Surgical Site Complications after Revision Total Hip or Knee Arthroplasty: a Prospective study of a Single Use Negative Pressure Wound Therapy System in a High-risk Cohort

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Disclosures: Philip Huang (None), Jennifer O'Connell (employee of Mölnlycke Health Care), Liis Teene (employee of Mölnlycke Health Care), John Timmons (employee of Mölnlycke Health Care).

INTRODUCTION: National rates of primary total hip arthroplasty (THA) and total knee arthroplasty (TKA) are estimated to grow to 1.4 and 3.4 million annually, respectively, by the year 2040. [1] While rates of all-cause surgical site complications (SSCs) are relatively low in primary procedures, approximately one in every 20 TKAs will require revision within 10 years. [2] Rates of complications are up to 15-fold higher in revision procedures. [3] Closed incision negative pressure wound therapy (ciNPWT) is increasingly being used to prevent surgical site complications (SSCs) in patients undergoing revision arthroplasty. Reported benefits of ciNPWT include decreased incidence of surgical site infection (SSI), reduced length of hospital stay, and lower re-operation rates. [4] Despite these advantages, ciNPWT is often associated with the development of skin blisters around the incision site, which can cause significant pain to patients.

METHODS: This investigation was undertaken at 7 high-volume orthopedic centers in the US to assess the rates of post-operative SSCs in patients who had a canister-based, single-use, NPWT system (Avance Solo, Mölnlycke Health Care) applied following revision THA or TKA. This system includes a single use canister-based device which delivers nominal pressure at -125 mmHg for up to 14 days and skin-friendly dressings with Safetac (soft silicone adhesive) technology. Safetac dressings have a well-evidenced track record of minimizing trauma to the wound site and surrounding skin. [5,6] Institutional Review Board approval was obtained prior to the study commencing. The study's primary endpoint was the proportion of patients with at least one SSC from baseline to within 90 days after surgery. Secondary endpoints included the incidence of surgical site infection (superficial, deep, or organ space) dehiscence, hematoma, and seroma formation at 30 and 90 days, and drainage within 14 days.

RESULTS SECTION: A total of 105 patients were recruited successfully into the study. At 30 days post-operatively, 3 patients had experienced an SSC, none of which were deemed to be device-related. Importantly, skin was deemed 'healthy' by investigators at almost all assessments, with no maceration, hematomas or seromas reported. Mild blistering was reported in 5 patients.

DISCUSSION In an interim analysis of wound healing and safety data at 30 days post-revision THA and TKA, a low incidence of SSCs was reported in patients using a single-use NPWT system. Importantly, peri-wound skin was rated as healthy at nearly all assessments. Use of a single-use NPWT system in higher risk revision TKA and THA procedures may reduce the incidence of SSC.

SIGNIFICANCE/CLINICAL RELEVANCE: In this interim report of study findings, the canister-based NPWT system performed well after revision THA and TKA. Low SSC incidence and highly favorable outcomes relating to skin condition were reported. Systems that can reduce the risk of SSCs occurring while minimizing skin blistering around the incision site are desirable to health care providers, payers and patients.

ACKNOWLEDGEMENTS: The study was sponsored by Molnlycke Health Care (Mölndal, Sweden).

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