

# Accuracy of Component Size and Lateralization with 3D Templating for Reverse Total Shoulder Arthroplasty

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## INTRODUCTION:

Component size and position can affect the outcome of reverse total shoulder arthroplasty. Computer-assisted templating is an effective tool for improving the accuracy of component position in reverse shoulder arthroplasty. However, the accuracy of computer-assisted templating in determining final component size has not been readily evaluated. The aim of this study is to evaluate the accuracy of three dimensional (3D) computer topography templating in regard to component sizes and templated global lateralization for reverse shoulder replacements in vivo.

## METHODS:

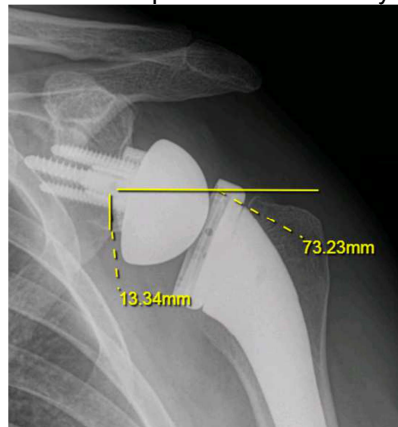
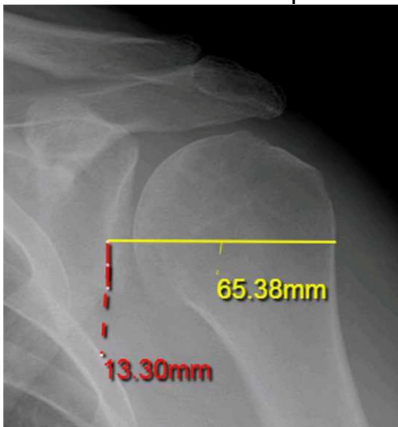
Sixty-three patients underwent reverse total shoulder arthroplasty using a three-dimensional computed tomography (CT)-based templating program. The specific program was utilized to provide estimations of sizes and positions for every component in reverse total shoulder arthroplasty (rTSA) surgery. Preoperative templates were compared to actual implanted sizes to determine accuracy and global lateralization was templated and calculated based on implanted components. We theorize that an accuracy of greater than 80% provides adequate evidence that templating is useful and provides the surgeon one more aspect of surgery that can be controlled.

## RESULTS:

Baseplate size (mm) matched in 96.8% of patients templated. Glenosphere size (mm) matched in 76.2%, and 96.8% were within 1 size. Humeral stem size matched in 42.9% of patients templated, with 81% within 1 size. Long versus short humeral stem was accurate in 98.4% of shoulders. Average global lateralization measured on true anterior/posterior films pre and postoperative of all patients was 7.1mm. If you removed patients with excessive lateralization (>12mm), the average lateralization decreased to 5.9mm.

## DISCUSSION AND CONCLUSION:

Three-dimensional computer topography templating is accurate in estimating size of a majority of aspects in reverse total shoulder arthroplasty. Baseplate size and type were the most accurate while humeral stem size was the least accurate but increased significantly when including sizes +1 or -1 from the templated size. This is likely due to the differences in bone quality and increased need for a tight fit using press-fit stems. Every patient's native lateralization was matched and in majority of patients the lateralization was increased according to CT templates. This study emphasizes that customization of implants based on patient's anatomy can be highly accurate and reproducible.



Component	Exact Accuracy (%)	Accuracy within 1 size when applicable (%)
Baseplate size	96.8	100
Baseplate Type (standard v. Full v. Half wedge)	93.7	
Glenosphere size	76.2	96.8
Glenosphere (centered v. eccentric)	65.1	
Stem Length (Long v. Short)	98.4	
Polyethylene Inclination	44.4	
Tray Offset (High v. Low)	61.3	
Humeral Stem size	42.9	81
Humeral Inclination	87.3	