Diagnostic Accuracy of Alpha-Defensin in Total Hip and Total Knee Arthroplasties

Mark Wu¹, Brett Robert Bukowski, Joel Allan Hickman, Elitza Slavova Theel, Robin Patel¹, Daniel J Berry¹, Matthew Philip Abdel¹

¹Mayo Clinic

INTRODUCTION:

Accurate and timely diagnosis of periprosthetic joint infection (PJI) remains suboptimal. One available test is the alpha defensin lateral flow assay (ADLFA). This study assessed ADLFA for diagnosis of PJI in total hip arthroplasties (THAs) and total knee arthroplasties (TKAs). The hypothesis was that ADLFA would have high specificity and sensitivity for diagnosing PJI, but that certain clinical features would influence test reliability. METHODS:

We reviewed 473 ADLFA tests from 141 THAs and 332 TKAs performed in routine clinical practice from 2020 – 2023 at a single institution. Mean age was 66 years, 51% were female, and mean BMI was 32 kg/m². There were 142 PJIs (2018 MSIS criteria excluding ADLFA). Overall, 49% were primary and 51% revision procedures, 22% were on antibiotics within 2 weeks of arthrocentesis, 18% had an inflammatory arthropathy, and 7% had an *in situ* spacer. RESULTS:

The overall sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of ADLFA were 80%, 97%, 92%, and 92%, respectively. Six percent of the entire cohort (29/473) had false negative results, of which 38% were on antibiotics within 2 weeks of arthrocentesis. Twenty-one percent of FNs were spacer aspirations. Two percent (10/473) of the entire cohort had false positive ADLFA results. NPV was lower for those with recent antibiotic use (76%) compared to without (94%; p<0.001). There was lower sensitivity (57%) in spacer compared to non-spacer aspirations (82%; p=0.04). Furthermore, the sensitivity in THA (67%) was lower compared to TKA (84%; p=0.033). In TKAs, there was lower specificity (91%) for those with inflammatory arthropathies compared to without (99%; p=0.02). DISCUSSION AND CONCLUSION:

ADLFA is highly specific in diagnosing PJI, but less sensitive in patients with antibiotic spacers and those with THAs compared to TKAs. Additionally, underlying inflammatory arthropathies may decrease specificity, yielding false positive results, specifically in TKAs.