What is the Minimum Necessary Internal Rotation After Reverse Shoulder Arthroplasty to Perform Internal Rotation-Dependent Activities of Daily Living?

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INTRODUCTION: The purpose of this study was to determine the minimum necessary internal rotation (MNIR) for patients to perform IR-dependent activities of daily living (IRADLs) and achieve favorable patient satisfaction after reverse shoulder arthroplasty (rTSA). Reverse total shoulder arthroplasty (rTSA) has expanding indications with satisfactory patient reported outcomes overall. Despite overall satisfaction, rTSA has suffered from generally inferior internal rotation (IR) compared to anatomic total shoulder arthroplasty. This difficulty in regaining IR and an unclear threshold for what IR level is needed for IR-dependent ADLs (IRADLs), make it difficult to predict outcomes and counsel patients. Studies tend to treat IR and ability to perform tasks as a linear relation, though we do not know if this is actually the case. The minimum necessary internal rotation (MNIR) for patients to perform IRADLs has not been empirically established. Knowing the true level will allow for better assessment of interventions, design, postoperative rehab and management, and outcomes on determining if sufficient IR is achieved. The purpose of this study was to determine the MNIR for patients to perform IRADLs and achieve favorable patient satisfaction after rTSA. We hypothesized that the L3 vertebral level would be MNIR for rTSA however this will vary by age and sex of patient.

METHODS: Our institutional shoulder arthroplasty database was queried for patients undergoing primary rTSA with a minimum 2-year follow-up. Patients who were wheelchair bound or had a preoperative diagnosis of infection, fracture, and tumor were excluded. IR was measured to the vertebral level and scored using an 8-point scale.

RESULTS: We initially identified 599 consecutive RSAs (536 patients) with minimum 2-year clinical follow-up. We excluded patients that were wheelchair bound (7 RSAs in 4 patients), with missing postoperative objective IR (52 RSAs in 48 patients), or missing answers to questions regarding ability to perform IRADLs (5 RSAs in 3 patients). We found that L1-L3 vertebral levels were the lowest IR levels to achieve reasonable ability to perform ADLs. However, this varied with age and sex. Patients 60-69 years of age require only the buttock level to be satisfied, despite requiring greater than IR of L3 to achieve most activities. The oldest reported age group, patients ≥80 years of age, appeared more willing to accept a lower IR to the sacrum, while requiring IR to L4-L5 for successful achievement of most of their IRADLs. Conversely, the youngest group, ages <60 years, required a higher IR to L4-L5 to be considered satisfied, but similar IR level to achieve IRADLs.

DISCUSSION AND CONCLUSION: Confirming an MNIR of L1-L3 to achieve IRADLs in most patients provides useful information to both the patient and surgeon in counseling, postoperative expectations, and now with the advent of potential machine learning and predictive tools.