Hip and Knee Section, Prevention, Prosthesis Factors: Proceedings of International Consensus onOrthopedic Infections
Craig A. Aboltins1, Valentin Antoci2, Sanjib Bhattacharyya3, Michael Cross4, Paul Ducheyne3, Andrew A. Freiberg5, Nils Hailer4, Peter Kay6, Constantinos Ketonis2, Mitchell R. Klement4, Nusret Köse3, Mel Lee1, Philip Mitchell1
Keywords:
implant factors, implant materials, custom implants, implant surface, implant coating, chemical modification of implant surface, type of fixation, implant roughness, implant porosity, implant symmetry, cemented total hip arthroplasty, uncemented total hip arthroplasty, hybrid total hip arthroplasty, cemented total knee arthroplasty, uncemented total knee arthroplasty, uncemented total hip arthroplasty, type of bearings, metal-on-metal total hip arthroplasty, total hip arthroplasty bearing surfaces, metal-on-metal, ceramic-on-ceramic, metal-on-polyethylene, modular femoral neck implants, hardware failure, metal corrosion, adverse local tissue reaction (ALTR), synovial markers,
serum markers
,
chronic periprosthetic joint infection (PJI)
,
acute periprosthetic joint infection (PJI)
,
synovial cell count
,
contaminated prosthesis
,
re-sterilization
,
dropped prosthesis

Question 1: Are there implant materials that mitigate the risk for surgical site infections/periprosthetic joint infections (SSIs/PJIs) after total joint arthroplasty?

Recommendation:

There are various implant materials that can be utilized to reduce the chance for surgical site infections/periprosthetic joint infections (SSIs/PJIs) in patients undergoing total joint arthroplasty.

Level of Evidence: Limited

Delegate Vote: Agree: 49%, Disagree: 30%, Abstain: 21% (No Consensus)

Rationale:

The skyrocketing increase in the number of joint arthroplasty surgeries and their associated failures has raised serious concerns in the field of medicine. Failures of medical
devices due to infections have resulted in an increase in the number of revision surgeries, and even fatality. Biomaterial-associated infections are fearsome complications of modern orthopedic surgery, which often lead to prolonged patient pain and functional losses. Although immense efforts to minimize the risk of these infections have intensified over the last decade [1], orthopedic surgical site infections (SSIs) continue to occur in worrisome numbers.

The concept of a “race for the surface” was previously proposed by Gristina et al [2] and Costerton et al [3]. They described a situation whereby the ultimate fate of the implant is determined by the competition of host cells and bacterial cells. When bacteria won the race, an infection would result, instead of tissue integration. Gristina et al [2] also realized that bacterial colonization of the tissue around the implants was another possible mechanism of infection.

Herein we will review, among others, that bacterial adhesion and subsequent biofilm formation may be prevented by modifying the physicochemical surface properties of biomaterials. We will go beyond the mere aspect of implant surface biofilm formation, though. In fact, there are mainly 3 schools of thought regarding how to manage SSIs and periprosthetic joint infections: first, making the surface of the implant bacteria unfriendly; the concern about such approach is that it does not deal with infected surrounding tissue; second, applying coatings on the implant surface that incorporate antibiotics, but coating adhesion and stability are concerns; third, local biodegradable “implants” releasing antibiotics. We will review the benefits and limitations of each approach first. A general discussion will follow concluding that no method is ideal, but that a combination is probably needed. As is self-evident then, no consensus currently already exists.