# Effect of humeral lengthening on postoperative pain scores by three-dimensional measurements in RSA

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INTRODUCTION:

Humeral lengthening has been reported to correlate with postoperative clinical outcomes in Reverse shoulder arthroplasty (RSA). However, these are simple radiographic evaluations, and three-dimensional (3D) assessments using CT images have not been considered. The purpose of this study was to investigate the factors that influence postoperative clinical outcomes in the RSA implant placement in 3D evaluation and, in particular, the effect of humeral lengthening on postoperative clinical outcomes.

METHODS:

This retrospective study included 49 patients who underwent RSA between August 2017 and June 2021 and were followed up for at least two years postoperatively (Table 1 &2). Preoperative and postoperative CT images were used to evaluate postoperative implant placement using the 3D planning software Zed Shoulder software (Lexi, Tokyo, Japan) (Figure 1). Global offset, overhang of glenosphere, glenoid version, glenoid inclination, humeral lengthening (HL), and the amount of humeral resection (AHR) were measured (Figure 2). Clinical outcomes were also evaluated in relation to postoperative implant placement.

RESULTS:

Univariate analysis revealed that humeral lengthening correlated with the Pain score of Constant-Murley score and VAS (r=-0.37, p=0.01; r=0.38, p=0.01), and the overhang of the glenosphere correlated with the Constant–Murley score and Pain score of the Constant-Murley score (r=-0.34, p=0.02; r=0.31, p=0.03) (Table 3). Multivariate analysis by multiple regression analysis also detected humeral lengthening and the overhang of the glenosphere as factors of the pain score of Constant-Murley score ($R^2$=0.502) (Table 4). When patients with humeral lengthening were divided into two groups based on the amount of lengthening ($\leq$18 mm and >18 mm), the pain score of Constant-Murley score and pain VAS were significantly lower in the group with humeral lengthening of $\leq$18 mm (p<0.01, p<0.01) (Table 5&6).

DISCUSSION AND CONCLUSION:

Humeral lengthening affected postoperative pain scores in the RSA. In particular, the group with humeral lengthening of $\leq$18 mm had a significantly lower pain score. Therefore, we believe that postoperative pain scores can be improved by reducing the humeral lengthening to $\leq$18 mm.