Overview Top Resources

Periprosthetic Joint infections in pandemic times. Focus on risk patients and prevention

COVID_19:


Guidelines based on the available scientific evidence. The recommendations have been reviewed and voted on by the expert delegates who produced this document. Goal is to minimize the risk of pathogen transfer during the severe acute respiratory syndrome (SARS)-CoV-2 pandemic.

Doi:10.2106/JBJS.20.00844


The study evaluates the impact of the coronavirus (COVID-19) pandemic on joint arthroplasty service in Europe by conducting an online survey of arthroplasty surgeons. During the current 2020 COVID-19 pandemic, we are experiencing a near-total shutdown of TJA. A massive cutback was observed for primary TJA and revision TJA, even in massively failed TJA with collapse, dislocation, component failure or imminent dislocation. Only life-threatening pathologies like periprosthetic fractures and acute septic TJA are currently undergoing surgical treatment.

Doi: 10.1007/s00167-020-06033-1

Periprosthetic Joint Infection (PJI) treatment concepts:


Retrospective analysis of 181 patients with PJI of the Hip or knee undergoing two-stage exchange with a two-year follow-up showed that treatment of PJI’s managed in a separate department with an interdisciplinary team using a standard algorithm significantly reduces the rate of recurrent infection.


Systematic description of twenty common mistakes in the diagnosis and treatment of PJI, to help surgeons avoid these pitfalls e.g. incomplete evaluation of joint aspirate, suboptimal microbiological procedures, missing possible sources of distant infection in hematogenous PJI, inadequate antibiotic treatment, both underdebridement and overdebridement or failure to individualize treatment.
Multidisciplinary teamwork with infectious disease specialists and microbiologists in collaboration with orthopedic surgeons have a synergistic effect on the management of PJI. An awareness of the possible pitfalls can improve diagnosis and treatment results.

Doi: 10.1007/s00264-019-04426-7

Pro-Implant Foundation. Pocket Guide for the Diagnosis and Treatment of Periprosthetic Joint Infection (PJI)

Including Definition, Classification, Diagnostic algorithm, Treatment algorithm, Surgical procedures, Recommended antimicrobial treatment, Local antimicrobials in bone cement (PMMA)

https://www.pro-implant-foundation.org/

Evidence for antibiotic-loaded bone cement (ALBC) in prevention:


Pilot study with 32 high-risk for infection patients (PJI group and aseptic and primary group) were treated with gentamicin and clindamycin-loaded (G+C) PMMA cement with a follow-up of 5 years. There was no reinfection among the patients of the PJI group. Infection was prevented in the aseptic group, including patients with a history of PJI or at higher risk of infection. No patient underwent an exchange of the cemented prosthesis at the 5-year follow-up. The local use of G+C bone cement during septic and aseptic revision arthroplasty, was associated with a high success rate for the eradication of infection following one-stage septic exchange, and with prevention of infection in high-risk patients.

Doi: 10.1099/jmm.0.000895


Monocentric study compared the osteoarticular infection rate in the use of single (gentamicin) and dual (gentamicin and clindamycin) antibiotic-loaded cement in 292 patients undergoing cemented revision (aseptic and septic) with a follow-up of 1 year. The use of dual loaded cement could significantly decrease re-infection by 12% after septic revision (one-stage PJI). In aseptic revision a decrease of re-infection by 3,5% was observed. To get a significant result for the aseptic group n=2,500 patients for two statistically comparative groups would be necessary.


Sanz et al. Is dual antibiotic loaded bone cement more effective and cost-efficient than a single antibiotic loaded bone cement to reduce the risk of prosthetic joint infection in aseptic revision knee arthroplasty? Journal of Arthroplasty 2020; in press.
Retrospective study with 246 patients undergoing strictly aseptic revision knee comparing the use of low dose single antibiotic loaded cement (gentamicin) and high dose dual antibiotic loaded cement (gentamicin and clindamycin). Use of dual antibiotic loaded cement in aseptic revision TKA was associated with a significant reduction of PJI cases (4.1% vs. 0%, p=0.035) after one year follow-up. The use of dual-loaded antibiotic bone cement has been found to be more effective in preventing PJI in aseptic knee revision and proved cost-efficient in all cost-calculation models.

Doi: 10.1016/j.arth.2020.06.045


The study compares the rate of deep and superficial site infections in the use of dual antibiotic impregnated cement with single antibiotic impregnated cement in patients following cemented arthroplasty for fractured neck of femur in 206 patients over a 12-month period. Dual antibiotic cement reduced the rate of deep surgical site infection (0%) compared with conventional single antibiotic cement (2.9%) in arthroplasty for fractured neck of femur. Only a marginal difference in superficial surgical site infection was observed.

Doi: 10.1308/rcsann.2019.0054


Quasi-randomised study of 848 patients with an intracapsular fracture of the hip treated with hemiarthroplasty in one large teaching hospital on two sites shows that the use of high dose dual-antibiotic impregnated cement reduces significantly the rate of SSI compared with standard low dose single antibiotic loaded bone cement from 3.5% to 1.1%.


A retrospective analysis of patients with deep SSI after hemiarthroplasties within one trust from April 2008 to December 2014 observed a significantly lower infection rate with the use of dual loaded antibiotic cement compared to single loaded antibiotic cement. Whilst the differences in the study were not found to be statistically significant, it is reassuring for teams using dual antibiotic loaded cement to prevent SSI in hip hemiarthroplasty.

Doi: 10.7150/jbji.22192

Risk factors for PJI

This retrospective observational cohort study evaluated the impact of preoperative patient and clinical factors on the risk of surgical site infection (SSI) within the 90-day period after primary and revision in a total of 335,134 TKRs and 163,547 THRs. SSI rates were 15.6% and 8.6% after revision in TKR THR, respectively, compared with 2.1% and 2.1% for primary TKR and THR, respectively. SSI occurred most commonly among patients after revision TJR and were related to many patient comorbidities, including diabetes, congestive heart failure, and coagulopathy, which were significantly associated with a higher risk of SSI after TJR.

Doi: 10.1016/j.ajic.2019.03.030


This prospective observational cohort study aimed to assess the overall and time-specific associations of patient, surgical and health-care factors with the risk of revision due to PJI after primary total hip replacement. Several modifiable and non-modifiable factors are associated with the risk of revision for PJI after primary hip replacement. Identification of modifiable factors, use of targeted interventions, and beneficial modulation of some of these factors could be effective in reducing the incidence of PJI. It is important for clinicians to consider non-modifiable factors and factors that exhibit time-specific effects on the risk of PJI to counsel patients appropriately preoperatively.

Doi: 10.1016/S1473-3099(18)30345-1

Antibiotic-loaded bone cement


This in vitro study shows that antibiotic release after 672 hours from Copal bone cement was more extensive (65% of the clindamycin and 41% of the gentamicin incorporated) than from Palacos R-G (4% of the gentamicin incorporated). The higher antibiotic release from Copal resulted in a stronger and more prolonged inhibition of bacterial growth on agar and therefore more effectively decreased biofilm formation.

DOI 10.1007/s11999-008-0203-x


A prospective open clinical trial with 20 patients with an implanted hip prosthesis requiring revision due to periprosthetic infection were treated with antibiotic loaded bone cement (ALBC) containing gentamicin and vancomycin. The antibiotic concentrations in plasma, urine and wound exudate was determined. Slow absorption of both antibiotics after release from the cement resulted in plasma concentrations well below toxic levels and did not result in a critical systemic concentration potentially inducing bacterial resistance. As no reinfection was observed during the follow-up period up to 7 months post surgery the treatment was assessed as efficacious and very well tolerated by all patients.

DOI: 10.5301/hipint.5000307
The bone cements that are currently available commercially are all based on the chemical substance methylmethacrylate. Although all of them have the same chemical basis, acrylic bone cements are not all alike. This article discusses the composition of acrylic bone cements and the influence of the composition on the properties of the material.

Doi: 10.1016/j.ocl.2004.06.010