The Journal of Arthroplasty 31 (2016) S131–S135

Contents lists available at ScienceDirect

The Journal of Arthroplasty

journal homepage: www.arthroplastyjournal.org

Primary Arthroplasty

Dual-Mobility Articulations for Patients at High Risk for Dislocation

Darren R. Plummer, MD, MBA [a, *], Jonathan M. Christy, MD [b], Scott M. Sporer, MD [c, d], Wayne G. Paprosky, MD [c, d], Craig J. Della Valle, MD [c]

[a] Department of Orthopaedic Surgery, The Ohio State University, Columbus, Ohio
[b] Optim Orthopedics, Savannah, Georgia
[c] Department of Orthopaedic Surgery, Rush University Medical Center, Chicago, Illinois
[d] Department of Orthopaedic Surgery, Central DuPage Hospital, Winfield, Illinois

ARTICLE INFO

Article history:
Received 24 November 2015
Received in revised form
23 February 2016
Accepted 1 March 2016
Available online 17 March 2016

Keywords:
dislocation
dual mobility
revision
total hip arthroplasty
instability
high risk

ABSTRACT

Background: The purpose of this study was to evaluate the performance of dual-mobility articulations in patients at high risk for dislocation after revision total hip arthroplasty.
Methods: We reviewed the results of 36 consecutive revision total hip arthroplasties performed on patients considered high risk for instability. Indications for inclusion included abductor insufficiency, recurrent instability, failure of constrained liner, or inadequate intraoperative stability when trialing.
Results: At a minimum of 2 years, there were 4 (11.1%) repeat revisions including both dual-mobility liners that were cemented into an acetabular shell and 2 for deep infection treated with a 2-stage exchange. There was one dislocation that was successfully closed reduced but no revisions for recurrent instability. The mean Harris hip score improved from 45 to 90 points ($P < .001$).
Conclusion: Dual-mobility articulations are associated with a low rate of failure with no revisions for instability in this challenging group of patients.

Instability after total hip arthroplasty (THA) remains a persistent problem. It is the most common cause for revision THA in the United States and similarly is the most common complication after revision THA [1-3]. Current reports estimate the rate of dislocation to be as high as 28% after revision THA [4-6]. Despite the numerous advances in implant design, surgical technique, and postoperative management, the rate of instability remains relatively high following revision procedures [7].

Numerous prosthetic options and surgical approaches have been attempted to both prevent and treat instability. Dual-mobility bearings are relatively new to the North American market, but variations on the concept have been used clinically in Europe for more than 35 years. The design affords greater range of motion (ROM), a greater head-to-neck ratio, and a larger effective head size that increases jump distance. Several studies suggest that these articulations can be used for preventing or treating instability [8-11]. Although these bearings have their own concerns, including intraprosthetic dislocation and theoretically higher wear rates due to the dual articulating nature of the design, our group viewed them as a potential alternative for managing complex patients at high risk for instability after revision THA.

The risk of recurrent dislocation is greater after revision surgery than primary THA [5,12-14], and hence, the use of dual mobility is attractive for revision procedures and for the treatment of the hip that is unstable as an alternative to conventional larger diameter (>36 mm) femoral heads and constrained liners. Patients who have been noted to be at particularly high risk for instability include those with abductor insufficiency and those specifically revised for instability [7,15-17]. We are unaware of prior reports that have evaluated the use of dual-mobility bearings in these most complex of situations, and in some reports, abductor insufficiency is described as a contraindication to their use. The purpose of our study was to evaluate the outcomes of dual-mobility bearings when used in these most challenging of situations where a constrained liner has traditionally been used.

Methods

After obtaining institutional review board approval, we reviewed the medical records of 36 consecutive patients

One or more of the authors of this paper have disclosed potential or pertinent conflicts of interest, which may include receipt of payment, either direct or indirect, institutional support, or association with an entity in the biomedical field which may be perceived to have potential conflict of interest with this work. For full disclosure statements refer to doi: http://dx.doi.org/10.1016/j.arth.2016.03.021.

* Reprint requests: Darren R. Plummer, MD, MBA, Department of Orthopaedic Surgery, The Ohio State University Wexner Medical Center, 140 Liberty Street, Apt 3110, Columbus, OH 43215.

http://dx.doi.org/10.1016/j.arth.2016.03.021
0883-5403/

Table 1
Indication for Revision Arthroplasty.

Indication	Dual-Mobility Group (N = 36)
Instability	14 (38.9%)
Periprosthetic joint infection	9 (25%)
Implant loosening	6 (16.7%)
Wear/osteolysis	6 (16.7%)
Periprosthetic fracture	1 (2.7%)

considered high risk for instability who underwent revision arthroplasty utilizing dual-mobility bearing by one of the 3 surgeons between September 2010 and November 2012. The most common indications for revision included recurrent instability and treatment of a deep periprosthetic joint infection (Table 1). Indications for the dual-mobility bearing included revision for instability or a history of instability in 22 patients, abductor deficiency in 8 patients, and inadequate intraoperative stability when trialing in 6 patients; these are situations in which we traditionally would have used a constrained liner. Three of the patients included were undergoing repeat revision secondary to a failed constrained liner. The mean age and body mass index was 64 years (range, 42-87 years) and 28.6 kg/m^2 (range, 20.8-43.6 kg/m^2).

All revisions were performed via a posterior approach including an extended trochanteric osteotomy in one patient. Posterior hip precautions were maintained for a total of 90 days postoperatively and weight bearing varied based on the concomitant revision performed. Both components were revised in 21 patients (58.3%) and the acetabular component only was revised in 15 (41.6%) patients (Fig. 1A and B). Monoblock dual-mobility acetabular components were cemented into a metal shell in 9 of the 36 hips (Fig. 2A and B; 6 anatomic dual mobility, Stryker, Mahwah, NJ and 3 Polar Cup, Smith & Nephew, Memphis, TN). In 2 patients earlier in this series, a dual-mobility "liner" (modular dual mobility, Stryker, Mahwah, NJ) was cemented into a metal shell after the backside had been roughened with a burr and based on their early failure as described in the following section (Fig. 3), this technique was abandoned in favor of cementation of a monoblock dual-mobility cup. Implants used for each group are included in Table 2.

Patients were evaluated preoperatively and postoperatively at 3 weeks, 6 weeks, 3 months, 1 year, and annually thereafter for a physical examination and plain radiographs. Radiographs were reviewed for evidence of acetabular and femoral component loosening [18,19], and clinical outcomes were assessed using the Harris hip score (HHS) [20]. Clinical scores and radiographic evaluations were performed by 2 observers who were not directly involved with the index surgical procedures. Patients were followed for a minimum of 2 years (mean 2.4 years, range 2-4 years), and no patients were lost to follow-up.

Results

Of the 36 patients studied, there was one dislocation in a patient initially revised for periprosthetic joint infection, which was successfully closed reduced, requiring no further interventions. There were 4 (11.1%) repeat revisions; 2 for periprosthetic joint infection treated with a 2-stage exchange and 2 for dissociation of a dual-mobility "liner" that had been cemented into a metal shell (Fig. 3A-D). Both of these failures were early in our experience and both failed within the first 90 days postoperatively. There were no failures among the monoblock dual-mobility shells that were cemented inside a metal shell. No cases of intraprosthetic dislocation were identified, and there was no loosening of the femoral or acetabular components. At a minimum of 2 years, the mean HHS improved

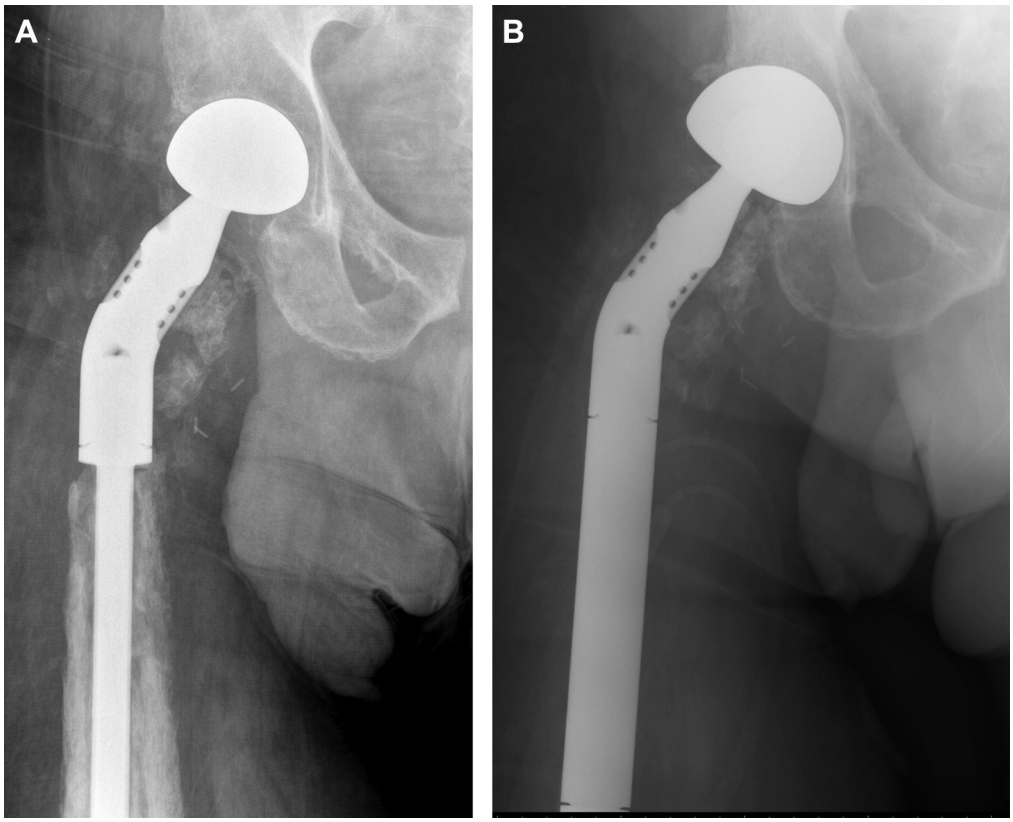

Fig. 1. (A) Preoperative X-ray of a 62-year-old male with an infected proximal femoral arthroplasty used to treat a giant cell tumor of the proximal femur. This is the first case in this series. (B) Postoperative X-ray showing a monoblock dual-mobility shell used in this patient who is abductor deficient.