P0710 Novel pathogen detection methods in synovial fluid: can microcalorimetry better diagnose septic arthritis than culture?

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Background: Synovial fluid culture is the standard investigation for the diagnosis of septic arthritis, but it is time-demanding and has limited sensitivity. In this prospective study, we evaluated a microcalorimetry for the rapid diagnosis of septic arthritis. Microcalorimetry measures growth-related heat production of reproducing cells in biological fluid and delivers live, on-site results of microbial growth.

Materials/methods: Synovial fluid of patients with acute inflammatory hip and knee arthritis was analyzed for leukocyte count and differential, culture and microcalorimetry. Septic arthritis was diagnosed by positive synovial fluid culture or by the presence of local inflammatory signs, elevated synovial fluid leukocyte count (or differential) and exclusion of aseptic causes of inflammatory arthropathy. The sensitivity and specificity for each test were compared by McNemar's chi-squared test.

Results: Among 57 included patients, septic arthritis was diagnosed in 22 patients (39%). Among 22 patients with septic arthritis, the causative pathogen was identified by culture of synovial fluid and/or intraoperative tissue in 14 cases (64%). In 8 patients empirical antimicrobial treatment was initiated before joint aspiration. The most common isolated pathogens were Streptococcus spp. (n=5) and Staphylococcus aureus (n=5). Synovial fluid culture was positive in 10 (46%) and microcalorimetry in 10 (46%) patients (p=0.724). Positive microcalorimetry growth curves are shown in the figure. Specificity of culture and microcalorimetry was 100% and 94%, respectively. Comparing microcalorimetry with conventional culture of synovial fluid, 49 concordant pairs were found (86% agreement rate). Microcalorimetry required a median of 8.8 hours (range 2.3 - 64 hours), whereas cultures required a median of 4.5 days (range, 3 - 14 days).

Conclusions: The performance of synovial fluid microcalorimetry was similar to culture, but provided results more rapidly. This represents an important advantage in the clinical setting, where immediate joint wash-out is crucial for treatment success. However, as microcalorimetry does not provide the pathogen identification and susceptibility testing, standard microbiological tests are still necessary.

Figure. Positive microcalorimetry growth curves