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Systematic review

The effect of wound dressings on infection following total joint arthroplasty

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ABSTRACT

Background: The use of perioperative surgical wound dressings is an important factor in the mitigation of infection following total joint arthroplasty (TJA). Few studies have been published comparing wound dressings and infection rates after TJA.

Methods: MEDLINE, PubMed, and EMBASE were searched for studies published between 2006 and 2016 reporting infection rates in patients using various wound dressings after undergoing TJA. All studies comparing Hydrofibre dressings to Standard dressings or Absorbent dressings were included in this meta-analysis. Studies looking at TJA secondary to trauma were excluded. Two individuals independently extracted data, and study results were divided based on type of treatment. The primary outcome was to compare the infection rate of Hydrofibre dressings to that of both Standard Dressings and Absorbent dressings.

Results: Of a total of 3721 participants, 1483 were treated with Standard dressings (non-impregnated gauze), 1911 with Hydrofibre dressings, and 327 with Absorbent dressings. The risk ratio for infection comparing Standard with Hydrofibre was 4.16 (95% confidence interval, 1.71-10.16) as compared to 2.60 (95% confidence interval, 0.66-10.27) when comparing Absorbent with Hydrofibre dressings.

Conclusions: Our analysis suggests that Hydrofibre dressings may be significantly better than Standard and Absorbent dressings with respect to reducing infection. However, given the observed heterogeneity and small number of studies included, more comparative studies are needed to definitively recommend superiority among dressings following TJA.

Level of Evidence: Level 1.

Introduction and background

Infection remains one of the most serious complications following total joint arthroplasty (TJA) [1-3]. Even with the advent of multiple prophylactic measures to prevent infection after TJA, the rate of infection is still reported to occur in 0.3% to 2.5% of patients undergoing total knee arthroplasty (TKA) and nearly 1% of total hip arthroplasty (THA) [4-7]. Furthermore, periprosthetic joint infection (PJI) has been associated with significant morbidity after TJA and requires further examination [8]. As such, infection after TKA or THA will remain a significant factor in the cost of TJAs in the future [6]. This issue is made even more significant by the projected rise in the rate of TKAs and THAs, which are expected to increase by 673% and 174% respectively, by 2030 [9]. Moreover, infection has been reported to be the greatest contributor for revision TKA (25.2%) and the third most common cause of revision THA (14.8%) in the United States [10,11].

A protective barrier is often used to cover wounds, limit contamination, and promote healing following surgery. It has been shown that a moist occlusive wound environment greatly improves the healing process as compared to a dry wound environment by preventing tissue dehydration and cellular death

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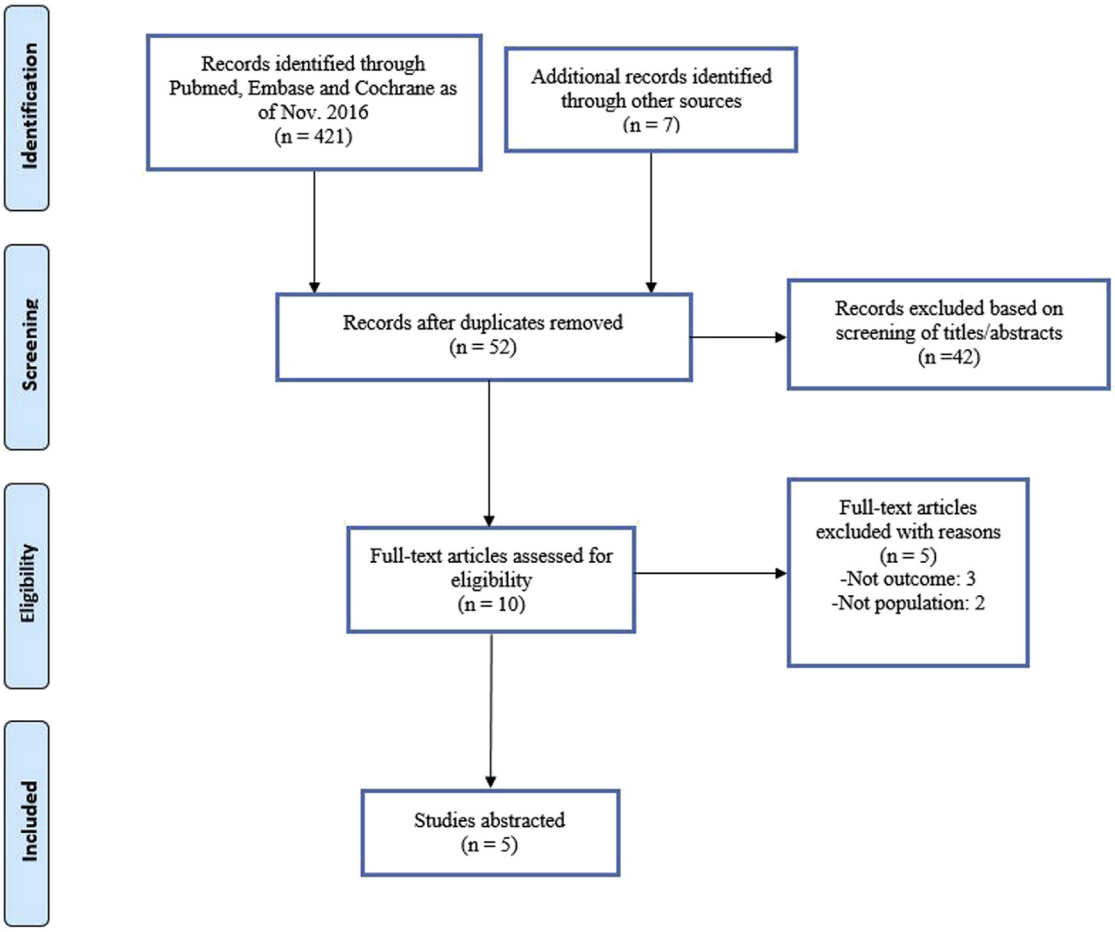

Figure 1. Flowchart of systematic search strategy.

[12-15]. However, such an environment can increase the risk of microbial colonization. The most effective dressings must therefore protect the incision area from contamination and further damage while still maintaining a moist environment for proper wound healing [16,17]. Traditionally, wounds are protected by use of a simple dressing such as a gauze that is removed after 24-72 hours allowing adequate time for re-epithelialization [18]. Many different types of surgical wound dressings have been developed for use after TJA [2]. In this secondary analysis of published literature, we specifically compare Hydrofibre (Aquacel, ConvaTec Inc., Princeton, NJ), Absorbent dressings (Primapore [Smith & Nephew] and Mepore [Mölnlycke]), and Standard (non-impregnated gauze) dressings. Standard dressings are generally considered to be low adherence cotton pads placed directly in contact with the wound [19]. Alternatively, Absorbent dressings such as Mepore and Primapore, also placed directly over the wound, are said to have secondary absorbent layers helpful for heavily exuding wounds [19]. Finally, Hydrofibre dressings such as Aquacel and Aquacel Ag (ConvaTec, UK) are thought to have the benefit of maintaining an environment necessary for optimal wound healing and supposedly require less dressing changes. These Hydrofibre wound dressings are composed of sodium carboxymethylcelluose and are reported to have up to 30 times its weight in absorptive capacity to limit exudate spread, blistering, and epidermal stripping [2,19,20]. Silver-impregnated Aquacel (Aquacel Ag) differs from generic Aquacel dressings in that the ionic silver has properties that help to prevent microorganism growth through its bacteriostatic effect [2,21,22].

Despite advances in wound dressing designs, there is still no consensus as to whether any particular type of wound dressing has decreased infection, blistering, or mean number of dressing changes. A review of randomized controlled trials (RCTs) comparing wound dressings concluded that there was insufficient

Table 1
Evidence profile of studies in systematic review.

Characteristics	Standard	Absorbent
No. of studies	1 RCT; 2 retrospective	2 RCTs
No. of patients (comparator)	1487	327
No. of patients (Hydrofibre)	1548	363

Table 2
Study design and sample size information.

Author by dressing comparator	Study type	Type of arthroplasty	# Comparator	# Aquacel
Standard dressings				
Cai et al., 2014 [21]	Retrospective	TKA/THA	875	903
Grosso et al., 2017 [22]	Retrospective	TKA/THA	568	605
Langlois et al., 2015 [24]	RCT	TKA/THA	40	40
Absorbent dressings				
Springer et al., 2015 [25]	RCT	TKA/THA	121 (Primapore)	141
Clarke et al., 2009 [26]	RCT	TKA/THA	186 (Mepore)	242