

G 34 :Is there a role for addition of topical antibiotics to saline irrigation solution bags for prevention of SSI/PJI in patients undergoing major orthopedic procedures?

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Response/Recommendation : No addition of topical antibiotics to the saline solutions to prevent PJI and SSI in major orthopedic surgeries is not recommended as it has not been shown to reduce the rate of SSI/PJI.

Strength of recommendation : moderate

Delegate Vote

Rationale :

Intraoperative surgical irrigation is a common practice in orthopedic procedures. The purpose of using irrigation solution is to reduce the remove tissue exudate, hematoma, foreign debris, nonviable tissue, and metabolic waste from the surgical field in an effort to reduce the potential for subsequent infection.[1-3] Many studies have been completed related to identification of optimal irrigation solution.[1]

We conducted a comprehensive systematic review to evaluate the potential role of topical antibiotics in reducing orthopedic infections, when added to irrigation solution. Appropriate MESH terms were developed by the librarians to conduct a literature search in two databases. Medline, Embase publications were identified which were then screened by two experts to identify 23 final publications for inclusion in this systematic review.

After detailed review of the current (limited) evidence, it appears that addition of topical antibiotics like bacitracin and polymyxin, to normal saline irrigation solution has no role in prevention of orthopedic infections.

One study by Goswami et al investigated the in vitro efficacy of polymyxin and bacitracin against Staphylococcus aureus and Escherichia coli and did not detect a beneficial effect for the topical antibiotics used [4], Other studies have corroborated the latter, and found that addition of topical antibiotics (bacitracin, neomycin) did not enhance the removal of S aureus

biofilm from stainless screws, bone, and titanium compared to normal saline.[5, 6] Schmidt et al demonstrated that the triple antibiotic (bacitracin 50,000 U/L, gentamicin 80 mg/L, and polymyxin 500,000 U/L) solution was not able to eradicate *Staphylococcus epidermidis* from the biofilm in vitro.[7] *In vitro* study suggests that addition of polymyxin-bacitracin to saline irrigation solution is a futile exercise[4]. Taken within the context of its associated expense, risk of hypersensitivity and impact upon antimicrobial resistance, our findings bring its widespread clinical usage into question.[8]

There are few only in vivo investigations comparing antibiotic irrigation with other solutions, and even fewer of these are specific to orthopedics.[9]

Owing to different pharmacokinetic properties and their efficacy, not all antibiotics can be instilled while irrigating wounds.[1]

Few studies have shown that they are effective in preventing Surgical Site infections and Prosthetic Joint Infections in major orthopedic surgeries including total joint arthroplasty.[10] [11] [12]The most widely used antibiotics are polymyxin , bacitracin, and neomycin. More recently, the Food and Drug Administration (FDA) has warned against the use of bacitracin in irrigation solutions and withdrawn bacitracin injection due to serious adverse effects of bacitracin including nephrotoxicity and anaphylaxis [13] In recent years, at least in the United States, many pharmacies do not provide bacitracin for use in irrigation solutions.[13] .

Most studies do not recommend adding antibiotic to saline solution[14] because of the same effectiveness as saline solutions, associated costs [9] and its side effects like : Allergic reactions [15, 16], antibiotic resistance and wound problems.[17] Two clinical practice guidelines issued by the WHO [18] and NICE [19] advise that antibiotic incisional wound irrigation before closure should not be used for the purposes of preventing SSIs. Overall, the evidence supporting the use of antibiotics in wound irrigation in orthopedics is not convincing. Although toxicity and adverse reactions to antibiotics are rare, they do occur .[20]

When various antibiotic mechanisms of action, which take time and require the opportunity to bind to a specific target site, are considered, the level of effect when they are transiently washed over a wound is likely diminished or even improbable.[21] Theoretical concerns of promotion of antibiotic resistance, coupled with major costs of antibiotic irrigation are also important.[9]

It should be understood that any routine prophylactic use of antibiotics may result in resistant organisms, and the wise stewardship of the use of antibiotics is an important part of surgical practice.[12] In the comparison of different solutions, antibiotic solutions are not superior to others.[17, 22] Based on ICM 2018 demonstrating benefit, the risks of antibiotic resistance, the known reactions, and the associated costs, antibiotics should not be utilized as an additive for irrigation in orthopedic surgery .[23]

Conclusion :

Most studies have not supported adding antibiotics to the saline irrigation solutions for the prevention of PJI and SSI .Although limited studies have shown the possible effect, however it is not possible to simply overcome the complications of adding antibiotics, which include problems caused by wounds healing, allergic reactions, associated costs and antibiotic resistance.

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