

Impact of Histological Tissue Analysis on Management in Revision Total Hip Replacement: Insights from a UK Specialist Orthopaedic Centre

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INTRODUCTION:

In revision total hip replacement (rTHR), tissue samples are routinely collected for microbiological culture to investigate prosthetic-joint-infection (PJI). Routine histological analysis and blood cultures has been standard practice to improve diagnostic accuracy. However, their added remains unclear. This study evaluates their diagnostic accuracy in detecting PJI. This study aims to evaluate the diagnostic accuracy of intra-operative histological sampling and blood cultures in detecting PJI.

METHODS:

rTHR performed for any indication except malignancy were identified from the tertiary centre's prospectively maintained arthroplasty database(2004-2019). Histology and blood culture reports from specialist musculoskeletal histopathologist were compared against intra-operative microbiological culture. PJI was defined as ≥ 2 samples growing the same organism(>50% positive), per Musculoskeletal-Infection-Society-2018 and European-Bone-and-Joint-Infection-Society-2021 criteria. Diagnostic accuracy, including sensitivity, specificity, positive-predictive-value(PPV), negative-predictive-value(NPV), positive-likelihood-ratio(PLR), and negative-likelihood-ratio(NLR), with 95% confidence-intervals(CIs), was calculated.

RESULTS:

Of 1367 rTHR, 132(9.7%) were positive for infection. Histology showed high specificity(92%, 95%CI:90–94), PLR (6.29, 95%CI:4.79–8.26), and NPV(94%, 95%CI:92–95), but low sensitivity(50%, 95%CI:41–59), NLR (0.54, 95%CI:0.45–0.64), and moderate PPV(44%, 95%CI:36–53), making it reliable for ruling-in infection but not ruling-out infection. Similar to histology, blood culture was useful adjunct for ruling-in infection (specificity(95%, 95%CI:94–97), PLR(14.10, 95%CI:9.90–20.08), NPV(96%, 95%CI:94–97)) but not at ruling-out infection (sensitivity(66%, 95%CI:56–76), NLR(0.35, 95%CI:0.27–0.47), and moderate PPV(64%, 95%CI:54–74)). In 5.2% of cases, both blood and sample cultures grew the same organism, while 76% were both negative

DISCUSSION AND CONCLUSION:

While blood culture still serves as a useful adjunct in the diagnostic process, our findings suggest that routine histology sampling in rTHR may not be necessary, but rather when infection is suspected or during multi-stage revision. These findings challenge the routine PJI investigation practices among UK revision-arthroplasty surgeons and offer potential for substantial cost-savings.