Incidence of Early Peri-Prosthetic Hip Fractures in Patients Over Age 70 Following Primary THA Using a Novel Triple-Tapered Collared Femoral Stem: A Multi-Center Study

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INTRODUCTION: Peri-prosthetic hip fractures are a known complication following cementless total hip arthroplasty (THA), especially in elderly patients. A triple-tapered collared femoral stem has been introduced to provide multidirectional contact to resist torsional forces and distribute load more evenly to help reduce subsidence. The purpose of this study was to compare the incidence of peri-prosthetic femur fractures between a novel triple-tapered collared stem versus a dual tapered collarless femoral stem in a higher-risk group of patients age >70 years undergoing primary THA.

METHODS: We performed a multi-center retrospective analysis in patients age over 70 years undergoing primary THA. 383 THAs using a dual-tapered collarless femoral stem were compared to 385 using a triple-tapered collared stem. There were no differences between groups regarding gender or ASA class. The dual-tapered group had a higher average BMI than the triple-tapered group (29.9 vs. 28.4, p<0.01), and higher age (76.0 vs. 75.2, p=0.022). Overall revision rates, incidence of peri-prosthetic fractures, complications, and PROMs were compared.

RESULTS SECTION: There were seven (1.8%) early (< 1 month) periprosthetic fractures in the dual-tapered group, and 1 (0.26%) noted at two months in the triple-tapered group (p=0.038). The dual-tapered group had a longer follow-up and had a higher overall revision incidence of 5.7% primarily due to PJI and early and late periprosthetic fractures. There were 4 revisions in the triple-tapered collared group (1.0%, p<0.01). There were no differences in PROMs between groups.

DISCUSSION: The use of a novel triple-tapered collared stem, designed to provide greater torsional stability and load distribution, was associated with a statistically significant decrease in the incidence of peri-prosthetic fractures in patients age >70 years undergoing primary THA. Based on this study, the use of a triple-tapered stem with a collar appears promising and requires additional follow-up to determine if the results are durable.

SIGNIFICANCE/CLINICAL RELEVANCE: Given the increased risk and mortality of peri-prosthetic hip fractures in elderly patients, use of a triple-tapered collared femoral stem may offer a solution in achieving greater stability and help reduce the risk of peri-prosthetic fracture in this higher-risk patient cohort undergoing total hip arthroplasty.

IMAGES AND TABLES:

Table 1: **Intraoperative Fractures and PPF within 1 month (no trauma)**

Post-Operative Metric	Accolade II Cohort	Insignia Cohort	P-Values
Total Cases	7 (1.8%)	1 (0.26%)	0.038
Tip of Trochanter Fracture	2	0	0.5
Calcar Fracture	1	0	1
Greater Trochanter Fracture	2	0	0.5
Trochanter	1	0	1
Lesser Trochanter	1	0	1
Other/Not Recorded	0	1	1

Table 2: **Post-Operative Complications requiring revision of femoral stem, all time points**

Post-Operative Metric	Accolade II Cohort	Insignia Cohort	P-Values
Total Revisions	22 (5.7%)	4 (1.0%)	<0.01
Periprosthetic Fracture	11	2	0.01
Infection	9	1	0.01
Aseptic loosening	2	0	0.5
Psoas Impingement + pain	1	0	1
Post-Operative leg length discrepancy	0	1	1

*** 1 patient in the Accolade II Cohort was revised for both a periprosthetic fracture and a coinciding infection