Title: **Three-Dimensional Tapered Polished Stem has Lower Periprosthetic Femoral Fracture Risk than Taper Slip Stems: An analysis of 6800 total hip arthroplasties from a high-volume hospital**

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Abstract

The increasing number of total hip arthroplasties (THA) and the rising incidence of periprosthetic femoral fractures (PFF) highlight the need for stem-type-specific outcome evaluation. PFF is one of the leading causes of THA reoperation and early stem failures, also increasing mortality. Our study's objective was to determine the incidence of PFF revision for two taper-slip stems (Exeter and CPT) and three-dimensionally tapered polished stem (MS-30) and to find differences between the stem types.

This retrospective cohort study includes patients who underwent primary THA at Coxa Joint Hospital during 2012-2021 using Exeter (n=1681), CPT (n=2306) or MS-30 (n=2813) stem. Revision for PFF was the endpoint and analyzed with Cox proportional hazard regression and Kaplan-Meier cumulative percentage probability estimate models at standardized two-year follow-up.

The incidence of PFF revisions was 0.8 % (95 % CI: 0.6-1.0 %) at two-year follow-up. MS-30 performed best (0.2 %, 95 % CI: 0.1-0.5), followed by Exeter (0.9 %, 95 % CI: 0.5-1.5) and CPT (1.3 %, 95 % CI: 0.9-1.9). Relative to Exeter, MS-30 had a hazard ratio (HR) of 0.870 (95 % CI: 0.225-3.368) at a six-month follow-up and 0.294 (95 % CI: 0.105-0.827) with a follow-up period from six months to two years. CPT performed higher early- (HR 3.073, 95 % CI: 0.961-9.825) and beyond six-month hazard (HR 1.797, 95 % CI: 0.967-3.338).

Three-dimensionally tapered MS-30 appears to offer a promising alternative to taper-slip stems CPT and Exeter, combining the versatility with lower risk of PFF revision, also in high-risk subgroups.