Application of topical Negative Pressure (VAC) to Split Thickness Skin Grafts
A Structured Evidence-Based Review

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INTRODUCTION
Significant controversy surrounds the effectiveness of negative pressure wound therapy although it has been in use for decades. Whilst many clinicians favour this modality in relation to its practicality, ease of use especially in complex wounds, it has faced the same challenges as other dressings in relation to evidence base of efficacy in relation to a number of outcome measures.

In view of current financial pressures on healthcare systems worldwide this structured review systematically challenges the evidence for perioperative application of Topical Negative Pressure (TNP) to Split Thickness Skin Grafts through evidence-based critical appraisal, and extrapolate the mechanisms of action on the mechanisms through which TNP may aid wound healing. Weighted evidence-based recommendations regarding the impact of TNP on split skin graft quality and quantity of take as outcomes.

METHODS
Phase 1: Structured literature search. Phase 2: retrieved articles were critically appraised (CA) for rigour and methodological validity by three independent authors, then stratified according to a validated "levels of evidence" framework. Graded 'current best evidence' recommendations could therefore be proposed. Weighted evidence-based recommendations regarding the impact of TNP on split skin graft quality and quantity of take as outcomes.

RESULTS (TABLE 1)
Of 220 studies retrieved in the initial search, 38 studies satisfied our quality of evidence criteria. Current best evidence supports two complementary trends explaining the mechanisms whereby STSG benefits from TNP. Active stimulation of epithelial mitosis: TNP creates mechanical stretch which stimulates multiple signaling pathways up-regulating growth- and mitosis-associated epithelial transcription factors. TNP also promotes microcirculatory flow (graft and wound edge), stimulates angiogenesis and basement membrane integrity (Grade C). Prevention of complications: significant reduction of graft lift-off by edema, exudates, sub-graft hematoma, and reduction of shear when compared to traditional dressings (Grade B). TNP promotes significant qualitative improvement in the final STSG result studies (Level 1B). The role of TNP in prevention of infection is however equivocal and further research is required. No evidence of harm from TNP application was reported.
**Table 1: Perioperative Application of Topical Negative Pressure to Split Thickness Graft: Hierarchy of Evidence and Graded Recommendations**

**Application of TNP may promote blood flow and microcirculation to the graft bed, and around the wound edges, stimulate angiogenesis and integrity of the basement membrane.**

Grade C Recommendation  
Chen *et al* (2005) – Level 2b  
Morykwas *et al* (1997) – Level 4  

**Application of TNP may reduce graft loss due to lift off and shear, through reduction of edema, exudates, and hematoma when compared to traditional dressings.**

Grade B Recommendation  

**Application of TNP may result in qualitative improvement in split skin graft take compared to traditional bolster dressings.**

Grade C Recommendation  
Moisidis *et al* (2004) -- Level 2  

**DISCUSSION**

Literature published in the last ten years suggests TNP expedites active graft take and reduces the rate of complications. Evidence of an effect of TNP on quality of the graft take rests within level 2 to 5 evidence which suggested a positive effect. No study reported any deleterious effect arising from TNP application to graft take. Moreover a synthesis of 101 cases reported in the literature reports 95% graft take in complicated cases. Naturally, case-series data is open to the possibility of reporting bias, however this pooled data matches the general outcome trends from other studies. Only one study suggested no significant difference between TNP and traditional bolster dressings, and the validity of this study's qualitative findings may have been affected by non-independent experimental conditions. TNP is therefore proposed as the dressing of choice for STSG applied to complex, large, exuding, irregularly contoured wounds.

**CONCLUSIONS**

TNP increases quantity and quality of split skin graft take compared to traditional bolster dressings. The advantages are increased in irregularly contoured, technically difficult wounds and suboptimal recipient wound beds where it appears to be the best modality currently available. Large scale randomized clinical controlled trials remain scanty in all areas of wound dressing research including negative pressure therapy.