

QUESTION 37: What surgical dressing (i.e., occlusive, silver impregnated, dry gauze) is associated with a lower risk of surgical site infection/periprosthetic joint infection (SSI/PJI) in patients undergoing orthopaedic procedures?

RECOMMENDATION: Occlusive and/or silver-impregnated dressings have been proven to reduce the rate of wound complications, SSI and PJI compared to standard gauze dressings and should be considered for routine use. The majority of the literature at present focuses on total joint arthroplasty (TJA). However, further research is required to see if the added antimicrobials (such as silver), the occlusive, active-nature of the dressing or their combination is responsible for the demonstrated reduction in SSI/PJI.

LEVEL OF EVIDENCE: Moderate

DELEGATE VOTE: Agree: 81%, Disagree: 12%, Abstain: 7% (Super Majority, Strong Consensus)

RATIONALE

To successfully prevent SSI and PJI, the patient must be optimized before, during and after orthopaedic surgery. One method of infection prevention gaining recent attention is the type of post-surgical dressing. Wound complications are common after orthopaedic procedures. These are particularly important in TJA as patients are encouraged to mobilize early and often and wounds are over mobile areas such as the knee joint. Appropriate prevention and management is crucial since wound issues can lead to PJI if left untreated [1]. While traditional gauze and tape dressings have been used after surgical procedures for decades, new commercial dressings have questioned this practice [2–4].

Dressings have been classified as passive (gauze, absorbent pads, adhesive tapes, island dressings), active (films, hydrocolloid, hydrofiber, alginate, foam) and interactive (antimicrobial, biomaterial, larva therapy, vacuum dressings) [5]. Passive dressings only serve a protective function, while active dressings promote healing through the creation of a moist environment. Interactive dressings interact with the wound bed to further enhance healing and include, for example, antimicrobial agents (such as silver). An increasing body of literature supports use of a dressing that provides an impermeable barrier to pathogens and preserves a moist environment. Good fluid management capacities are important to prevent excess exudate, which causes maceration and to reduce the frequency of dressing changes thereby reducing the risk of exposure to outside pathogens [5]. While many studies have compared various dressings and the rate of wound complications (defined as blisters, erythema, maceration, leakage) or fluid handling capacity (wear time, mean dressing changes) [5], few have been adequately powered to investigate rates of SSI and PJI [6–12]. Sharma et al. [5]. recently performed a systemic review and meta-analysis on 12 randomized controlled trials (RCTs) [6–17] comparing alternative dressing materials for postoperative management of wounds following TJA. Eight of these studies reported SSI data but no dressing type was superior over another in SSI reduction. However, occlusive film dressings (odds ratio (OR): 0.35, 95% confidence interval (CI) 0.21 to 0.57) or occlusive dressings with hydrofiber (OR: 0.28, 95% CI 0.20 to 0.40) were significantly less likely to have wound complications than those managed with passive (standard) dressings [5]. The authors concluded that there was insufficient evidence available to determine whether the use of these advanced dressings reduced PJI.

Recently, two interactive dressings are gaining popularity. One is the Aquacel® Ag surgical dressing (ConvaTec) that both maintains a moist environment through use of a weaved cellulose center (hydrofiber) that allows it to contour to the skin and prevents the growth of microorganisms by releasing antimicrobial ionic silver when in contact with fluid [18,19]. Another is the Silverlon® Surgical Dressing (Argentum Medical) with a woven nylon dressing that is silver plated and embedded in a waterproof foam adhesive [20]. Three large cohort, case-controlled studies have retrospectively investigated the utility of these dressings for PJI reduction after TJA. All three studies used the Musculoskeletal Infection Society (MSIS) criteria for PJI [18–20]. Cai et al. compared 903 patients receiving an Aquacel Ag dressing (removed at 5 days) to 875 receiving a standard xeroform and gauze dressing removed at 2 days postoperatively after TJA [19]. They reported an acute PJI rate (within 3 months of surgery) of 0.44% in the Aquacel Ag dressing group compared to 1.7% in the standard gauze dressing group (p = 0.005 =

A multivariate analysis revealed that use of Aquacel dressing was an independent risk factor for reduction of PJI (OR: 0.165, 95% CI 0.051 to 0.533, p = 0.003) [19]. These results were corroborated by Grosso et al. who compared 605 patients with Aquacel Ag dressing (removed at 7 days) to 568 xeroform and gauze dressings (removed at 2 days and changed every other day) after TJA [18]. The incidence of acute PJI for patients managed with a sterile xeroform dressing was 1.58% (9/568). The incidence of PJI for patients managed with the use of Aquacel dressing was 0.33% (2/605, p = 0.03). Similar to Cai et al., a multiple logistic regression demonstrated use of an Aquacel dressing as a protective factor for PJI (OR: 0.092, 95% CI 0.017 to 0.490, p (0.05) = [18]. Tisosky et al. evaluated 309 patients with the Silverlon dressing (removed at 7 days) compared to 525 patients with xeroform and gauze (removed at 2 days) after TJA [20]. They found an overall infection rate of 8.4% in the control group versus 3.90% in the Silverlon group (OR: 0.38 95% CI 0.25 to 0.58, p = 0.012). There was no PJI in the Silverlon group vs. 12 (2.3%) in the control (p = 0.007). In addition, the superficial infection rate was 6.1% in control vs. 3.9% in Silverlon (OR: 0.54, 95% CI 0.34 to 0.87, p = 0.011). In a multivariate logistic regression the Silverlon dressing was independently associated with decreased infection (OR: 0.39, 95% CI 0.27 to 0.57, p < 0.0001)

[20]. Finally, Kuo et al. performed a prospective, RCT comparing the Aquacel Ag to a standard dressing in 240 TKA patients [21]. They found that the Aquacel Ag dressing was independently associated with a reduction in SSI (as defined by the Centers for Disease Control and Prevention (CDC) [22]) when controlling for confounding variables (OR: 0.07, 95% CI 0.01 to 0.58, $p = 0.01$) [21].

In conclusion, active and interactive dressings have been shown to reduce the rates of SSI and PJI after joint arthroplasty compared to passive dressings. The benefit of adding antimicrobial/antiseptic agents such as silver or 0.2% polyhexamethylene biguaide [23] in postoperative dressings is still controversial as few studies have compared active dressings to interactive dressings [24]. In addition, studies investigating the use of active or interactive dressings in foot and ankle surgery [25], hip fracture surgery [26] and spinal fusion [27] are limited and have not demonstrated a reduction in SSI. Finally, formal cost-effectiveness studies will be needed to see if the increased price of the occlusive, silver-impregnated dressings (USD \$30 to \$40) [19,20] compared to standard dressings (USD \$2 to \$5) is justified for routine versus selective use by the reduction in cost with decreased SSI/PJI.

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