RATIONALE

In 2016, the World Health Organization (WHO) published guidelines for the prevention of surgical site infections (SSIs) [1]. Based upon a review of 17 randomized controlled trials, there is moderate quality evidence that alcohol-based antiseptic solutions for preparation of the surgical site decrease the risk of SSIs in comparison to aqueous solutions. A low quality of evidence showed decreased SSI risk with alcohol-based chlorhexidine gluconate compared to alcohol-based betadine. While alcohol may be concerning for persons from certain religions, the WHO guideline highlights the statement issued in 2002 by the Muslim Scholars Board of the Muslim World League. According to the Board, medicines containing alcohol may be used as an external cleaner. With the use of alcohol-based agents, care must be taken to allow them to dry completely, as operating rooms fires have been reported. According to the Centers for Disease Control and Prevention (CDC), skin preparation with an alcohol-based antiseptic solution should be completed prior to surgery, to reduce the risk of SSI [2].

A systematic review and meta-analysis of combination chlorhexidine gluconate (CHG) and betadine implicated the utility of these agents, despite the low quality of the evidence. A major limitation of many of these studies, however, was the use of bacterial colonization as an endpoint rather than the development of a true SSI [3].

Privitera et al. recently provided a meta-analysis updating and clarifying issues from prior meta-analyses which had not clearly distinguished among studies using alcohol and aqueous-based products. In the updated meta-analysis, there was subgroup analysis showing decreased colonization rates with chlorhexidine, but there was not a statistically significant difference in SSI due to the low numbers of SSI [4].

Although the use of antiseptic agents for skin preparation is necessary for bioburden reduction and prevention of infection, there is minimal data available regarding the role of antiseptic irrigation solutions during TAA. The use of antiseptic agents for irrigation is often performed in the setting of periprosthetic joint infections (PJI) of the hip and the knee, although the utility in total ankle replacements is unknown.

Randomized controlled studies have evaluated the use of various irrigates in open fracture wounds, noting that normal saline was more efficacious and as effective at decreasing infection in comparison to castile soap and bacitracin solution, respectively [5,6]. Chlorhexidine solutions have been evaluated in an in vitro model as being beneficial to decreasing the biofilm load, particularly at concentrations above 2%. However, of importance is that concentrations as low as 0.02% CHG have shown to lead to fibroblast toxicity [7,8]. Dilute betadine may be advantageous in this regard, as it has minimal cellular toxicity at low concentrations and excellent efficacy for prevention of infection [9].

Based on the available data, the CDC has recommended that strong consideration should be given to the use of dilute betadine during all surgical procedures. Although no data in TAA exists, extrapolating the recommendations of the CDC to TAA appears to be reasonable as dilute betadine is inexpensive, efficacious and carries little-to-no cell toxicity.

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QUESTION 3: Does revascularization prior to foot and ankle surgery reduce the incidence of surgical site infection (SSI)?

RECOMMENDATION: Several studies support the effect of peripheral vascular disease (PVD) on wound healing and SSI. Despite this, there have been no specific studies proving the beneficial effect of revascularization on SSI prior to surgical intervention in the setting of traumatic or elective foot and ankle surgery. The majority of studies on revascularization are in the setting of diabetic foot infection or established ischemia.

We recommend that in the presence of an inadequate vascularization in the foot and ankle, vascular optimization should be undertaken prior to elective surgery.

LEVEL OF EVIDENCE: Limited

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

RATIONALE

Oxygenation of soft tissues is a critical component of wound healing, with wound tissue oxygen tension having a direct correlation with the risk of postoperative wound infection [1].

Diabetes mellitus (DM) and its complications, such as PVD, have proven to be risk factors for increased infection and complication rates after surgery for ankle fractures [2–4]. A large cohort study of

over 57,000 patients found that PVD alone was a strong risk factor for the development of complications after ankle fracture fixation, with the rate of infection increased from 1.44% to 6.87% in the presence of PVD [2].

Diabetes and PVD are associated with increased complications in other forms of foot and ankle surgery, as well [5]. PVD is a proven risk factor for infection after arthrodesis procedures of the foot and ankle and is an independent risk factor for periprosthetic joint infection (PJI) following total ankle arthroplasty [6,7].

Clinical guidelines for the management of diabetic foot disorders suggest a thorough assessment for vascular risk factors prior to surgery [8]. PVD and poor oxygen delivery to tissues are associated with poor wound healing in these patients and should thus be identified [9,10]. Angiography should also be performed when appropriate to assess the potential for revascularization [8], as this intervention has shown to improve the level of amputation and tissue loss in this group of patients [11–13]. Furthermore, Faglia et al. demonstrated revascularization in diabetic patients with critical limb ischemia to lead to a low rate of early amputation [14].

Aust et al. reported that combining revascularization with surgical intervention results in improved wound perfusion and healing of chronic wounds [15]. Revascularization prior to surgery can even allow for successful primary closure of some chronic wounds, according to Barshes et al. [16]. Furthermore, two groups have reported that if primary closure is not viable, then revascularization can be completed in the setting of free tissue for chronic wounds [17,18].

Transmetatarsal amputation can be an effective method of limb salvage in the ischemic or infected diabetic foot, and the rates of wound healing and limb salvage have demonstrated to be improved in conjunction with revascularization [19,20]. Additionally, it is important to understand that the timing of revascularization prior to surgery has not been shown to influence outcomes [21,22]. This would suggest that revascularization prior to diabetic foot surgery is not essential but beneficial when performing revascularization close to foot and ankle surgery in the diabetic patients.

There is little literature related to the effect of revascularization in preventing SSI in foot and ankle surgery. While the presence of PVD is known to increase the risk of SSI/PJI in patients undergoing foot and ankle procedures, no specific study demonstrates revascularization of the foot and ankle obviates this increased risk.

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QUESTION 4: Are prophylactic perioperative antibiotics required for isolated forefoot procedures, such as hammertoes?

RECOMMENDATION: Though limited clinical data exists, the administration of perioperative antibiotics is not required for isolated forefoot procedures in the absence of any risk factors, such as immunodeficiency or diabetes mellitus.

LEVEL OF EVIDENCE: Moderate

DELEGATE VOTE: Agree: 67%, Disagree: 25%, Abstain: 8% (Super Majority, Weak Consensus)