Inferior Glenoid HyperOSTosis (GHOST) Lesion Development Following Reverse Total Shoulder Arthroplasty

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INTRODUCTION: Patients undergoing reverse shoulder arthroplasty (RTSA) have been noted on post-operative radiographs to have a curved bony overgrowth on the inferior glenoid neck. This study aims to investigate potential risk factors for and postoperative effects of these ossifications, here called glenoid hyperostosis (GHOST) lesions due to their location.
METHODS: A retrospective review of patients undergoing reverse total shoulder arthroplasty between 2007 and 2020 at a single institution was performed. Predictors including gender, age, implant sizing, and preoperative diagnosis were examined using logistic regression analysis. Outcomes including readmission rate, revision rate, preoperative and postoperative range of motion, visual analog scale (VAS) pain scores, and American Shoulder and Elbow Surgeons (ASES) functional outcome scores were also analyzed using two-sample *t*-tests.
RESULTS:
Preoperative and postoperative radiographs of 170 primary reverse shoulder arthroplasty patients were assessed. 25.9% of RTSAs were identified to have a GHOST lesion. When adjusting for race, age, BMI, preoperative diagnosis, male patients were still associated with 2.277 odds of developing a GHOST lesion compared to female patients (95% CI: 1.08 – 4.86). Other elements such as age, race, BMI, laterality, preoperative diagnosis, implant manufacturer, and implant sizing demonstrated no statistically significant association to GHOST lesion presence. Postoperatively, GHOST lesion development was not associated with range of motion or ASES score. However, presence of GHOST lesions on radiographs was associated with increased pain scores for patients at 2 months ($p = 0.034$) and 12 months ($p = 0.029$) post-operatively.
DISCUSSION AND CONCLUSION:
Inferior glenoid hyperostosis (GHOST) lesions is a common and potentially benign finding following reverse shoulder arthroplasty, with unclear etiology. Risk factors for GHOST lesions included male gender, while patient demographics, implant type or size, shoulder lateralization and distalization were not associated with lesion formation. Clinically, greater short-term VAS scores were seen in patients with GHOST lesions. However, there were no differences observed between the two groups in ASES scores or postoperative range of motion at later time points. Further research is needed to identify risk factors and assess the clinical implications of GHOST lesions.

Figure 1a. Preoperative AP radiograph exhibiting no lesion on the inferior glenoid. Superior migration of the humeral head is noted, likely indicating rotator cuff pathology, as well as glenohumeral joint space narrowing, subchondral sclerosis of glenoid and humeral articular surfaces, and osteophyte formation on the inferior margin of the humeral articular surface, indicating severe glenohumeral osteoarthritis.
Figure 1b. Postoperative AP radiograph of the same patient from Figure 1, demonstrating presence of a glenoid hyperostosis (GHOST) lesion (white arrow) after reverse total shoulder arthroplasty (RTSA).
Figure 1c. Select coronal computed tomography cut of a right shoulder demonstrating a GHOST lesion (white arrow) following RTSA in one of the patients from this sample.