

S1. Infections Following Mass Casualty Situations

Late skin infections in tsunami victims

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Background and Objective: Rapidly growing mycobacteria, like *M. abscessus* and *M. fortuitum*, and the dark-pigmented mold *Cladophialophora bantiana* are found worldwide in waters and decaying vegetation. Such micro-organisms may cause cutaneous infections in immunocompetent patients following inoculation by surgical procedures or accidental penetrating trauma.

Seven immunocompetent patients contracted cutaneous infections by *M. abscessus* or *M. fortuitum*, and 2 of them *Cladophialophora bantiana*. All had sustained severe soft tissue injuries on the lower legs during the tsunami catastrophe in Thailand, 2004, and received partial thickness skin grafts after multiple surgical revisions. The infections arose closely outside the skin grafts approximately two months after the tsunami.

Methods: Culture of biopsy from several purulent, blue-red, skin lesions revealed *M. abscessus* (5 cases), *M. fortuitum* (2) and *Cladophialophora bantiana* (2).

Histopathological examination showed granulomatous reaction, formation of suppurative palisading epithelioid and giant cells granulomas, with central neutrophilic abscesses. Fungal hyphae were noted in dermis in one case. Sand particles were identified.

The 4 patients with *M. abscessus* infection got ampicillin intravenously and clarithromycin orally for 4-10 months, one patient with *M. fortuitum* doxycycline and ciprofloxacin orally for 4 months. *Cladophialophora* infections were treated with voriconazole for one month.

Surgical excisions were needed in three patients. Hyperbaric oxygen treatment was tried in one patient. Two patients recovered spontaneously.

Results: All skin lesions have healed completely within one year. Sand particles can still be detected in the subcutis in one patient by magnetic resonance.

Conclusion: Inoculation infections were contracted with micro-organisms by the trauma connected with the tsunami. Histopathological examination and culture for mycobacteria and fungi of biopsy tissues may reveal environmental infectious agents contracted by contaminated trauma.

S4. Prosthetic Implant Infections

Treatment of prosthetic knee infections: a retrospective evaluation of a five and a half year experience

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Objectives: To evaluate the outcome of treatment of prosthetic knee infections, and to identify predictive factors associated with treatment failure.

Methods: We retrospectively analysed the outcome of all patients with a total knee arthroplasty infection treated at a single tertiary care centre from January 2000 to July 2005. Clinical presentation, C-reactive protein level, white blood cell count, infecting organisms, interval between placement of total knee arthroplasty and first symptoms of infection as well as delay between onset of symptoms and surgical treatment, surgical intervention, antibiotic therapy, and co-morbidity were recorded. All patients were followed for at least 12 months after the first surgical intervention until April 2006. Treatment was considered successful if no signs and symptoms of prosthetic joint infection occurred within this period.

Results: 16 patients met the criteria for prosthetic knee infection. Mean follow-up was 36.8 months. Patients were managed according to one of three treatment protocols: (1) two-stage exchange of the prosthesis: 7 patients, (2) debridement with retention of the prosthesis: 8 patients, (3) resection arthroplasty with arthrodesis: 1 patient. 10 patients had monomicrobial infection; 4 patients had polymicrobial infection; in 2 patients, no microorganisms could be identified. Overall treatment failure rate was 37.5% (6 of 16 patients). All of the 7 patients undergoing two-stage exchange were cured, while in patients who underwent debridement without implant removal only 3 of 8 (38%) interventions were successful ($p=0.003$). Mean treatment delay was considerably longer in the five patients who underwent debridement without success when compared with the three patients who were treated successfully with retention of the prosthesis (20.8 vs 1.1 weeks). All three patients with sinus tracts failed therapy with debridement. Long-term antimicrobial therapy did not improve success rate of debridement.

Conclusion: In prosthetic knee infections, debridement without removal of the prosthesis was associated with a high rate of failure when compared to two-stage exchange. Especially a long interval between onset of symptoms and surgical intervention as well as the presence of a sinus tract were associated with treatment failure in this group of patients. Our data suggest that patients should be carefully selected according to current treatment algorithms for successful treatment of prosthetic knee infections with retention of the prosthesis.

S5. Intraabdominal Infections

Planned relaparotomy versus relaparotomy on demand in patients with secondary peritonitis: a randomised, clinical trial (RELAP trial).

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Objectives: Surgery is the mainstay of the treatment of abdominal sepsis. The discussion whether a more aggressive (planned: PR) strategy is preferred over the more conservative strategy (on demand: OD) is ongoing. The aim of this trial was to compare whether relaparotomy 'on demand' in comparison with a planned relaparotomy reduces the risk of 180-day bad outcome (death or severe morbidity leading to surgical intervention or readmission) within 6 months after initial surgery.

Methods: The RELAP trial is a randomised multicenter (9 center) trial in patients with secondary peritonitis. Exclusion criteria were: age <18 and >80; APACHE ≤10; pancreatitis; CAPD peritonitis; peritonitis caused by perforation within 24 hours after endoscopy. Randomisation was stratified by severity of disease (APACHE II score 11-20 or >20) and hospital. Patients were randomised for planned relaparotomy every 36-48 hours until negative findings or relaparotomy only when clinical deterioration or lack of improvement.

Results: A total of 231 patients were randomised (115 OD and 116 PR). In the OD group a relaparotomy could be avoided in 58% of the patients. In the PR group 24% underwent 3 or more relaparotomies compared to 8.8% in the OD group. Patients in the OD group had a shorter ICU stay (median 7 vs. 11 days; p=0.0013) and hospital stay (median 27 vs. 35 days; p=0.0075). The OD patients had a slightly reduced risk of 180 day bad outcome (54% in OD vs. 60% in PR group; p=0.39), and in the components mortality (26% in OD vs. 30% in PR; p=0.48) and severe morbidity in survivors (39% in OD vs. 43% in PR, p=0.56). Hospital ICU level and type of hospital were significant modifiers of treatment effect with respect to mortality (p=0.045). Mortality was lower in the OD compared to the PR group in academic hospitals and/or hospitals with a level III ICU care (highest level) compared to OD patients treated in non-academic hospitals and/or hospitals with level I/II ICU care. Health care resource utilisation was lower in the OD group resulting in almost 20% less costs compared to the PR group: mean per OD patient EURO 62,569 vs. EURO 77,724 for PR).

Conclusions: Relaparotomy 'on demand' strategy is a safe strategy that clearly reduces re-operation, ICU and hospital stay and costs, but not mortality or severe morbidity at 6 months after initial admission. The effect on mortality varied between hospitals, with a survival benefit for the OD strategy in academic hospitals and/or hospitals with ICU level III.

S7. Infections in Intensive Care

Prevalence and pattern of infections caused by multi-drug resistant *Pseudomonas Aeruginosa* susceptible only to Colistin in cardiac surgical ICU patients

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Objectives: Gram negative bacilli including multi-drug resistant (MDR) *Pseudomonas aeruginosa* are responsible for severe ICU-acquired infections, mainly pneumonia and bacteraemia. The aim of this study was to determine the incidence of this multi-resistant strain of *Pseudomonas* in patients undergoing cardiac surgery, to elucidate the effectiveness of treating them with colistin and to assess the safety of the drug.

Methods: A retrospective study was conducted among patients who were submitted to cardiovascular surgery for a variety of cardiac lesions during the last year and were attended at the Surgical Intensive Care Unit. All case histories of the patients were objected to meticulous analysis in order to identify the development of infectious complications. Diagnosis of infection was based on clinical data and isolation of the pathogen which was tested with respect to its susceptibility to colistin. Clinical response to polymyxins was evaluated.

Results: Over a 12-month period, 10 patients were colonized and infected by strains of *Pseudomonas aeruginosa* resistant to all potentially active antibiotics except colistin. All patients were mechanically ventilated and 8 of them presented respiratory tract infection while 1 patient suffered deep surgical site infection and bacteraemia and 1 patient donor site infection. They were all treated with intravenous colistin in combination with aerolized colistin. Deterioration of renal function occurred in 3 patients (30%). Nephrotoxicity was elevated significantly in those patients with a history of renal failure. Cure or clinical improvement was observed in 8 patients (80%) while 2 patients (20%) developed sepsis and Multiple Organ Failure. Aerolized colistin was administered even after the cessation of the intravenous therapy and amelioration of renal function was observed. The age of the patients and the type of surgical procedure were independent predictors of mortality.

Conclusions: The increasing prevalence of MDR *Pseudomonas aeruginosa* in ICU patients has recently rekindled interest in polymyxins that had previously been used but had been abandoned because of toxic side-effects. Colistin retained significant "in vitro" activity against this virulent organism, has an acceptable safety profile and should be considered as a treatment option in critically ill patients with infection caused by multiresistant Gram-negative bacilli. Aerolized colistin merits further consideration as a therapeutic intervention for patients with pulmonary infections who are already receiving renal replacement therapy.

S8. Skin and Soft Tissue Infections

Emergence of community acquired MRSA soft tissue infections

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Objective: The objective of our study is to describe the increasing incidence of community acquired methicillin-resistant *Staphylococcus Aureus* (MRSA) soft tissue infections as well as their surgical treatment in East Tennessee

Methods: After obtaining consent from the East Tennessee Children's Hospital Investigational Review Board, a retrospective chart review of all 245 patients treated with incision and drainage of a soft tissue infection from March 2000 to September 2005 was completed. 40 patients were excluded from the review as no cultures were completed during their hospital stay.

Results: The most common organism cultured was community acquired MRSA, 33% (67/205). Non-community acquired MRSA accounted for another 4% (9/205). The age of the patients ranged from 1 month of age to 21 years with a mean of 7.2 years. Stratified by year, the incidence of positive cultures for community acquired MRSA has increased 159% since 2004 and 868% since 2003. Additionally, the average age of patients affected has decreased from 8.3 years in 2000 to 6.1 years in 2005.

Conclusions: Community acquired MRSA has emerged as the dominant source of soft tissue infections regardless of site requiring incision and drainage in Eastern Tennessee. This has caused a change in the choice of empiric antibiotic use in our region. These infections now account for the third most common reportable disease to the Department of Health in Eastern Tennessee

S10. Infection Control

Laparoscope use and surgical site infections in colon surgery, appendectomy, and cholecystectomy

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Objectives: To compare surgical site infections (SSI) rates following digestive operations performed by laparoscopy or open surgery.

Methods: Prospective study included in a multicenter surveillance programme using the Centres for Disease Control and Prevention (CDC) criteria for the diagnosis of SSI and a post-discharge follow-up at 30 days. 2092 colon surgeries (COL), 2468 appendectomies (APP), and 3096 cholecystectomies (CCY) performed in 9 hospitals between March 1998 and December 2004 were analysed. Length of stays (LOS) and SSI rates were compared for each procedure between open operations and those done with a laparoscope. Multivariate analysis (logistic regression) was used to analyse the effect of laparoscope use on SSI rates while adjusting for potential confounding factors such as the 3 components of the U.S. National Nosocomial Infection Surveillance (NNIS) index (contamination class, ASA score, duration of the operation), the age, the gender, any re-intervention done for a non infectious complication, and the hospital.

Results: A 30-day follow-up was available for >95% of the patients. 19% of SSI were diagnosed post-discharge in COL, 66% in APP, and 45% in CCY. The mean LOS were significantly shorter for patients operated with a laparoscope than for those who underwent open surgery (p smaller than .001): 12.5 days (standard dev. = 10.1) vs. 20.3 days (15.7) for COL, 5.5 days (11.8) vs. 6.4 days (9.5) for APP, and 5.9 days (5.1) vs. 13.1 days (8.7) for CCY. Crude SSI rates in operations done with a laparoscope and open operations were respectively 35/311 (11.3%) vs. 400/1781 (22.5%) for COL, 59/1051 (5.6%) vs. 117/1417 (8.3%) for APP, and 46/2652 (1.7%) vs. 35/444 (7.9%) for CCY. In univariate analysis, the use of a laparoscope was associated with a risk reduction of 50% for COL (crude OR: 0.5; [95%CI: 0.36-0.69]), 32% for APP (0.68 [0.50-0.92]), and 78% for CCY (0.22 [0.14-0.34]). In multivariate analysis, laparoscopy remained independently associated with lower rates of SSI in COL (adjusted OR: 0.43 [0.29-0.63]), APP (0.61 [0.43-0.87]), and CCY (0.27 [0.16-0.43]).

Conclusion: Irrespective of differences in the length of hospital stay, the use of a laparoscope appears independently associated with lower SSI rates in cholecystectomy, appendectomy, and colon surgery.