Next Generation Sequencing Test for Diagnosing Periprosthetic Joint Infection is Not Affected by Premature Antibiotic Administration

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INTRODUCTION:
Administration of antibiotics prior to diagnostic testing for periprosthetic joint infection (PJI) can impede the accuracy of standard diagnostic tests, namely cultures results. Next generation sequencing (NGS) has shown promising results when cultures failed to detect the infecting organism. The aim of this study was to assess the impact of administration of premature therapeutic antibiotics prior to performing diagnostic workup for PJI on serum ESR and CRP, synovial WBC and PMN%, synovial culture and NGS results.
METHODS:
A retrospective analysis of 132 patients who underwent revision hip or knee arthroplasty due to MSIS confirmed PJI. All patients underwent synovial NGS testing for detecting the infecting organism in addition to serum ESR and CRP, synovial WBC and PMN% and synovial cultures. Among the patients, 46% received antibiotic therapy before the diagnostic workup, while the rest did not. The patients were categorized into two groups depending on whether or not they received antibiotics and the sensitivity of the mentioned diagnostic tests were compared.
RESULTS:
Patients in the antibiotic group had lower median in serum ESR (87 vs. 62 mm/hr; p = 0.007), CRP (17.8 vs. 11.2 mg/L; p=0.0042), synovial WBC (48,252 vs. 8,788; p=0.002), and PMN% (95% vs. 84.2%; p=0.004). Administration of antibiotics negatively impacted the sensitivity of all the diagnostic tests ESR (75.2% vs. 91.5% [relative risk (RR) for false-negative results, 2.4; p = 0.04]), CRP (65.4% vs. 82.5% [RR, 2.1; p = 0.03]), synovial WBC (70.2% vs. 94.4% [RR, 5.2; p = 0.001]), PMN% (75.8% vs. 93.5% [RR, 3.4; p = 0.01]). The rate of negative cultures were higher in the antibiotics group at 36.0% compared to the no-antibiotics group at 18.3% (p = 0.029). NGS was overall significantly more sensitive than cultures 96.2% vs. 73.5% [RR, 5.3; p = 0.001]. Administration of antibiotics did not impact the NGS results 95.1% in the antibiotic group vs 97.2%.
DISCUSSION AND CONCLUSION:
Administration of antibiotics prematurely can have negative consequences on the accuracy of standard diagnostic tests for periprosthetic joint infection, leading to a significant increase in false-negative results. However, the NGS test was found to maintain its effectiveness even when antibiotics had been administered prior to diagnostic workups. This suggests that the use of antibiotics before diagnostic testing for periprosthetic joint infection can interfere with diagnosis, but the NGS test can still be used as a reliable diagnostic tool, even in these situations.