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The Diagnosis of Periprosthetic Infections: the special case of Cutibacterium

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These authors are recognized as international experts on the diagnosis of periprosthetic infections (PJI). They point to the particular challenge in diagnosing PJI caused by Cutibacterium. As the authors point out, “ESR and CRP are often not elevated in PJI cases caused by slow growing organisms, such as Cutibacterium acnes, that do not produce a suppurative host response. This is of particular clinical concern in the setting of shoulder arthroplasty. A review of 1,200 hip and knee revision arthroplasties demonstrated that ESR and CRP had higher false-negative rates than previously reported, particularly for slow-growing and culture negative organisms.”

Diagnosing PJI (in any joint) caused by Cutibacterium has some very particular and important requirements :
(1) Multiple (ideally 5) specimens from deep tissue or explants need to be submitted for culture at the time of revision surgery.
(2) Specimens need to be cultured on aerobic and anaerobic media as well as broth
(3) Cultures need to be observed for at least 17 days
(4) Culture results are ideally characterized not simply as “positive” or “negative” but rather as the degree of positivity (broth only (0.1), one colony only (0.1), only one quadrant of the plate with growth (1+), two quadrants of the plate with growth (2+), three quadrants of the plate with growth (3+), and four quadrants of the plate with growth (4+).
(5) Each medical center needs to run cultures of control specimens (such as sterile swabs exposed in the operating room) to determine their particular control culture rate of positivity
(6) There is no such thing as a “false positive” culture – if Cutibacterium grow, the culture is positive. Step #5 above is helpful in determining whether the organisms cultured come from the patient or from the environment.
(7) Because of the relative insensitivity of ESR, serum D-dimer, serum CRP, synovial WBC, synovial % PMN, synovial leukocyte esterase, synovial alpha-defensin, and synovial CRP for Cutibacterium PJI, the only reliable diagnostic criteria for Cutibacterium PJI is “two or more positive cultures” from deep tissue or explant specimens, especially if these cultures have a degree of positivity of 1 or more (see #4 above).

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In summary, these authors have made great progress in establishing criteria for the diagnosis of PJI from the organisms typically found in infected hip and knee arthroplasties. Further work is needed to develop criteria for organisms, such as Cutibacterium, that are relatively uncommon in the hip and knee, but that constitute the majority of PJI of the shoulder.

References

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