plasty components. The authors of this study concluded that TAA may be a viable option for patients with a history of infection of the ankle [3].

While this study does demonstrate the potential for infection-free survival of a TAA in patients with a history of infection in or around the ankle, the follow-up of the cohort is too short to allow conclusive recommendations to be made regarding this patient population. Therefore, further studies on the topic are needed. In the interim, we recommend that all patients with infection in or around an ankle that is being considered for TAA be worked up for infection prior to the elective arthroplasty. During the arthroplasty, additional measures should be implemented to reduce the risk of subsequent SSI/PJI.

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QUESTION 7: During draping for total ankle arthroplasty (TAA), should the foot be prepped into the surgical field or be covered?

RECOMMENDATION: There is insufficient data demonstrating any advantage or disadvantage to covering the toes during TAA.

LEVEL OF EVIDENCE: Moderate

DELEGATE VOTE: Agree: 100%, Disagree: 0%, Abstain: 0% (Unanimous, Strongest Consensus)

RATIONALE

Multiple studies have shown increased rates of bacterial colonization in the toes after skin preparation [1–4]. Zacharias et al. reported on the pre-procedural cultures in 12 patients who underwent lower extremity orthopaedic surgery not involving the foot [4]. The authors performed pre-procedural toe cultures, prepared the extremity with povidone-iodine and followed with coverage of the toes with a self-adherent wrap. The authors found a 75% rate of positive pre-procedural and aerobic cultures, concluding that there is some benefit to applying sterile draping to the toes in order to minimize the risk of infection. However, the major weaknesses of the latter study are the small sample size (n = 12), lack of a control group, preparation of the surgical site being done by an operating room nurse not aware of the study and the use of povidone-iodine.

In another study, Brooks et al. demonstrated that there was a significantly lower rate of bacterial recolonization in patients who underwent a standard antiseptic technique in combination with sliding a gauze swab soaked in topical antiseptic multiple times between the toes compared to standard antiseptic technique alone [1].

Hort and DeOrio designed a study that assessed the amount of residual bacterial contamination after surgical preparation of the foot and ankle with or without the use of alcohol [2]. In this study, the 49 patients were randomly assigned to either a standard preparation with chlorhexidine gluconate home scrubs and preoperative povidone-iodine or a standard preoperative preparation with the addition of 70% alcohol. While there was a trend towards significance, the authors found no significant difference in colonization rates with or without the use of alcohol. However, they found high rates of residual colonization (35% in the standard surgical group and 57% in standard preparation plus alcohol). Subsequently, the authors' conclusions included the recommendation of covering the toes during hindfoot and ankle surgery. No patient had any clinical evidence of infection or wound problems. It should be noted, however, that this study did not specifically compare patients with their toes uncovered or covered.

However, despite the presence of studies recommending covering the toes to decrease the risk of contamination in lower extremity surgeries, there are limited studies assessing the rates of infection with the toes covered versus uncovered. Goucher et al. performed a prospective, randomized study to assess the effect of covering the toes during hindfoot and ankle surgery [5]. In this study, they performed three sets of cultures (before skin prep, immediately after skin prep and after the conclusion of the surgery) from the foot and toes from one group of 20 patients with their toes covered and a second group of 20 patients with their toes uncovered. Of 40 patients, only two postoperative cultures were positive, and neither of these patients showed any signs of postoperative infection. Additionally, while seven patients showed signs of superficial infection (erythema, superficial dehiscence or suture abscess), there was no difference between the two groups. Therefore, the authors concluded that there were no benefits in covering the toes in hindfoot and ankle surgery.

Recently, the order of skin preparation has also been investigated. Hunter et al. performed a prospective, randomized control study to assess the proper order of skin preparation of foot and ankle orthopaedic surgeries [6]. The authors found that there were lower rates of positive post-procedural cultures in patients undergoing preparation with isopropyl alcohol followed by chlorhexidine compared to patients undergoing preparation with chlorhexidine followed by isopropyl alcohol. However, no assessment was performed comparing coverage versus non-coverage of the toes during the procedure.

Although inconclusive, there is ample evidence of persistence of bacterial colonization irrespective of skin preparation technique of the foot. Consideration should be given to covering the toes to limit the risk of contamination of the surgical site and the potential for subsequent infection.

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Author: Jens Richter

QUESTION 8: Should antibiotic-impregnated cement be used during primary total ankle arthroplasty (TAA)?

RECOMMENDATION: Unknown. There is insufficient evidence for the routine use of antibiotic-impregnated cement during primary TAA.

LEVEL OF EVIDENCE: Consensus

DELEGATE VOTE: Agree: 100%, Disagree: 0%, Abstain: 0% (Unanimous, Strongest Consensus)

RATIONALE

The main sources for this systematic review were the Medline, Embase, CINAHL and Cochrane CENTRAL databases, beginning with the first citation of ankle arthroplasty in July 2003, the 2016 Swedish Ankle Registry [1] and the 2016 New Zealand Joint Report [2].

In their report on the New Zealand Joint Registry, Rothwell et al. reported on 1,261 TARs from January 2000 to December 2015. Cement fixation was used only in 13 tibial components and in seven talar components. Antibiotic-impregnated cement was used seven times for tibial component fixation and three times for the talus component fixation. However, there was no statistical evaluation in this registry for the item periprosthetic joint infection (PJI) according to the type of cement used.

Considerable research is available related to PJI and antibiotic-impregnated cement for total knee arthroplasty (TKA) procedures. Gutowski et al. stated in their study that the absolute rate of infection increased when antibiotic-loaded cement was used in TKA, although this was less when compared to infection rates after use of plain cement [3]. In 2016, Schiavone et al. performed a systematic review determining the effectiveness of utilizing antimicrobials and the safety of antibiotic-loaded bone cement in primary TKA [4]. The authors concluded that there was no significant difference in the rate of deep or superficial surgical site infection in patients receiving antibiotic-impregnated cement in primary TKA compared with those receiving plain cement.

Based on the lack of proven efficacy for antibiotic-impregnated cement in the prevention of PJI in the TKA literature and the lack of research into antibiotic-impregnated cement in TAA, we cannot provide a recommendation for or against the routine use of antibiotic-impregnated cement during TAA. However, this point may be of limited current importance anyway, as the majority of modern generation TAA are cementless in design.

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1.2. PREVENTION: NON-TOTAL ANKLE ARTHROPLASTY-SPECIFIC

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QUESTION 1: What are the benefits and risks associated with the use of vancomycin powder in the wound during total ankle arthroplasty (TAA) or other foot and ankle procedures?

RECOMMENDATION: Though one study supporting topically-applied vancomycin has shown it to reduce the rate of deep infection in diabetic patients undergoing foot and ankle surgery, there is insufficient evidence to show benefits or to show any risks associated with the use of vancomycin powder during TAA or other foot and ankle procedures in a general population.

LEVEL OF EVIDENCE: Consensus

DELEGATE VOTE: Agree: 100%, Disagree: 0%, Abstain: 0% (Unanimous, Strongest Consensus)