The Journal of Arthroplasty 29 (2014) 2167–2170

Contents lists available at ScienceDirect

The Journal of Arthroplasty

journal homepage: www.arthroplastyjournal.org

Revision Total Hip Arthroplasty With Modular Femoral Stems

Jeffrey D. Stimac, M.D. [1], John Boles, B.S. [1], Natalie Parkes, B.A. [1], Alejandro Gonzalez Della Valle, M.D. [1], Friedrich Boettner, MD [1], Geoffrey H. Westrich, M.D. [1]

Hospital for Special Surgery – Weill Medical College of Cornell University, New York, New York

ARTICLE INFO

Article history:
Received 16 January 2014
Accepted 24 June 2014

Keywords:
revision hip arthroplasty
modular hip stems
Restoration Modular
offset
leg length

ABSTRACT

As the rate of revision total hip arthroplasty (THA) rises, attention must be paid to potential complications relating to bone loss, soft tissue deficiencies, and loss of tissue planes. Using modular femoral stems in revision surgery allows for varying amounts of bone loss in the proximal and distal femur while letting the surgeon adjust rotation, leg length, and offset. We retrospectively reviewed 125 patients that underwent revision THA with a modular femoral component system and had minimum 2 year follow-up. Ten patients required reoperations for infection, recurrent dislocation, or fracture treatment. There was no evidence of radiographic loosening or mechanical failure in the remaining patients. Modular femoral components provide excellent intraoperative flexibility and significant radiographic and clinical benefits as seen in this patient cohort.

As the number of total hip arthroplasties (THA) performed annually continues to rise, the need for revision surgery will also increase. Several options exist for femoral reconstruction in revision THA, however one such option that has gained popularity is the use of modular femoral stems. One of the main concerns in revision surgery is bone loss in the proximal femur and how to best deal with the disparity between the amounts of bone loss proximally and distally in the femur during revision reconstruction. Modular distally tapered revision stems, such as the Restoration Modular Stem system (Stryker, Mahwah, NJ), were developed to bypass proximal bone loss and obtain fixation within the isthmus of the femur. Another major concern with revision surgery is the increased risk of dislocation, which has been reported to be higher than the rate following primary THA [1,2]. Modular revision stems allow a surgeon to increase offset and therefore increase soft tissue tension, which theoretically may decrease the risk of dislocation [3]. Furthermore, modular revision stems allow a surgeon to adjust version to help decrease the risk of dislocation. Modular femoral stems also allow the surgeon the ability to correct leg length discrepancies by intraoperatively adjusting the length of the proximal body of the modular femoral stem. In general, one concern with revision stems is postoperative subsidence, which has been reported in previous studies [4,5]. The key to preventing subsidence is through solid distal fixation via the tapered conical shape of the stem.

We report our experience with the use of the Restoration Modular Stem for femoral revisions specifically looking at patient reported outcome measures at two year minimum follow-up and the ability intra-operatively to restore offset and leg length based on radiographic follow-up at regular intervals.

Materials and Methods

A retrospective review of our institutional joint database was performed to identify revision THAs performed from 2004 to 2010. We identified only those patients who had femoral revisions with the Restoration Modular Stem system using a conical stem. Medical and operative records were reviewed to determine patient demographics including: age, gender, BMI, date of initial surgery, date of revision surgery, status of the contralateral hip whether native or replaced, date of last follow-up visit, use of extended trochanteric osteotomy, and indication for revision surgery. Clinic records of every patient in the study were reviewed to determine Harris Hip Scores (HHS) at the latest follow up with two year minimum follow up stipulated. We also determined patients' length of follow up and whether they had any postoperative complications such as dislocations. Furthermore we reviewed records to identify patients who required further revision surgery, the time to revision, and the indication for subsequent revision surgery.

We reviewed radiographs taken before surgery, 6 weeks after surgery, and the latest radiograph taken 2 years or more after surgery. A single author, who is an orthopedic surgery fellow in adult reconstruction, reviewed all preoperative radiographs to determine the degree of preoperative femoral bone loss according to the Paprosky classification system. Six week and 2 year radiographs were reviewed to determine the stem-shaft angle, amount of subsidence, and for evidence of osteolysis or loosening. Two other authors, a senior surgeon and his research assistant, measured leg-length discrepancy and restoration of offset. Radiographic measurements were performed using a computer based PACS system.

The Conflict of Interest statement associated with this article can be found at http://dx.doi.org/10.1016/j.arth.2014.06.015.

Reprint requests: Geoffrey H. Westrich, MD, Hospital for Special Surgery, 535 East 70th Street, New York, NY 10021.

[1] Adult Reconstruction and Joint Replacement Division, Hospital for Special Surgery, New York, NY, USA.

http://dx.doi.org/10.1016/j.arth.2014.06.015
0883-5403/

Our PACS system utilizes a 25 mm calibration ball to adjust for magnification. AP pelvis and Lowenstein cross-table lateral hip radiographs were reviewed. AP radiographs were reviewed for leg length discrepancy, combined offset, and subsidence. Leg-length discrepancy was determined by measuring the perpendicular distance from the proximal edge of the lesser trochanter to a line spanning the distal edges of the obturator foramena and comparing it to the contralateral side. Leg length discrepancies in which the operative side was shorter than the contralateral side were assigned a negative value, while those with the operative side being longer than the contralateral side were assigned a positive value. Combined offset was the sum of acetabular offset and femoral offset. Acetabular offset was the distance from the inter-pelvic symphysis line to the center of rotation. Femoral offset was measured from the center of rotation to a line representing the anatomic axis of the femur. Subsidence was measured from the inferior junction of the neck and the body to the top of the lesser trochanter. The stem shaft angle was the angle between the anatomic axis of the femur and the long axis of the femoral stem. Varus stems were given positive numbers while valgus stems were given negative numbers. AP and lateral radiographs were reviewed for evidence of radiographic lines according to the Gruen zones, osteolysis and implant loosening. See Fig. 1.

Eight surgeons at a single tertiary hospital performed all revision procedures (Figs. 2 and 3). All procedures were performed through a posterior approach. A canal finder was used by hand to isolate the femoral canal. Reaming with the conical reamer system was performed with power instruments. The constructs were inserted stem first in modular fashion, and then the proximal reaming was performed. Then, after the trial reduction was done to assess length and anteversion, the final proximal body was inserted. The postoperative protocol was similar for all patients. Patients were mobilized on the first post-operative day. Patients initially ambulated with a walker and then progressed to a cane. Weight bearing status was determined by the individual surgeon and was based upon the surgeons' intraoperative impression of fixation of the tapered stem. All patients were instructed to maintain posterior hip precautions for a minimum of 6 weeks.

Results

We identified 125 patients who had revisions with Restoration Modular conical stems from 2004 to 2010. Ten patients were lost to follow-up and were excluded from the study leaving 115 patients. Nineteen patients were deceased prior to 2 year follow-up. Further, we excluded from the study 10 patients that had 2 year follow up but whose radiographs could not be located. The remaining 86 patients, consisting of 47 males and 39 females, constituted our study cohort. 27 of those patients (31.4%) underwent extended trochanteric osteotomies during revision surgery. We conducted a separate offset and leg length analysis on the subset of patients that had native

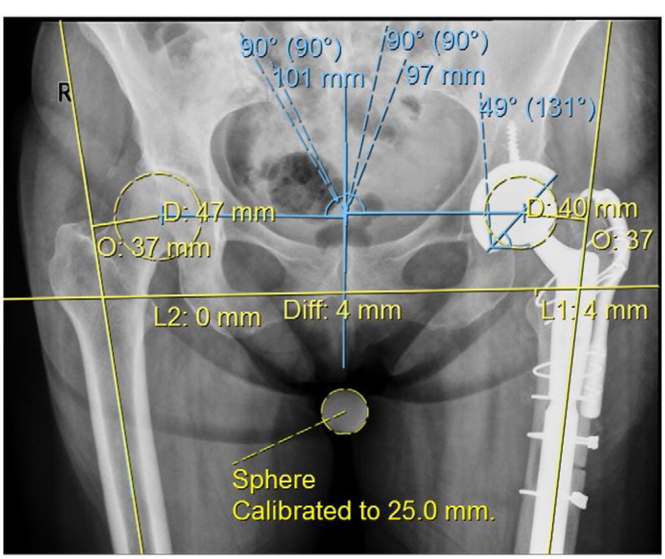

Fig. 1. Example of radiographic measurements.

Fig. 2. Restoration Modular Stems.

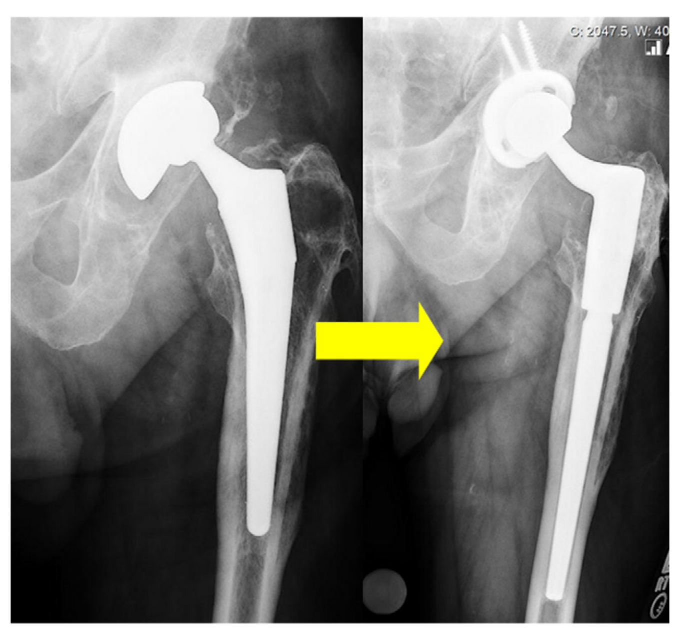

Fig. 3. Example of a revision with a Restoration Modular Stem.