

OSTEOMYELITIS AND RELATED TOPICS

Ongoing Literature Review:

G. Cierny III, MD: 75TH Annual Meeting of the American Academy of Orthopedic Surgeons; (San Francisco, CA, March, 2008)

Primary Total Knee Arthroplasty following Infected Tibial Plateau Fractures. Larson, AN, Cass JR; Rochester, MN Paper No. 099

The study involved 38 primary total knee arthroplasties matched for gender, age and date of arthroplasty: 19 with and 19 without a previous history of infection involving the ipsilateral, tibial plateau. The time from fracture to arthroplasty averaged 6.5 years. Despite the use of antibiotic cement and some 2 stage procedures, the infection rate was 26% and reoperation rate 56% (p=0.02) in the patients with previous infection.

Effect of Prophylactic Pre-operative Antibiotic on Intraoperative Cultures in Infected TKA. Aggarwal A, Barack RL, Clohisy JC, et al; Philadelphia, PA. Paper No. 069

This study involved 18 TKA with known infecting organisms and no recent antibiotic therapy. The tourniquet was inflated ~14 minutes and all cultures taken ~26 minutes following antibiotic infusion. Results: routinely administered, prophylactic antibiotics will not affect the likelihood of isolating the infecting pathogen(s) while still serving to protect the host from secondary infection.

Hydrex vs showering in the cleaning of External Fixator Pin Sites. Vincent, M, Dennison M, Britten S; Sheffield, United Kingdom. Paper No. 144

The study was done in the UK. The Russian method of weekly dressing changes (packing off pin sites with alcohol-soaked sponges) was compared to a pin care involving daily showering and pin cleaning. The Russian method significantly reduced the incidence of pin site infection (p=0.01).

Comparison of Negative a pressure Dressings and Standard Dressings in a Contaminated open Fracture Model. Lalliss SJ, Branstetter J, Wenke JC; San Antonio and La Vernia, TX. Paper No. 146

Complex, orthopaedic wounds were created in goats and inoculated with a strain of *Pseudomonas aeruginosa* genetically modified to emit photons, thereby allowing quantification of bacterial concentrations within a photon-counting camera system. 'VAC' dressings were changed every 48 hrs; control dressings were wet-to-dry and changed twice a day. There were significantly less bacteria luminescing (p<0,02) in the 'VAC' group as well as decreased edema (p=0.0035).

An Antibiotic Bone Substitute vs Antibiotic Bone Cement in Post-Traumatic Infection. McKee MD, Li E, Wild LM, Schemitsch EH; Toronto, Canada. Paper No. 147

30 patients with chronic osteomyelitis were randomized to a study comparing dead space management following debridement using either Tobramycin-impregnated CASO₄ or PMMA beads. Infection eradication was 86% in both groups. As opposed the authors' previous work, this time, the reoperation rate was higher in the PMMA group (p=0.04) with no further mention of fistulous formation in the T-CASO₄ group.

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Deep wound Infection After Spinal Fusion in Cerebral Palsy: does antibiotic-loaded allograft Matter? Dabney KW, Borkhuu B, Borowskie A, et al.

Paper No. 193

IRB study of 220 patients undergoing surgical fusion for spinal deformities: 154 with Ab-BGF and 66 with bone grafts not pre-loaded with antibiotics. The incidence of deep wound infection was 4% and 15%, respectively ($p=0.03$).

Prospective Study of the Treatment of Infected THR with or without an Antibiotic Spacer. Cabrita HB, Camargo OP, Lima AL, Croci AT; Sao Paulo, Brazil.

Paper No. 346.

Prospective, randomized study of 68 infected hip arthroplasties: 30 patients without and 38 patients with an Ab-spacer (Vancomycin); follow up averaged 6 years. The two-stage surgery without spacer controlled infection in 66.7% of patients and the 2-stage surgery using the spacer controlled it in 89% ($p<0.05$). Level of evidence 1-1.

Different Composition of Clinical Iliac Crest and Tibial Bone Grafts. Chiodo CP, Hahne J, Wilson MG, Glowacki J. Paper No. 258.

Both iliac and tibial bone grafts showed trabecular fragments with abundant osteocytes. All iliac grafts included stroma and hematopoietic marrow. The medullary space of tibial grafts contained fat and little hematopoiesis. 9/10 iliac grafts were graded V or VI whereas all tibial grafts were graded I or II ($p=0.0001$) in % bone surfaces opposing hematopoietic marrow. *

Comparison of Re-operation Rates following Ankle Arthrodesis and Total Ankle Arthroplasty. SooHoo NF, Zingmond D, Ko C; Los Angeles, CA Paper No. 265.

4,705 ankle fusions and 480 total ankle replacements evaluated (California's Discharge Database). Patients undergoing ankle replacement had an increased risk of device-related infection and major revision procedures. The rates of major revision surgery for TAR were 9% at 1 year and 23% at 5-years post-op compared to 5% and 11% for ankle fusions, respectively. *3
Ankle arthrodesis patients had a higher rate of subtalar fusion at 5 years as compared to TAR (2.8% vs 0.7%, respectively).

Take Down of Painful Ankle fusion and Conversion into total ankle arthroplasty. Barg A(Basel), Hintermann B(Liestal), Switzerland.

30 cases wherein a painful ankle fusion was taken down and converted to a TAA using a current three-component prosthesis. Follow up of 5.5 years. The authors found a high patient satisfaction regarding pain relief and regain function. The AOFAS foot score increased from 34 pre-operatively to 66, post-operatively.

Two-Stage Hip revision for Infection: a 10-15year follow-up in 103 patients. Duncan CP, Kostamo T, Biring GS, et al. Paper No. 349

44 Patients had died and 4 were lost to follow up. Estimated 89% infection arrest rate at 10-15 years with 2-stage alone and 96% following additional surgical intervention. In addition, the patient-reported outcomes revealed no difference when compared with a matched cohort of patients who had undergone revision hip replacement for aseptic failure.

Urinary Tract Infection and Total Joint Replacement. Koulouvaris PS, Casey D, Sculco P, et al; New York, NY. Paper No. 350

The data of this study demonstrate that preoperative treated UTI poses no risk for wound infection if treated for 5-8days preoperatively and it would not be a reason to delay or postpone the surgery. Urinary catheterization does not appear to pose an increased risk for SSI.

Comparison of Surgical Site Infection Rates in Primary versus Revision Hip Arthroplasty. Ashby E, Davies MJ, Wilson A, Haddad F

S, London, UK. Paper 351

ASEPSIS wound scoring system used to assess SSI in primary(293) versus revision(53) THA. The SSI rate for revision THA was 4 times greater than that for primary cases. The possible reason for this finding were listed as poorer quality of soft tissues, greater co-morbidities, longer length of surgery and longer post-operative stay. *

Evaluating the Risk of Septic Knee in Retrograde Femoral Nails. Barnett TM, Jackson V, Birkedal JP; Winston Salem, NC. Paper 433.

353 retrograde femoral nails with 314 for analysis: 72 open fractures and 242 closed. No septic knees were encountered despite there being infected non-unions, 2 cases of osteomyelitis and 2 wound infections at the open fracture site.

Two Stage Revision TKR for Infection. Mild to Long Term Results. Pietri M, Bourne RB, Rorabeck CJ, et al; London, ON Canada and Florence, Italy. Paper No. 444.

121 two stage revision TKR for infection followed. The cumulative survival at two years with operation for any reason as an endpoint was 75%. The long term infection control was 87%.

Why Do Revision Total Knee Arthroplasties Fail? Suarez JC, Griffin WL, Odum SM, Springer BD; San Juan, Puerto Rico, Charlotte, NC. Paper No. 446.

Mechanisms of failure for revision TKAs are different that for primary total knees. Younger patients and polyethylene exchange procedures rather than full component revisions were more likely to fail.. Revisions for infection are four times more likely to fail than revisions for aseptic loosening. The survivorship for the entire cohort, with revision for any reason as an end point, was 82% at 12 years.

Surface Temperature Variation after Total Knee Arthroplasty. Rachala S, Krackou KA, Manohar L, et all. Paper No. 448.

When compared to a non-pathological knee, the largest rise in the surface temperature of the operated knee occurred at the 6 week visit. A statistically significant rise also occurred at 12 weeks and at 6 months but not at 1 year.

Negative-Pressure Wound Therapy Following High-Risk Lower Extremity Fractures. Stannard JP, Volgas DA, McGurin G, et all. Birmingham, AL. Paper 499.

262 patients enrolled in a multi-institutional study. Prospective and randomized comparative study: outcomes included wound breakdown and infection. Results: there was a significant difference in total infections in wounds treated with NPWT as opposed to conventionally treated wounds. The relative risk of developing an infection was 2.3 times higher in control patients ($p<0.02$).

Comparison of Irrigation Solutions in Removing Adherent Bacteria from Trauma Implants. Chiu MJN, Bhandari M, Schemitsch; Toronto, ON Canada. Paper No. 500.

The purpose of this study was to determine how Ethylenediaminetetraacetic acid(EDTA) , a chelator that binds calcium, works as irrigant in removing adherent bacteria from trauma implants. Staphylococcus epidermidis strain was used with a 2×10^7 CFU inoculum on cortical screws. Results: There were no differences between the different EDTA concentrations, saline or neomycin. When using jet lavage on Staph. epi-coated screws, antibiotics had no benefit over normal saline and soap removed the most bacteria. EDTA had limited ability to remove biofilm from trauma implants.

Do Pre-operative Steroid Injections Increase the Risk of Postoperative Infections? Kukla TR, Rosner M, Moquin R. Sat Louis, MO, Washington, DC. Paper No. 538.

In this series, there is an increased post-operative infection rate in patients pre-operatively treated with epidural steroids, especially when receiving 3 or more injections. There is also a trend toward increased infection when receiving an injection within 3 months of surgery or when instrumentation is used.

Sonication of Removed Orthopaedic Devices and Calorimetry for Improved Diagnosis of Infection. Schneiderbauer MM, Trampuz A, Widmer A, Hintermann B; Basel and Liestal, Switzerland. Paper No. 574.

Orthopaedic implants extracted for infected reconstructions, were aseptically collected and then placed sonicated in an ultrasound bath 5 minutes at 40kHz. The resulting sonicate was cultured and then investigated for heat production from bacteria using an ultra-sensitive calorimeter. The sensitivity for infection improved from 74% using tissue cultures to 89% using sonicate cultures (p,0.05) to 96% using sonicate calorimetry (p,0.001). The calorimetric detection time was 2-12 hours.

Should Outer Surgical gloves Be Changed Intra-operatively Before Prosthesis Implantation? Dawson-Bowling S; Sussex. UK. Paper 575.

21 consecutive hip and knee replacements were studied to determine the rate of outer glove contamination prior to implantation of the prosthesis. Of 42 pairs of gloves studied after patient preparation and draping, 12% grew organisms (p<0.05). Of the 42 gloves studied and removed intra-operatively, 22% were positive (p,0.05). Changing of gloves prior to implantation is, therefore, recommended.

Risk Factors for Re-infection of the Infected Total Knee Arthroplasty After a 2-Stage Re-implantation. Wolf BT, Martin SD, Reichmann, et al. Poster No. P159.

Study included 19 cases of re-infection and 57 cases not re-infected (controls). The multivariate logistic regression identified body mass >30 (p=0.006) and infection within the first 6 months of the primary TKA (p=0.026) as significantly associated with a higher risk of becoming re-infected. Also implied were history of an infection at a remote site (p=0.081) and peripheral vascular disease (p=.135).

Five Types of Inflammatory Arthritis Following Total Knee Arthroplasty. Niki Y, Matsumoto H, Enomoto H, et al; Tokyo, Japan. Poster No. P180.

Authors analyzed pheno-typic characteristics of joint fluid leukocytes in patients suffering effusions associated with TKA. Analysis using a flow cytometry classified into five groups: deep infection; increased activity of RA; particle-induced synovitis; metal sensitivity; and non-specific synovitis. The most frequent cause of post-TKA effusion was increased disease activity in RA and non-specific synovitis in OA. Analysis of synovial fluid cell phenotypes revealed that the characteristic cells for each diagnosis were CD16+CD14 neutrophils in increased activity of RA and deep infection, CD14 macrophages in particle-induced synovitis, and CD3 + CD45RO + T cells in metal sensitivity.

Revision of Total Knee Replacements for allergies Against One or More Components. Rodrigo JJ, Henderson J, Stott, T Spartanburg, SC. Poster No. P198.

11 knee revisions in eight patients were done for failure of anti-inflammatory medications in the treatment of known strong allergies to specific materials. A lymphocyte proliferation assay was used to measure immune reactions to cobalt-chrome, titanium, polyethylene, and methacrylate. Three of the 11 joints did not improve following revision. Conclusions: knee revisions for allergies will improve pain at rest, but only occasionally give good functional outcomes.

Impact of Psoriasis on Deep Infection following Primary Knee and Hip Arthroplasty. Anderson DR, DEE DO; Rancho Palos Verdes and El Cajon, CA. Poster No. P202.

296 patients with active psoriasis underwent primary joint replacement: 217 TKA; 79 THA. 8,913 and 4376 patients were used as controls, respectively. No increased risk of infection with psoriasis was identified.

Optimization of Polymethylmethacrylate (PMMA Formulations for Local Delivery of Antibiotics) Evans RP, Smeltzer MS, Weiss B, Haggard W; Little Rock AR and Memphis, TN. Poster No. 203.

2gm Daptomycin (Cubicin) and 22gm sterile Xylitol per 40gm package of Palacos PMMA resulted in a peak concentration on day 1 of 640ug/ml and a sustained peak concentration on day 10 of 5ug/ml as determined by bioassay. These assays corresponded to over 1000x and 8x the MI of the test strain of Staphylococcus aureus, respectively.

Osteomyelitis and Bone Healing with the Use of Bone Wax and a Soluble Polymer Bone Hemostasis Agent. Wellisz T, Armstrong JK, Cambridge J, et al; Los Angeles, CA and Charleston, SC.

A new soluble polymer bone hemostasis agent has recently become available (Ostene, Ceremed, Inc.). Staphylococcus aureus was used to inoculate defects plugged with bone wax (Ethicon, Inc.), Ostene and 'no fill'. Osteomyelitis developed in 100% of the bone wax defects, 25% of the polymer defects (p=0.004) and none of the unplugged defects. There was no difference between the polymer and the control groups in the rates of osteomyelitis, positive cultures, or bone healing.

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The Role of Crusts in Ilizarov Fixator Pin Site Care. Ghoz A, Britten S, Duffield B, Giannoudis P Leeds, UK. Poster No. 472.

To compare infections rates in two cohorts of patients undergoing Ilizarov treatment whose pin sites were treated using a Russian style regimen (clean weekly with alcohol and keep covered). In one cohort the crusts (dried exudates) were removed at cleaning and, in the other, the crusts were left intact unless infection occurred. Retention of adherent crusts act as a biologic dressing reducing the incidence of pin site infections, presumably by preventing bacterial contamination.

Bilateral Cosmetic Tibial Lengthenings with the Intramedullary Skeletal Kinetic Distractor (ISKD). Spech G S C, Belthur M, Jindal G, et al; Baltimore, MD. Poster No. P510.

10 patients, 20 tibiae lengthened simultaneously with 60% non-union rate and 13 unexpected surgeries. Non-unions and complications occurred most frequently in those with ≥ 6 cm of lengthening.

Treating Upper Limb Infected Nonunion Using a Vascularized Fibular Graft vs the Ilizarov Technique. Morandi MM, Desai SS, DaRin F, et al. Poster No. P509.

The Ilizarov technique was limited to a maximum bony defect of 5cm due to vascular and functional deficits. Vascularized-fibular grafts were used to treat 21 infected nonunions with 100% success. There were larger defects and fewer complications using the free-fibula method when compared to Ilizarov techniques (90% success in smaller defects).

