

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).

2009 EUROPEAN BONE AND JOINT INFECTION SOCIETY

Abstracts from the 28th Scientific Meeting

G. Cierny III, MD: 28th Scientific Meeting of the European Bone & Joint Infection Society Vienna, Austria September, 2009

POSTER SESSIONS:

- The bone defect in septic surgery
- Biofilm: Latest developments in basic science and clinical consequences
- Stabilization - possible risks and benefits of external and internal fixation
- Joint arthroplasty: one stage versus two stage exchange
- The soft tissue defect in septic surgery
- Quality Management for Septic Surgery
- The "Septic" Patient - Psychological, Social and Economic Consequences

Prosthetic joint infections: From animal studies to clinical experience. *W. Zimmerli, A. Trampuz; University Medical Clinic Liestal and CHUV Lausanne, Liestal, Switzerland.*

Experiments showed that an agent acting on slow-growing and adhering microorganism is needed to eradicate device-associated infection. This requirement is only fulfilled by Rifamycins in staphylococcal infection and by fluoroquinolones in infections caused by gram-negative bacilli. Even new drugs against methicillin-resistant

staphylococci (MRSA), such as Linezolid and Daptomycin, were not able to eradicate experimental foreign-body infections,

when used as single agents. In contrast, in combination with Rifampin Linezolid cured 60%, and Daptomycin 67% of the implant-associated MRSA-infections. An algorithm was developed and validated in cohort studies. Finally, in a randomized double-blind controlled trial, the benefit of a Rifampin-Quinolone combination as compared to Quinolone monotherapy has been proven in patients with acute orthopedic implant associated staphylococcal infection undergoing debridement with retention. The favorable role of Rifampin has been proven in vitro, in animals and in human studies. Also the newest anti-staphylococcal agents must be given in combination with Rifampin in order to eliminate infection without removal of the device.

***Metal-on-metal bearings in hip arthroplasties: influences of cobalt chromium particles and its corrosion products on biofilm formation.** *A. H. Hosman, H. C. van der Mei, S. K. Bulstra, H. J. Busscher¹, D. Neut; Department of Biomedical Engineering, Groningen; Department of Orthopaedic Surgery, Groningen, Netherlands.*

Co-Cr particle concentrations of 20 g/L reduced biofilm formation significantly. Moreover, these particle concentrations were found to be bactericidal (killed the bacteria). Biofilm formation was inhibited at concentrations of 10/5 mg/L Co-Cr ions, as reported to occur in synovial fluids. Co-Cr ion concentrations up to 1/0,5 mg/L revealed no consistent influence on biofilm formation. Interpretation: Co-Cr ions may yield these prostheses less prone to biofilm formation and subsequent infection.

Sonication of temporary devices (spacers and cement nails) inserted during a two-stage implant exchange in patients with prosthetic joint infection. *O. Borens, R. Baalbaki, F. Nussbaumer, M. Clauss, A. Trampuz; University Hospital Lausanne (CHUV), Lausanne, Switzerland; Kantonsspital Liestal, Liestal, Switzerland.*

Investigated the value of sonication of removed spacers and cement nails. 28 spacers and 10 cement nails from patients with confirmed PJI were included. The devices were impregnated with antibiotics (gentamicin and/or vancomycin) and were placed in the hip (n=21), knee (n=9) or shoulder joint region (n=7). At the time of re-implantation, tissue cultures were negative in all 38 patients, whereas sonication cultures showed growth of *Propionibacterium acnes* in 2 of 38 patients (5%)

with a hip and shoulder spacer, both in significant numbers (150 and 550 colonies/ml sonication fluid, respectively). **Conclusion:** Sonication may replace the current standard approach consisting of multiple tissue specimens in order to document successful eradication of infection.

Determination of bacterial quantity by sonication in Vacuum-Assisted Closure (VAC) foams used for treatment of chronic wounds. *M. Claus¹, R.*

Baalbaki, F. Nussbaumer, A. Trampuz², O. Borens;

Kantonsspital Liestal, Liestal, Switzerland, University Hospital Lausanne (CHUV), Lausanne, Switzerland.

With sonication, a high density of bacteria present in VAC foams was demonstrated after a median of 3 days.

The use of a calcium hydroxyapatite antibiotic carrier (PerOssal*) in long bone chronic osteomyelitis. *A. Drakou, G. I. Karaliotas, V. Sakellariou, G. Mazis, K.*

Starantzis, S. Athanasia; First Department of Orthopaedics, Athens University Medical School, ATTIKON University Hospital, Athens, Greece.

PerOssal is a new osteoconductive bone substitution material for bone filling which consists of an entirely synthetically produced, nanocrystalline hydroxyapatite and calcium sulfate. Authors present their preliminary results monitoring an in vivo response of patients to PerOssal used to treat bone infection in the form of long bone chronic osteomyelitis. Postoperative observations were focused on primary wound healing, inflammation markers and clinical eradication of infection (minimum FU: 12 months). 19 cases in the study: 15 cases with eradication of infection, 2 recurrences of disease, in terms of re-infection by different species or amputation, and 2 on-going cases. Declining wound leakage and delayed wound healing was present in 5 (26%) cases where PerOssal was used either intramedullarily but not sealed or extraosseously in relatively large amounts.

***Analysis and results of 282 one stage exchange procedures for periprosthetic infection of the hip and the knee.** *J. F. Wodtke, V. Jonen, P.*

Stangenberg; Endo-Klinik, Hamburg, Germany.

In three years (2005/06/07) 555 one stage exchanges of the hip and the knee were carried out at our clinic. A

first homogenous group of 282 cases has now been analysed and followed. The group contained 180 hips and 102 knees. The primary success rate (dismissal from hospital) was 99% (1 death, 1 disarticulation). The revised rate of success in the course of the follow-up was 92.7 %. Prerequisites have to be respected (ed (GC): soft tissue envelope; sensitive organism; adequate host).

Treatment of early prosthetic joint infections: a study of 39 patients prospectively recorded.

M. Westberg, B. Grøgaard, F. Snorrason; Orthopaedic Centre, Ullevål University Hospital, Oslo, Norway.

39 (24 women) consecutive patients with a mean age of 71 years (range, 32-89) who presented with an early prosthetic joint infection within one month after the index operation. Infection was clinically diagnosed and based on the CDC definition for deep incisional surgical site infection. 37 patients were treated with soft tissue debridement, retention of the prosthesis and antimicrobial therapy. The mean duration of antimicrobial therapy was 70 days (range, 20-270). The mean duration of days after index operation until initial debridement, was 22 days (range, 11-63). At a mean follow-up of 48 months (range, 9-120), 35/37 patients had no signs of recurrent prosthetic infection. 26 infections (70,3%) were eradicated by debridement alone, 9 after additional surgery. When treated within 3 weeks after index operation, 17/23 infections were eradicated by debridement alone (73,9%).

Retrospective analysis of 73 cases of prosthetic joint infections following total knee replacement. *T. Lovse¹, P. Sadoghi¹, M. Hochegger, H. Clar¹, S. Egner¹, G. Feierl, R. Windhager¹; Univeristy Clinic of Orthopaedic Surgery, Medical University of Graz, Graz, Austria; Institute of Hygiene, Microbiology and Environmental Medicine, Graz, Austria.*

74 patients underwent septic revision surgeries following total knee replacement in the years 1998 to 2005. The eradication rate overall was 77 %: one stage exchange 41.7%; two stage procedures 86%. Regarding **McPherson's** systemic grades classification the eradication rate for two stage exchanges was 85.7% in groups A+B and 60%% in group C. One stage procedures achieved 0% eradication in group B and 60% in group C. Regarding **McPherson's** local extremity grade classification eradication rates within two stage revisions were 84% in group 2 and 75% in group 3. One stage revision achieved 40% and 0%, respectively.

***Investigations on blood to diagnose subtle infection and determine definitive eradication of infection.** *C. E. Lautenbach; Johannesburg Hospital, Johannesburg, South Africa.*

The white cell count, differential count and the activity tests can be normal in a large number of patients with recognizable infection. The most subtle evidence of infection is found in the iron profile, namely a diminished serum iron with an elevated Ferritin level. Indeed the most definitive indicator of infection is the ratio of Ferritin to iron.

Are radiological contrast agents bactericidal? An in vitro study. *J. H. Zwiers, M. J. Bruins, C. C. Verheyen, M. J. Wolfhagen; Isala Klinieken, Orthopedic Surgery and Traumatology ; Isala Klinieken, Laboratory for Medical Microbiology, Zwolle, Netherlands.*

The influence of modern widely used iodine containing contrast agents (Omnipaque, Visipaque, UltraVist, Xenetix) and two 30 year old agents (Hexabrix en Telebrix) on the growth of the following relevant prosthesis infection causing micro-organisms were examined: Staphylococcus aureus, Staphylococcus epidermidis, Enterococcus faecalis, Streptococcus pyogenes, Bacillus cereus, Escherichia coli (E. coli), Pseudomonas aeruginosa, Candida albicans, Corynebacterium jeikeium. Results: Modern contrast agents do not seem to have a significant inhibitory effect on micro-organisms to cause of the false-negative synovial fluid culture results.

***Haematogenous Chronic Osteomyelitis in African children: Radiographic Presentation and Prognosis.** *A. Loro, F. Fulvio, O. Justin; CoRSU, Kisubi, Uganda.*

864 patients 2002-2008. Three groups were identified based on clinical and radiographic findings: "**ordinary**" **osteomyelitis (565)** requiring treatment of the infection through a sequestrectomy: the sequestrum is clearly defined and there is a good involucrum on X-ray film. Surgery under tourniquet is possible. In most cases the surgical treatment achieves the healing of the bone and recurrence is uncommon. "**Difficul**" **osteomyelitis (134)** needed more than one surgery to cure the bone infection: bone involved presents with multiple erosions-cavities and there is no clear sequestrum on X-ray film. This category also includes those cases where surgery under tourniquet is impossible. Blood for transfusion must be available. Despite treatment, this type of osteomyelitis often recurs. "**Complex**" **osteomyelitis (165)** needed treatment of the infection and its complications, such as pathological fractures, bone loss, and septic arthritis. In the latter group techniques of bone transport, bone graft and radio-ulna/fibula-tibia fusion were used whereby chronic osteomyelitis is associated with a pathological fracture or septic arthritis. There is axial deformity, bone loss and non-union. Some sort of reconstruction is always required.

***Antibiotic-loaded resorbable hydrogel coating for infection prophylaxis of orthopaedic implants: preliminary studies.**

C. L. Romano, G. Giammona², R. Giardino³, E. Meani⁴; Istituto Ortopedico IRCCS Galeazzi, Milano, Italy, Università di Palermo, Palermo, Italy, 3Istituto Ortopedico IRCCS Rizzoli, Bologna, Italy, Istituto Ortopedico G. Pini, Milano, Italy.

Aim of the present study was to develop and test a new fast-resorbable antibacterial carrier to be used as a temporary coating to prevent early bacteria colonization of metallic implants. The patented tested hydrogel is a co-polymer comprising hyaluronic acid (HA) and a biocompatible polyester (poly-lactic acid) with or without polyethylene glycol chains to further modulate hydrophilicity and anti-fouling characteristics of the compound. The HA derivative is then added to water and mixed, just before its use, with the chosen antibacterial agent. Antibacterial hydrogels provided vancomycin release ranging from 47 % to 80 % in two hours to 100 % (complete release) in 24 to 72 hours, with antibiotic concentrations up to 400 times the minimum inhibiting concentration.

***Circulating Natural IgA Antibodies against Angiogenin and Risk of Post-Surgical Joint Prosthesis Infection.**

Y. Savitskaya, V. Ilizaliturri, A. Cicero, A. Izaquirre, L. Sierra, C. Ibarra; National Institute of Rehabilitation, Mexico City, Mexico.

Infection development and progression are inherently dependent on the process of angiogenesis. Many immune disorders are associated with circulating natural antibodies which bind self-protein as angiogenin (ANG). Biomarkers as anti-ANG IgA show a predisposition for infection development. Method: IgA antibodies, reacting with ANG tested, were present in the sera of all patients as well as in the sera of normal individuals. Serum levels of anti-ANG IgA are significantly low in 19.1% patients with pre-surgical total joint replacement than in healthy individuals ($m \pm SD$: 385 ± 101 versus 121 ± 98 ; $P < 0.001$). Very low serum levels of anti-ANG IgA, as occur in primary immunodeficiency syndromes, are associated with significantly increased risk of infections ($r = 0.85$; $P < 0.005$). Increases in serum anti-ANG IgA to normal /higher levels in patients before surgery associated with good response after gamma globulin replacement therapy ($m \pm SD$: 385 ± 101 versus 587 ± 189 ; $P < 0.001$). Risk of JPI was dependently associated with secretory anti-ANG IgA antibody responses. Very low the expression of anti-ANG IgA in sera seems to be potentially useful as angiogenic biomarkers of risk JPI.

***New algorithm for rapid detection of early surgical wound infection after elective joint replacement using 5-day postoperative CRP levels.**

M. K. Wasko¹, J. Kowalczewski, W. W. Wasko; Postgraduate Education Medical Center, Otwock; Jagiellonian University Medical College, Krakow; Warsaw University of Technology, Warsaw, Poland.

An elevated C-reactive protein level on the fifth postoperative day correlated positively with the development of acute periprosthetic infection in the first three months postoperatively.

***Relationship between contamination rate of haematoma of femoral neck fractures and postoperatively early prosthetic joint infection:**

L. Font, L. Casanova, E. Muñoz-Mahamud, S. García, A. Zumbado, J. Mensa, A. Soriano; Hospital Clinic of Barcelona, Barcelona, Spain.

To evaluate possible contamination of the femoral neck fracture haematoma as a source of an increased rate of early postoperative prosthetic joint infection (PJI). A prospective, observational study was performed. All patients who underwent hip hemiarthroplasty for a femoral neck fracture from April '08 to February '09 were included. Three samples were taken just after the arthrotomy: a tissue sample (TS), a swab of haematoma (S) and blood of haematoma (AL) inoculated into blood culture flasks. Patients received the standard prophylaxis. Conclusion: The haematoma in femoral neck fractures was contaminated in 31.2% of cases. The contamination of the haematoma with a GNB was associated with a higher risk of early postoperative PJI.