

The Modular Cup-in-Cup Technique for the Prevention of Instability and Aseptic Loosening Following Complex Revision Total Hip Arthroplasty

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INTRODUCTION: The modular cup-in-cup technique, involving the cementation of a modular acetabular component into a highly porous monoblock tantalum revision shell, provides surgeons the flexibility to exchange the articulation if subsequent re-revision is required. This study seeks to characterize the outcomes of this technique.

METHODS: A single-center retrospective review was performed of all patients who underwent revision total hip arthroplasty (rTHA) utilizing a modular acetabular component cemented into a monoblock trabecular metal revision shell. Preoperative and postoperative radiographs were assessed to quantify bone loss, cup position, and aseptic loosening. All-cause revision, revision for aseptic loosening, and revision for instability were estimated using the Kaplan-Meier method.

RESULTS: In total, 24 hips were identified with a mean age of 64.2 years and a mean follow-up of 18.3 months. The most common preoperative indication for revision was aseptic loosening (54.2%). Preoperatively, 14 (58.3%) hips had Paprosky 3A defects, 6 (25.0%) had Paprosky 3B, 2 (8.3%) had Paprosky 2C defects, and 1 (4.0%) had a Paprosky 2A defect. Average inclination and anteversion of the outer cup were $48.6 \pm 7.8^\circ$ and $15.8 \pm 8.6^\circ$, respectively. Average inclination and anteversion of the inner cup were $44.6 \pm 6.2^\circ$ and $19.7 \pm 7.4^\circ$, respectively. In total, 3 (12.5%) patients underwent reoperation, 2 (8.3%) for instability, and 1 (4.2%) for irrigation and debridement. Both patients revised for instability were converted from a dual mobility articulation to a constrained liner. No patients underwent revision for aseptic loosening or demonstrated radiographic loosening at final follow-up. Estimated 5-year survivorships for all-cause revision and instability were 87.0% (95% confidence interval (CI): 74.2%-100.0%) and 91.3% (95%-CI, 80.5-100.0%), respectively.

DISCUSSION AND CONCLUSION:

The modular cup-in-cup technique is a viable option for patients undergoing rTHA at increased risk of instability. This technique provides surgeons the flexibility to exchange the articulation if additional surgery for instability is required.

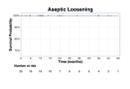
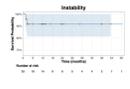
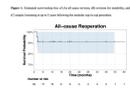


Table 1: Preoperative Characteristics of Study Cohort

Characteristic	n	%
Mean Age (years)	64.2	64.2
Male/Female	11/13	45.8/54.2
Preoperative Indication		
Aseptic Loosening	13	54.2
Instability	4	16.7
Pain	2	8.3
Dislocation	2	8.3
Periprosthetic Fracture	2	8.3
Other	1	4.0
Preoperative Paprosky Defect		
3A	14	58.3
3B	6	25.0
2C	2	8.3
2A	1	4.0
Preoperative Cup Position		
Inclination	48.6	7.8
Anteversion	15.8	8.6
Preoperative Cup Material		
Cermet	12	50.0
Alumina	12	50.0

Table 2: Surgical Characteristics of Study Cohort

Characteristic	n	%
Revision Type		
Cup-in-cup	24	100.0
Other	0	0.0
Preoperative Cup Position		
Inclination	44.6	6.2
Anteversion	19.7	7.4
Postoperative Cup Position		
Inclination	48.6	7.8
Anteversion	15.8	8.6
Postoperative Cup Material		
Cermet	12	50.0
Alumina	12	50.0

Table 3: Postoperative Instability and Aseptic Loosening Characteristics

Characteristic	n	%
Instability	2	8.3
Aseptic Loosening	0	0.0
Reoperation	3	12.5
Instability	2	8.3
Irrigation and Debridement	1	4.2

Table 4: Patient and Outcome Characteristics

Characteristic	n	%
Mean Follow-up (months)	18.3	18.3
Final Cup Position		
Inclination	48.6	7.8
Anteversion	15.8	8.6
Final Cup Material		
Cermet	12	50.0
Alumina	12	50.0

Table 5: Patient and Outcome Characteristics

Characteristic	n	%
5-Year Survival	21	87.5
All-Cause Revision	3	12.5
Instability	2	8.3
Aseptic Loosening	0	0.0
Dislocation	0	0.0
Pain	0	0.0
Periprosthetic Fracture	0	0.0
Other	0	0.0