

difference in the operation. In the multivariate analysis, CRP at the end of treatment ($P = 0.028$) was found to be a predictive factor for successful treatment.

Conclusion. CBJI is a rare disease but associated with high treatment failure. Prolonged antifungal treatment is essential for successful treatment of CBJI, and CRP at the end of treatment is a key predictive marker of successful treatment.

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218. The Influence of Obesity on the Infection Risk of Prosthetic Joint Infection in the Geriatric Orthopedic Population

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Session: 45. Clinical: Bone and Joint Infection

Thursday, October 5, 2017: 12:30 PM

Background. Prosthetic joint infection (PJI) is a dreaded complication of arthroplasty. PJI are more common in the elderly and are associated with a substantial increase in 5-year mortality risk. PJI risk may correlate with increasing body mass index (BMI). However, the effect of BMI on PJI risk in the elderly has not been evaluated, to our knowledge. We sought to evaluate this relationship in a cohort of geriatric arthroplasty patients at an orthopedic specialty hospital.

Methods. A retrospective cohort of hip and knee arthroplasty patients (age >75) from 2009–2014 was identified through administrative hospital data using ICD-9 codes. Patients with a BMI <14 or >60 kg/m², height <142 or >200 cm, and weight <36 or >226 kg were excluded. The presence of infection was confirmed via chart review; all PJIs met MSIS criteria. Obesity was defined as having a BMI >30. Univariate analyses were done using χ^2 tests and adjusted models were assessed using logistic regression.

Results. 13,755 geriatric arthroplasty patients (6,408 total hip arthroplasties [THA] and 7,347 total hip arthroplasties [TKA]) were assessed. Mean age and BMI were 82 (± 5.4) and 28.1 (± 5.3), respectively. In an unadjusted model, obesity was associated with infection in THA ($P = 0.02$), but not TKA ($P = 0.31$). This association remained after adjusting for age, sex, and diabetes. Obesity was associated with an increased risk of infection in THA [OR=1.89 (95% CI 1.12–3.21); $P = 0.02$]. However, as with the unadjusted model, this relationship was not found in TKA ($P = 0.50$).

Conclusion. Obesity increases THR PJI risk in the elderly. However, no such association was found for TKA. Future studies are needed to quantify the compounded risk of obesity in the geriatric arthroplasty patient.

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219. Searching for Bacterial Pathogens in Pediatric Patients with Chronic Recurrent Multifocal Osteomyelitis Using 16S rRNA Quantitative Real-Time PCR

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Session: 45. Clinical: Bone and Joint Infection

Thursday, October 5, 2017: 12:30 PM

Background. Chronic recurrent multifocal osteomyelitis (CRMO) is a rare auto-inflammatory disease in children that causes relapsing episodes of pain. Patients are treated with anti-inflammatory medications or immune-modulating agents. Increasing evidence suggests that CRMO is mediated by dysregulation of the interleukin-1 pathway, not a bacterial source. However, CRMO is often a diagnosis of exclusion, and patients occasionally receive antimicrobials for possible culture negative infectious osteomyelitis. Few prior studies have utilized molecular diagnostic techniques to identify bacterial pathogens in CRMO bone biopsies.

Methods. Musculoskeletal specimens sent for culture during routine clinical care were banked from patients admitted to Children's Hospital Colorado from 6/2012 to 10/2016. On retrospective chart review, 28 specimens were collected from 16 patients ultimately diagnosed with CRMO. Specimens were processed and extracted prior to molecular testing. All samples underwent quantitative real-time PCR (qPCR) testing using bacterial load assays targeting the bacterial 16S rRNA gene.

Results. Mean age at time of sample collection was 9.2 years. CRMO diagnosis was made by clinical, pathologic, and radiographic findings. All patients had pathology findings consistent with CRMO including lymphoplasmacytic infiltrate, focal necrosis, and/or marrow fibrosis. All patients had MRI findings consistent with CRMO. No patient had bacteria identified on Gram stain; 2/28 samples (7%) had bacterial growth on culture (both were coagulase-negative staphylococcus, felt to be contaminant). None of the 28 specimens met the threshold of bacterial load on qPCR testing to necessitate bacterial sequencing. None of the 16 patients were treated with antimicrobials and there were no readmissions for clinical worsening.

Conclusion. CRMO patients did not have bacteria identified on universal bacterial 16S rRNA testing. This finding further supports that CRMO patients do not require antimicrobial therapy. Future steps to exclude infectious pathogens in CRMO could include next-generation DNA sequencing.

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220. Clinical Experience with Tigecycline in the Treatment of Prosthetic Joint Infections

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Session: 45. Clinical: Bone and Joint Infection

Thursday, October 5, 2017: 12:30 PM

Background. As the population in the United States ages, the number of people who will require a joint arthroplasty is expected to rise dramatically. The most serious complication of this surgery is prosthetic joint infection (PJI) which can lead to long-term morbidity and even mortality. Biofilms play a major role in these infections, and studies have suggested that tigecycline may work better than other antimicrobials in the setting of biofilms. In this study, we examined our institution's experience with using tigecycline to treat PJI.

Methods. This was a retrospective review of all adult patients with PJI treated at West Virginia University from January 2008 to March 2016 who received tigecycline for 50% or greater of the treatment course. Demographic data, rationale for tigecycline use, type of surgery, microbiologic data, outcome and complications were assessed. Failure was defined as need to return to the operating room for an infectious complication or persistent drainage from the joint.

Results. In total, 34 patients met inclusion criteria. The median age was 65 years, and 62% of the patients were female. The most common reason for tigecycline use was empiric therapy, but other reasons included antimicrobial allergies and resistant organisms. The antimicrobial was used as frontline therapy in 29 cases (85%), and the mean duration of tigecycline therapy was 38 days. The most common organisms isolated were methicillin resistant *Staphylococcus aureus* ($n = 7$), coagulase negative *Staphylococci* ($n = 5$), and *Enterococcus* species ($n = 4$), but 12 cases (35%) were culture negative. Treatment success was documented for 21 cases (62%); though, there was limited follow-up (2 months or less) in four of the successful cases. Nausea and vomiting was the most common adverse event, occurring in three patients.

Conclusion. Tigecycline is a glycolcycline approved for use in a variety of infections including intra-abdominal and skin soft-tissue infections, but little is known about its use in the treatment of PJI. We found that tigecycline is well tolerated even when given for 6 weeks duration. Twenty-one of the 34 patients (62%) met our definition of successful treatment outcome with tigecycline. More studies are needed to assess tigecycline's use in the treatment of PJI.

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221. Subcutaneous Suppressive Antibiotic Therapy for Bone and Joints Infections: Safety and Outcome in a Cohort of 10 Patients

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Session: 45. Clinical: Bone and Joint Infection

Thursday, October 5, 2017: 12:30 PM

Background. Optimal surgical therapy could be sometimes non-feasible, especially in the elderly population. Therefore, a medical therapy with oral prolonged suppressive antibiotic therapy (PSAT) seems to be an option to prevent recurrence and prosthesis loosening. Subcutaneous (SC) administration of injectable intravenous antibiotics as PSAT could be a convenient way when oral treatment is not available to facilitate ambulatory care, even if this practice is considered as an "off-label" practice.

Methods. All patients receiving SC PSAT since 2010 were prospectively enrolled in a cohort study evaluating treatment modalities, efficacy, and safety. Success was defined by the absence of clinical signs of infection at the time of last follow-up.

Results. We included 10 patients (median age of 79 years): seven had PJI and three chronic osteomyelitis. Six had plurimicrobial infections and four had infections due to multidrug-resistant Gram-negative pathogens. Suboptimal surgery was performed in seven patients, and three received only antibiotics. All patients received an induction-phase therapy with conventional antibiotic treatment before SC PSAT. For nine patients, SC injections were delivered by a 50 mlml 30 minute gravity infusion of the antibiotic, using butterfly disposable needle. One patient received direct flash SC administration. The most frequent drug used was ertapenem ($n = 7$; 1–2 g/day), followed by ceftriaxone ($n = 2$; 1 g/day), and ceftazidime ($n = 1$; 2 g/day). The dose was adjusted depending on the results of trough residual blood concentration. Median duration of treatment was 6 months (from 1 to 58 months), corresponding to a total of about 5,000 SC injections. SC PSAT had to be discontinued for side effects in only two patients, including skin necrosis in the patient receiving direct SC infusion (lost to follow-up after treatment discontinuation) and epilepsy under ertapenem therapy (with relapse of the BJI after the treatment discontinuation). One other patient experienced a relapse despite the SC PSAT. Finally, SC PSAT was still ongoing in seven patients with a favorable outcome at the last follow-up.

Conclusion. SC PSAT appears to be a safe and effective alternative therapy when optimal surgical strategy is not feasible and when oral treatment is not available.

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222. Clinical Outcomes of Prosthetic Knee Joint Infection in a United States Tertiary Healthcare Center

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Session: 45. Clinical: Bone and Joint Infection

Thursday, October 5, 2017: 12:30 PM

Background. The 2013 IDSA prosthetic joint infection (PJI) guidelines identified some research gaps, some of which include what factors may predict PJI outcome. We therefore conducted a retrospective single-center study with the goal of addressing some of these gaps.

Objectives: 1. Describe the incidence, pathogens, role of inflammatory markers, and treatment outcomes of knee PJI. 2. Identify correlations between joint aspiration (JA) and intraoperative (IO) cultures.

Methods. We retrospectively analyzed all adult knee PJI that were diagnosed and managed at our institution between 1/1/2005 and 12/31/2015. Statistical analysis was done using the paired *t*-test, Fisher exact and McNemar χ^2 tests as applicable.

Results. Forty-six subjects met the inclusion criteria and were analyzed. See table below.

Clinical and Demographic Information of PJI subjects (*n* = 46).

Parameter	Value (%)
Age (years)	
Range	27–84
Median	60
Mean	58.8
Sex	
Female	28 (61)
Symptom onset	
< 3 weeks	15 (33)
> 3 weeks	28 (61)
No Data	3 (6)
Implant duration	
Early (< 3month)	10 (22)
Delayed (3–24 month)	15 (33)
Late (> 24 months)	21 (45)
Positive culture	
JA	17 (37)
IO	29 (63)
Surgical Rx	
Two stage	15 (33)
Debridement and retention	18 (39)
Removal without replacement	13 (28)
Outcome	
Cure	26 (57)
Failure with relapse	5 (11)
Failure with progression	6 (13)
Indeterminate	6 (13)
Death	3 (6)

The incidence rate of PJI for the study period was 5.4%. *Staph. aureus* was the commonest pathogen accounting for 11(65%) JA and 13(40%) of IO cultures. Low virulence organisms [*Staph. epidermidis* *n* = 8 (25%) and *Corynebacterium* spp. *n* = 1 (3%)] were only recovered from IO cultures. Gram-negative bacilli accounted for 5(30%) JA and 7(28%) IO cultures. JA correlates well with IO cultures using paired sample correlations (*t*-test); (correlation 0.61, *P* = 0.027).. 97% of subjects had elevated ESR while 96% had elevated CRP. Concerning outcome, there was no statistically significant difference between groups based on implant duration (*P* = 0.98), symptom onset (*P* = 0.23), pathogen type (*P* = 0.83), and treatment options (*P* = 0.39).

Conclusion. 1. JA culture is a good predictor of IO culture in knee PJI. 2. Yield of low virulence organisms from JA culture is poor. 3. Elevated ESR and CRP can support diagnosis of knee PJI. 4. Implant duration, pathogen type, duration of symptoms and treatment type do not appear to affect outcome.

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223. Microbiological Epidemiology in Patients Experiencing Microbiological or Clinical Failure Following Reimplantation After a Two-Stage Exchange Strategy for Hip or Knee Prosthetic Joint Infection (PJI)

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Session: 45. Clinical: Bone and Joint Infection

Thursday, October 5, 2017: 12:30 PM

Background. Patients with late PJI are at risk for superinfection at the time of reimplantation. Different commercially available antibiotic-loaded cements (gentamicin, vancomycin, gentamicin+clindamycin [G+C], gentamicin+vancomycin [G+V]) could be used for the fixation of the new prosthesis and could be effective to treat or prevent superinfection. We aim to determine the microbiological epidemiology in patients experiencing failure following reimplantation to establish, based on the drug susceptibilities, which cement could be the most active.

Methods. Prospective cohort study including all patients with a two-stage exchange in 2013–2015. Microbiological failure was defined by positive culture at the time of reimplantation. Clinical failure was defined by patients with clinical signs of infection requiring a new surgery.

Results. We included 117 patients (median age 70 years). Fourteen patients (12%) experienced a failure: seven patients with microbiological failure (four CoNS, one *P. acnes*, one *corynebacterium*, and three *Candida albicans*); seven patients with a clinical relapse requiring a new surgery (three *Enterobacteriaceae*, two *P. aeruginosa*, one *streptococcus* spp., one CoNS, one *P. acnes*, one *E. faecalis*). Considering the use of a vancomycin-loaded cement, this antibiotic was inactive on *Candida* (*n* = 3) and Gram-negative isolates (*n* = 5). Considering the use of gentamicin, this antibiotic was inactive on *Candida* (*n* = 3) and five bacterial isolates. These five letter isolates were also not susceptible to Clindamycin. Considering the use of G+V, this combination was inactive on *Candida* (*n* = 3) and only one bacterial isolate (a gentamicin-resistant *K. pneumoniae*). Consequently, the vancomycin-, gentamicin- and G+C-loaded cements may effectively treat or prevent 42.9% of superinfections, only. Conversely, the G+V-loaded cement may effectively treat or prevent 71.4% of them.

Conclusion. Considering the commercially available antibiotic loaded: none of the *Candida albicans* superinfection could be locally treated, and the G+V-loaded cement could treat or prevent most bacterial superinfections.

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224. Pressure Ulcer-Related Pelvic Osteomyelitis: Evaluation of a Two-Stage Surgical Strategy (Debridement, Negative Pressure Therapy and Flap Coverage) with Prolonged Antimicrobial Therapy

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Session: 45. Clinical: Bone and Joint Infection

Thursday, October 5, 2017: 12:30 PM

Background. A two-stage surgical strategy (debridement-negative pressure therapy (NPT) and flap coverage) with prolonged antimicrobial therapy is usually proposed in pressure ulcer-related pelvic osteomyelitis but has not been widely evaluated.

Methods. Adult patients with pressure ulcer-related pelvic osteomyelitis treated by a two-stage surgical strategy were included in a retrospective cohort study. Determinants of superinfection (i.e., additional microbiological findings at reconstruction) and treatment failure were assessed using binary logistic regression and Kaplan–Meier curve analysis.

Results. Sixty-four pressure ulcer-related pelvic osteomyelitis in 61 patients (age, 47 [IQR 36–63]) were included. Osteomyelitis was mostly plurimicrobial (73%), with a predominance of *S. aureus* (47%), *Enterobacteriaceae* (44%), and anaerobes (44%). Flap coverage was performed after 7 (IQR 5–10) weeks of NPT, with 43 (68%) positive bone samples among which 39 (91%) were superinfections, associated with a high ASA score (OR, 5.8; *P* = 0.022). An increased prevalence of coagulase negative Staphylococci (*P* = 0.017) and *Candida* (*P* = 0.003) was observed at time of flap coverage. An ESBL *Enterobacteriaceae* was found in one (12%) patients, associated with fluoroquinolone consumption (OR, 32.4; *P* = 0.005). Treatment duration was as 20 (IQR 14–27) weeks, including 11 (IQR 8–15) after reconstruction. After a follow-up of 54 (IQR 27–102) weeks, 15 (23%) failures were observed, associated with previous pressure ulcer (OR, 5.7; *P* = 0.025) and Actinomyces infection (OR, 9.5; *P* = 0.027).

Conclusion. Pressure ulcer-related pelvic osteomyelitis is a difficult-to-treat clinical condition, generating an important consumption of broad-spectrum antibiotics. Carbapenem should be reserved for ESBL at-risk patients only, including those with previous fluoroquinolone use. The uncorrelation between outcome and the debridement-to-reconstruction interval argue for a short sequence to limit the total duration of treatment.

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225. Microbiologic Predictors of Pelvic Osteomyelitis Related to Decubitus Ulcers

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Session: 45. Clinical: Bone and Joint Infection

Thursday, October 5, 2017: 12:30 PM

Background. Management of pelvic osteomyelitis related to decubitus ulcers (PODU) remains challenging, whereas definitive therapy is based on blood, bone,