

A pilot study on closed porcine incisions of a novel low-cost, solid-state NPWT device

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Background: Randomized studies have shown that Negative Pressure Wound Therapy applied to closed incisions (iNPWT) reduces surgical site infection (SSI) or surgical site complications (SSC), by around 50%.¹ However, the expense of single-use electromechanical pumps (EMP) (US\$250-500) may limit the cost effectiveness of iNPWT.²⁻³ This pilot study tested a novel, low-cost-of-manufacture, non-electrical device that uses solid-state oxygen management technology (OxMT) to create and sustain a vacuum in an iNPWT dressing.

Methods: The study was conducted in pigs (n=2) using 12 stapled incision wounds (38mm long, 10mm depth) per animal. All wounds were covered with the same (pre-weighed) iNPWT dressing (length 5cm) connected either to the OxST device or a conventional EMP. Wounds (3) were harvested for each of the OxMT and EMP systems on days 1, 3, 5 and 7 for: total bacterial burden, H&E histology and exudate handling. Pressure sensors were connected to each of the (12) OxMT dressings.

Results: Over the duration of the study mean negative pressure across all OxMT dressings was -81.1 mmHg (n=9, lost 3 sensors). Exudate in the iNPWT dressings was minimal (mean 0.3015 mL n=24). Histological analysis was similar for new epithelial growth, epithelial thickness, white cell infiltration, granulation tissue and angiogenesis. Total bacterial counts for the OxMT treated wounds were significantly lower over the 7 days than the EMP treated wounds, with the difference at day 7 being approximately 1.5 log 10.

Discussion: This preliminary study on porcine incisions demonstrates that a novel, low cost iNPWT device and dressing system, utilizing a solid-state oxygen management technology, delivers comparable negative pressure therapy to existing electrical devices. Additionally, there are indications that the OxMT technology may have a beneficial effect on limiting bacterial viability in the wound.

EMP – PICO NPWT pump Smith & Nephew Inc

OxMT – Aatru iNPWT system – Aatru Medical LLC

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