journal: Vestnik Khirurgii, 1987, April (pg. 42 -44) Authors: Y.N.Usupov and MV.Yepifanov. Department of Clinical Surgery (Prof. M.I.Lytkin, Head) and department of general Surgery (Prof.I.G.Peregudov, Head), S.M.Kirov Military Medical Academy, Leningrad.

A series of animal and human studies were undertaken to identify the optimum duration and pressure setting for vacuum wound drainage. A device specifically developed for the experiments was used to maintain a constant pressure. 1616 clean and contaminated surgical wounds were evaluated. Clean wounds had negative pressure of -75mmHg to -80mmHg for 24 hours then reduced to -30mmHg to -40mmHg for the next 2 - 3 days. For infected wounds drainage was combined with irrigation with antiseptic and antibiotic solutions and continuous negative pressures of 30mmHg - 40mmHg. The results showed that optimum wound drainage occurred at a negative pressure of -75mmHg to -80mmHg. At levels greater than this ( -120mmHg to 160mmHg, the haemoglobin content of the exudates was found to increase, there was tissue oedema and splitting of muscle fibres. For all wounds, vacuum drainage compared to passive drainage resulted in significantly fewer complications.

### **Concepts for Clinical Biological Management of the Wound Process in the Treatment of Purulent Wounds Using Vacuum Therapy.**

Prof.Yu.A.davydov, Candidate of medical Science A.B.Larichev, A.Yu. Abramov, K.G.Menkov Department of General Surgery (prof. Yu.A.Davydov, Head), Yaroslavi Medical Institute Vestnik Khirurgii,1991.

This paper reviews the effects of vacuum therapy on purulent infected wounds following surgical debridement. Two groups of patients were compared. Group 1 of 406 patients had surgical excision and TNP therapy. Group 2 of 338 patients had surgical excision and a passive drainage followed.

The findings were Group 1 demonstrated better outcomes than group 2 on a number of levels. Decrease in wound exudates, a reduction in the acidity of the exudates, a reduction in wound bacterial levels, no requirement to use systemic antibiotics, an enhanced blood supply to the wound which lead to an increase in host immune response and an acceleration of the inflammatory phase of the wound healing process. The author was able to highlight the positive effect of TNP therapy on all aspects of wound healing following surgical debridement.

**Effects of Vacuum assisted closure therapy on inguinal wound edge micro vascular blood flow.** Wacenfors et al. Wound repair and regeneration Nov -Dec 2004

An analysis of micro vascular blood flow in experimental pig wounds in 7 animals undergoing negative pressure therapy was undertaken using laser Doppler considering tissue type and distance from wound edge. Negative pressures of between -50mmHg to -200mmHg were applied to the wound randomly using a foam interface dressing. Measurements took place from the wound edges subcutaneous. Intermittent treatment periods of negative pressure at -125mmHg were applied, to measure blood flow response.

Results showed that there was an increase in blood flow closer to the wound edge 1.5cms and 3cms. In the immediate proximity to the wound edge, blood flow was decreased in both vascular and subcutaneous tissues. When negative pressure was terminated, blood flow increased multifold, which may be due to reactive hyperaemia. In conclusion, negative therapy affects micro vascular blood flow to the wound edge and may thereby promote wound healing. A low negative pressure during treatment may be beneficial, especially in soft tissue, to minimise possible ischemic effects .

**Retrospective clinical evaluation of gauze-based negative pressure wound therapy** Campbell PE, Smith GS, Smith JM International Wound Journal 2008;5:280-286.

Negative pressure wound therapy (NPWT) is an established modality in the treatment of challenging wounds. However, most existing clinical evidence is derived from the use of open-cell polyurethane foam at -125 mmHg. Alternative negative pressure systems are becoming available, which use gauze at a pressure of -80 mmHg. This study describes clinical results from a retrospective non comparative analysis of 30 patients treated with Chariker-Jeter gauze-based negative pressure systems in a long-term care setting. The mean age of the patients was 72 years. The wounds consisted of chronic (n = 11), surgical dehiscence (n = 11) and surgical incision (n = 8). Wound volume and area were recorded at commencement and at the cessation of therapy. Discontinuation of therapy was instigated upon closure through secondary intention or when size and exudate were sufficiently reduced that the wounds could be managed by conventional wound dressing (median 41 days).

An overall median reduction in wound volume of 88.0% ( $P < 0.001$ ) and a 68.0% reduction in area ( $P < 0.001$ ) compared with baseline were observed over the course of NPWT. The overall rate of volume reduction (15.1% per week) compares favourably with published data from foam-based systems.

### **Negative pressure wound therapy using gauze or polyurethane open cell foam: similar effects on pressure transduction and wound contraction**

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The study looks at the effects of NPWT using polyurethane foam compared to that using gauze, regarding pressure transduction and wound contraction. 10 landrace pigs (70kgs) were used for the study. Round wounds were created measuring 5cms in diameter and 2cms in depth. The wounds were treated with NPWT on continuous pressure from 50 to 175mmHg at 25mmHg increments and treated with either gauze or polyurethane foam.

A custom built pressure gauge was used to measure the pressure at the wound bed. In conclusion it was found that gauze and foam are equally effective at delivering negative pressure to the wound. The major part of the contraction was observed when the negative pressure was increased from 0 to 50mmHg. Increasing the pressure above -50mmHg only resulted in minor further movement of the wound edge.

### **Using PHMB anti microbial to prevent wound infection.** Keith Moore, David Gray Wounds UK 2007.

Post-operative wound infections may result in delayed healing, extended hospital stay and increased costs. The increase in antibiotic-resistant bacteria mitigates against the prophylactic use of antibiotics. An effective alternative is the use of antiseptics that are less likely to generate resistance. AMD<sup>TM</sup> wound dressings use polyhexamethylene biguanide (PHMB) which has a low toxicity for wound cells and is effective in killing antibiotic-resistant bacteria. This paper reviews the evidence for the efficacy and cost-effectiveness of AMD dressings in the prevention of surgical site infections when routinely used in standard wound care protocols