Correlation between Baseplate Positioning and Clinical Outcomes after Reverse Shoulder Arthroplasty

Eiko Hashimoto, Nobuyasu Ochiai[1], Shohei Ise[2], Kenta Inagaki[3], Yu Hiraoka, Fumiya Hattori
[1]Chiba Univ Grad School Of Med/Ortho Surg, [2]Chiba University Graduate School of Medicine, [3]Department of Orthopaedics, Chiba University Hospi

INTRODUCTION:

Accurate positioning of the glenoid component is crucial for good clinical results after reverse shoulder arthroplasty(RSA). There are many previous reports that the mal-positioning of baseplate with superior inclination leads to postoperative instability and early failure of glenoid component after RSA. The ideal positioning of baseplate is recommended that baseplate inclination should be perpendicular to the base of scapular spine. However there are few reports of the correlation between baseplate positioning and clinical results after RSA. The purpose of this study was to evaluate the correlation between baseplate positioning and clinical outcomes after primary RSA in cases with cuff tear arthropathy or osteoarthritis.

METHODS:

From April 2014 to May 2021, 192 shoulders of 175 patients who were underwent primary RSA for cuff tear arthropathy, osteoarthritis and rheumatoid arthritis were included in this study. All patients were required to have both clinical and postoperative CT scanner assessment with minimum 12 months follow-up. There were 91 men and 101 women with an average age of 76.6years at the time of the surgery (range; 59-91). There were 160 shoulders with cuff tear arthropathy and 32 shoulders with osteoarthritis or rheumatoid arthritis. The average follow-up period after surgery was 33.7months (range; 12-88). The glenoid morphology was classified as Favard E0; 49, E1; 98, E2; 15, E3; 27, E4; 3shoulders and as Walch A1; 130, A2; 40, B1; 2, B2; 13, B3; 7 shoulders respectively. Baseplate positioning was measured using postoperative 3D reformatted CT with 3 parameters: inclination, height and version. Inclination was measured in the scapular coronal plane by reference at the base of scapular spine. Height was also measured in the scapular coronal plane with a vertical translation between the inferior edge of glenoid and the inferior border of glenosphere. Version was measured in the scapular axial plane by reference of Friedman's line. The active range of motion (anterior elevation, external rotation and adduction) and clinical scores (UCLA and Constant score) were evaluated as clinical outcomes and the correlation between the clinical outcomes and the postoperative measurements of 3 parameters for baseplate positioning was evaluated. Furthermore, the area under receiver operating characteristics curve(AUC) were evaluated to calculate the cutoff value for postoperative baseplate inclination to predict excellent results with better anterior elevation.

RESULTS:

There was significant improvement in ROM from preoperative to postoperative. Anterior elevation improved from 60.6° to 136.2°, external rotation improved from 17.3° to 41.3° and adduction improved from L4 to L1 at final follow-up. Overall, there was significantly improvement in clinical scores from preoperative to postoperative. UCLA score improved from 10.2 to 32.1 and Constant score improved from 31.9 to 87. The average measurements of the baseplate positioning were 4.4 degree of superior inclination, 1.9mm of inferior translation and 0.7 degree of anteversion postoperatively. The baseplate positioning with superior inclination has a significant negative correlation with anterior elevation ($r = 0.450$), external rotation ($r = 0.245$) and adduction ($r = 0.346$). Superior inclination also has a significant negative correlation with clinical scores (UCLA score; $r = 0.414$, Constant score; $r = 0.461$). Correlations of height or version with final ROM and clinical scores were found to be non-significant. Additionally 11.4° of superior inclination was the cutoff value for worse clinical outcome with a lower anterior elevation less than 110°. The AUC was 0.85 with moderate accuracy.

DISCUSSION AND CONCLUSION:

The baseplate positioning with superior inclination of RSA has a significant negative correlation with all ROM and clinical scores in cases with cuff tear arthropathy and osteoarthritis. The cutoff value of worse clinical outcome with lower anterior elevation was 11.4°of baseplate superior inclination. We should pay attention to ensure correct baseplate positioning with less superior inclination to obtain good clinical outcomes after RSA.