High Prevalence of Early Stress Shielding in Stemless Shoulder Arthroplasty
Ian DeYoe Engler¹, Paul-Anthony John-Joseph Hart, Daniel Patrick Swanson, Jacob Kirsch², Jordan Murphy³, Melissa Wright, Anand M Murthi⁴, Andrew Jawa
¹Tufts Medical Center, ²Boston Sports and Shoulder Center, ³Atlanta Medical Center, ⁴Medstar Union Memorial Hosp

INTRODUCTION:
The rates of early stress shielding in stemless total shoulder arthroplasty (TSA) in the limited current literature are very low and inconsistent with our observations. We hypothesized that the incidence of early radiographic stress shielding in consecutive stemless TSA would be higher than previously reported.

METHODS:
All consecutive stemless TSA in a prospective database using a single humeral implant comprised the study cohort of 104 patients, of which 76.0% (79 patients) had minimum one year radiographic and clinical follow up. Radiographs were reviewed for humeral stress shielding, humeral radiolucent lines, and humeral or glenoid loosening/migration. Stress shielding and radiolucent lines were classified by location in accordance with Denard et al.¹¹ Demographics and clinical outcomes, including American Shoulder and Elbow Surgeons Standardized Shoulder Assessment Form (ASES) score and Visual Analogue Scale (VAS) pain score, were compared between cohorts of patients with and without stress shielding.

RESULTS: At one year, 41.8% of patients had humeral stress shielding. Medial calcar osteolysis was seen in 32.9% of all patients and 78.8% of the stress shielding cohort. There were no cases of radiolucent lines or humeral or glenoid loosening/migration. There was no significant difference in age between stress shielding and no stress shielding cohorts (P = 0.31), but there were significantly more females (P = 0.018) and lower body mass index (BMI) in the stress shielding cohort (P = 0.004). There were no significant differences in preoperative ASES (P = 0.24) or VAS scores (P = 0.39) or postoperative ASES (P = 0.32) or VAS score (P = 0.32).

DISCUSSION AND CONCLUSION:
We found that stress shielding in stemless TSA is more prevalent than previously published, largely due to infrequently reported medial calcar osteolysis. Stress shielding is more common in women and in patients with lower BMI. At early follow up there were no significantly worse subjective patient outcomes in the stress shielding cohort, but longer term follow up is needed to fully understand the impact of stress shielding on patient function and implant stability.