

3D Templating Accuracy of Collared Triple Taper Stems and Single Taper

Melanie Caba¹, Laura Scholl¹, Ahmad Faizan¹, Emily Hampp¹, Robert Marchand²
¹Stryker Orthopedics, Mahwah, NJ, ² South County Health, South Kingston, RI
emily.hampp@stryker.com

Disclosures: Melanie Caba (3A and 4-Stryker), Laura Scholl (3A and 4-Stryker), Ahmad Faizan (3A and 4-Stryker), Emily Hampp (3A and 4-Stryker), Robert Marchand (2-Stryker, 3B-Stryker, 4-Stryker, 5-Stryker)

INTRODUCTION: The utilization of collared triple taper stems (CTTS) has grown significantly as compared to single taper stems (STS) in the past few years.¹ The CTTS stem designs aim to fill the proximal femur in both AP and ML planes.² Due to unique design features in both stems (collar vs non-collared, more proximally filling nature of CTTS), there may be differences in preoperative templating techniques between the two stem designs. The purpose of this study was to compare 3D templating accuracy of CTTS and STS stem designs in RA THA patients.

METHODS: A retrospective review of cases from a single high-volume surgeon performed with 3D CT-based robotic-arm assisted THA (RA-THA) were included in this study. The surgeon was exclusively used STS stems for cementless RA-THA, then the surgeon introduced CTTS and transitioned to CTTS over a period of a few months. 98 cases were reviewed for CTTS and STS: 196 total cases reviewed, 54% of cases were females. Both stem designs were from the same manufacturer, and used the same RA system for 3D preoperative templating.

RESULTS SECTION: The accuracy between the 3D templated size and the implanted stem are shown in Table 1. Exact matching of 3D template to stem size was 98% for both CTTS and STS. Matching the 3D template to stem size within 1 size was 100 % for both stems, with CTTS having only 2 cases with one size larger and one size smaller compared to template, and STS having only 2 cases with one size smaller compared to template.

DISCUSSION: This study demonstrated high accuracy of 3D templating for both CTTS and STS designs. The design differences between the two stems did not lead to variations in templating accuracy. Based on the results from this study, both stem designs are well suited for 3D templating of cementless RA-THA.

SIGNIFICANCE/CLINICAL RELEVANCE: This study demonstrates that 3D templating is highly accurate for both collared triple taper and single taper stems, despite design differences. These results reinforce the reliability of 3D templating across stem designs and support its continued use in RA-THA, potentially improving surgical planning, implant selection, and patient outcomes.

REFERENCES: 1. American Joint Replacement Registry 2024 Annual Report 2. Rainey J et al. Early Radiographic Fit and Fill Analysis of a New Metaphyseal-Filling Triple Taper Stem Designed Using a Large Computed Tomography Scan Database. Arthroplasty Today. PMID: 37745965

TABLE 1: Accuracy between template and actual stem size

Template stem size difference	Collared triple taper stem		Single taper stem	
	n	%	n	%
1 size larger	1	1.0	0	0.0
Same size	96	98.0	96	98.0
1 size smaller	1	1.0	2	2.0
Total	98	100.0	98	100.0