Incidence and Risk Factors of Metal Hypersensitivity in Patients Undergoing Total Shoulder Arthroplasty

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INTRODUCTION: Evaluation of the painful shoulder following total shoulder arthroplasty (TSA) can be complex. Metal allergies have been investigated as a cause of postoperative pain. Metal allergies assessment is limited to patient questionnaires and cutaneous tests, which have limitations with clinical applicability. Lymphocyte transformative tests (LTT) have been developed to ascertain patient sensitivities to metals. The purpose of this investigation is to assess metal sensitivities in patients undergoing TSA.

METHODS: Consecutive patients undergoing TSA (anatomic or reverse) and who were able to obtain a blood allergy test from March 2022 to April 2025 were included. Patient's blood samples were collected and sent to an outside facility to assess for metal sensitivities. Patient charts were reviewed for demographics, previous surgical history, and other exposures to metals. Multivariate analysis was performed to assess risk factors for metal hypersensitivity. Statistical significance was determined when $p<0.05$.

RESULTS: A total of 201 patients were included in the analysis. A positive result for metal reactivity to at least one metal was observed in 114 patients (57%). Of the 114 patients who tested positive, 106 patients (93%) were reactive to Nickel, which was the most common metal, 5 patients (4%) were reactive to bone cement monomer, 5 patients (4%) were reactive to titanium alloy particles, and 22 patients (19%) were reactive to multiple metals. There were 101 patients tested for LTT based on suspicious clinical history, of which 60 patients (59%) were reactive to at least 1 metal. Of the 33 patients tested based on being younger than 60 years old, 18 (55%) tested positive for at least 1 metal allergy. There were 29 patients indicated for LTT as workup prior to a revision surgery, with 18 (62%) testing positive. The remaining 36 patients had unclear history of metal allergy, and 18 (50%) had a positive result.

DISCUSSION AND CONCLUSION: Metal hypersensitivity is a highly prevalent phenomenon amongst patients undergoing TSA. Although long-term clinical effects and the direct correlation between metal hypersensitivity and outcomes are unknown, physicians should be vigilant of this sensitivity and consider avoidance of certain implants that may elicit an allergic reaction.