

# Comparing Clinical and Functional Outcomes following Anatomic Total Shoulder Arthroplasty based on Humeral Component Length

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## INTRODUCTION:

With the continued increase in total shoulder arthroplasty (TSA), there has been a trend to transition from traditional standard length stems (>120mm) to short (<100mm) and stemless humeral components. Advantages of shorter components include decreased operative time, preservation of humeral bone, and theoretical decrease in stress shielding. The purpose of this study was to compare the clinical and functional outcomes of anatomic TSA between standard stems, short stems, and stemless components at a minimum of 2 year follow up.

## METHODS:

Patients from an IRB-approved, multicenter international database treated with primary anatomic total shoulder arthroplasty performed between 2017-2020 for osteoarthritis and available 2-year minimum follow up were reviewed retrospectively. Demographic, clinical outcomes, radiographic findings, and complication/revision rates were compared preoperatively and at latest postoperative follow up for cohorts based on humeral stem length (standard length, short stem, or stemless) using a one-way ANOVA with post-hoc Tukey's tests for pairwise comparisons or  $\chi^2$  where appropriate. Clinical outcomes included range of motion measures (abduction, forward elevation, IR score, and external rotation) and patient-reported outcome measures (VAS pain, global shoulder function, SST, Constant Score, ASES, UCLA, SPADI, and SAS). Radiographic information included the presence of glenoid radiolucent lines according to the Lazarus classification, as well as humeral radiolucent lines in zones specific to the stem type.

## RESULTS:

A total of 751 patients were included in the study (304 standard length stem, 288 short stem, and 159 stemless). The mean overall follow up was 35.5 +/- 10.7 months. Stemless components were more commonly used in younger male patients, but there was no statistically significant difference in body mass index, previous shoulder surgery, and medical comorbidities between groups. Standard stems had a slightly longer mean follow up compared to stemless components by 6 months ( $p < 0.001$ ). The mean final forward elevation for standard, short stem, and stemless components was 155°, 161°, and 154°, respectively ( $p = 0.005$ ). The mean external rotation for standard, short stem, and stemless components was 58°, 54°, and 51°, respectively ( $p = 0.001$ ). There was no difference in final VAS pain score, global shoulder function, Constant Score, ASES score, UCLA score, or SPADI score between the 3 cohorts. There was no difference in complication rate (standard = 2.0%, short = 2.4%, stemless = 4.4%;  $p = 0.290$ ), or revision rate (standard = 1.0%, short = 1.7%, stemless = 3.1%;  $p = 0.240$ ). The rate of humeral component radiolucent lines was also similar ( $p = 0.191$ ) with a rate of 5.3% for standard, 2.1% for short stems, and 3.3% for stemless components. Patient satisfaction was also similar between the 3 cohorts ( $p = 0.119$ ).

## DISCUSSION AND CONCLUSION:

In this short term clinical comparative study, our findings demonstrate similar improvements in VAS pain and functional outcome scores including global shoulder function, ASES score, and SPADI irrespective of the humeral stem component utilized. Similarly, complication and revision rates were similar for all 3 cohorts without any statistically significant difference in component radiolucent lines. Early data supports the use of stemless and short stemmed humeral components which may be advantageous in decreasing operative time and preserving humeral bone for potential revision. Longer term studies are needed to confirm the survivability and durability of these shorter components.