EVIDENCE-BASED ORTHOPAEDICS

Large (36 or 40-mm) Femoral Heads Decreased the Rate of Dislocation After Revision Total Hip Arthroplasty

Garbuz DS, Masri BA, Duncan CP, Greidanus NV, Bohm ER, Petrak MJ, Della Valle CJ, Gross AE. Dislocation in Revision THA: Do Large Heads (36 and 40 mm) Result in Reduced Dislocation Rates in a Randomized Clinical Trial? Clin Orthop Relat Res. 2012 Feb;470(2):351-6.

Question: In patients requiring revision total hip arthroplasty (THA), does a large femoral head (36 or 40 mm) result in a lower dislocation rate than a standard head (32 mm)?

Design: Randomized (unclear allocation concealment), blinded (patients, caregivers, and nonoperating room study staff), controlled trial with mean 5-year follow-up.

Setting: 7 university-affiliated medical centers in North America.

Patients: 184 patients (mean age, 69 years; 53% men) who were undergoing revision THA. Only patients who underwent revision of both the acetabular and the femoral component were included in the study, and the acetabular component had to be a minimum of 50 mm in outer diameter.

Exclusion criteria were revision for recurrent dislocation, revision of the acetabulum requiring a structured allograft or reconstruction cage or a cemented all-polyethylene cup, or the intraoperative decision to use a constrained liner. Partway through the study, patients undergoing isolated acetabular revision were included because 36-mm heads became available for most stems. 179 patients (97%) were followed up for the primary outcome.

Intervention: Patients were allocated to the large femoral head (n = 92) or the standard head (n = 92). Patients allocated to the large head received the 40-mm head if the femoral stem and cup would accept that diameter. The surgical approach was at the discretion of the operating surgeon. The femoral components used were the VerSys beaded full-coated or ZMR femoral stem or CPT cemented

stem. The acetabular components used were the Trilogy cup or the Trabecular Metal modular shell. The Longevity highly cross-linked acetabular liner was used in both shells. All components were from Zimmer, Inc., Warsaw, Indiana.

Main outcome measures: The primary outcome was the rate of dislocation. The secondary outcome was quality of life as assessed with use of the Western Ontario and McMaster Universities (WOMAC) Osteoarthritis Index and Short-Form 36 (SF-36) physical and mental subscales.

Main results: The rate of dislocation was lower in the large head group than in the standard head group (Table). Fewer than 80% of randomized patients completed the quality-of-life questionnaire.

Conclusion: In patients requiring revision THA, the use of larger (36 or 40-mm) femoral heads decreased the rate of dislocation.

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Large (36 or 40-mm) vs. standard (32-mm) femoral heads for revision THA at a mean of 5 years*

Outcome	Large Head	Standard Head	RRR (95% CI)	NNT (95% CI)
Dislocation	1.1%	8.7%	88% (2.1 to 98)	14 (7 to 84)

*RRR = relative risk reduction, NNT = number needed to treat, CI = confidence interval (calculated from data in article).

Commentary

Cadaveric and mathematical models have demonstrated that large femoral heads and increases in the femoral head-neck ratio may be useful in preventing dislocation following hip replacement. This study by Garbuz and colleagues has clearly shown that large heads (defined as head sizes of 36 or 40 mm) are associated with a clinically meaningful decrease in the prevalence of postoperative dislocation compared with small heads (defined as 32 mm) in the complex and challenging population of patients undergoing revision THA.

While this finding is not surprising given our theoretical understanding of factors that lead to hip dislocation, there are potential risks associated with large heads. In particular, large-head total hip replacements are often used with thinner polyethylene inserts. Polyethylene, even highly cross-linked polyethylene, may be more susceptible to wear and fracture. Large head size may also cause mechanically assisted crevice corrosion (MACC) at head-neck taper connections that may be a factor in the relatively high incidence of adverse local tissue responses in patients with

large head metal-on-metal stemmed total hip replacements. Frictional torques and flexion moments at the femoral head-neck junction are greater with increasing head size, predisposing this junction to MACC, a process that is initiated by relative motion between the head and neck (fretting). Thus, while this study is reassuring because it clearly demonstrates the benefits of large heads in reducing postoperative hip dislocation, it does not address the concerns that other failure mechanisms, such as MACC and fracture of polyethylene liners, may be more common with larger heads.

Longer follow-up of this cohort will be required to address these potential complications. Like many situations in orthopaedic surgery, the choice of femoral head size needs to be optimized to balance these risks.

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