

Session: OS098 New frontiers in reducing SSI

Category: 8b. Other foreign-body and implant infections

23 April 2017, 16:24 - 16:34
OS0509

Synovial fluid examination before reimplantation and cultures at reimplantation do not predict outcome of PJI undergoing two-stage exchange

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Background: Reimplantation in patients with PJI undergoing two-stage exchange remains a challenge due to the lack of markers able to assess the risk of failure. In this subgroup analysis, part of a study investigating the usefulness of continuous antibiotic period versus an antibiotic-free period before reimplantation, we evaluate the predictive value of synovial fluid examination before reimplantation and of cultures at reimplantation in patients with PJI undergoing two-stage exchange.

Material/methods: We investigate the role of microbiologic data at reimplantation and of synovial fluid examination before reimplantation as part of a study investigating the usefulness of continuous antibiotic therapy in respect to an antibiotic-free period before reimplantation in patients with PJI referred for consultation to our Department of Infectious Diseases over a 6-year period (2009-2014).

PJI was defined by clinical and laboratory evidences. We collected demographic, clinical, and microbiological data. Cultures were performed during prosthesis explantation and during reimplantation. Synovial fluid examination was attempted before reimplantation. Cure was defined by absence of recurrence 24 months after reimplantation. The statistical analysis of the factors related to the therapeutic response was performed using the Mann-Whitney U test and Fisher's exact test.

Results: One hundred-thirty-six cases of PJI were evaluated [median age 67 years (range 36-81), 48% males, 53 hip PJI and 78 knee PJI]. Cultures at explantation were positive in 114 (84%) cases, 6 had a polymicrobial infection. *Staphylococcus aureus* was isolated in 48/136 (35%) cases, coagulase-negative staphylococci were isolated in 45/136 (33%) cases. Seventy-nine (58%) patients (Group A) received continuous therapy until reimplantation and 57/136 (42%) observed an antibiotic free period (Group B) before reimplantation. CRP value was normal in all cases before reimplantation. Median white synovial cell count before reimplantation was 1122 (980-1439) cells/mL in Group A patients and 1585 (1089-1730) in Group B patients ($p=ns$). At the time of reimplantation intraoperative cultures were positive in 14 (the same organism at explantation and reimplantation was reported in only 3 cases). A favourable outcome was achieved in 115 (85%) cases. Of 24 patients with recurrence during follow-up, 8 had 1 of the 5 specimens collected during reimplantation positive for growth of different bacteria in respect than those isolated of explantation. Patients undergoing reimplantation without an antibiotic free period reported better outcome (74/79 vs 41/57, $p=0.001$).

Conclusions: In our study synovial fluid aspirate before reimplantation has low accuracy to establish persistent infection in PJI patients undergoing two-stage exchange. Microbiology at reimplantation is not useful because the spacer in place influences bacterial growth and misleading information for the therapeutic choices derive from the changing of organisms cultured at reimplantation. In this view, reimplantation could be considered without an antibiotic free period to reduce recurrence. Other biomarkers must be investigated.