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Original Article

Randomized Clinical Trial of 2-Incision vs Mini-Posterior Total Hip Arthroplasty: Differences Persist at 10 Years

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ABSTRACT

Background: A previous randomized clinical trial at our institution demonstrated slower recovery of 35 2-incision total hip arthroplasties (THAs) when compared with 36 mini-posterior THAs at 2 years. The primary aim of the present study was to report concise 10-year follow-up results.
Methods: We retrospectively reviewed the 71 patients in the previous randomized clinical trial, comparing clinical outcomes, revisions, reoperations, and implant survivorship between the 2-incision and the mini-posterior THAs.
Results: At the most recent follow-up, the mean Harris hip score was 85 in the 2-incision group and 87 in the mini-posterior group ($P = .4$). There were 4 revisions and 2 reoperations (16%) in the 2-incision group vs 1 revision and 3 reoperations (11%) in the mini-posterior group ($P = .5$). Ten-year survivorship free of aseptic revision or reoperation was 77% in the 2-incision group vs 90% in the mini-posterior group ($P = .15$).
Conclusion: There were no improvements in early or midterm clinical outcomes with the 2-incision technique. However, there was a clinical trend toward a higher rate of aseptic revisions in the 2-incision THA group.

Minimally invasive total hip arthroplasty (THA) approaches conceptually should result in less surgical dissection, with less pain, faster recovery, and superior clinical outcomes when compared with traditional approaches [1–8]. Numerous minimally invasive techniques have been described and their differential outcomes analyzed over the past decade [1,4–13]. Proponents of the 2-incision technique have claimed quicker recovery, rapid rehabilitation, and faster return to activities of daily living [5,14]. However, several studies have contradicted the early functional benefit [15–19] and true muscle-sparing benefit of the technique [20]. To date, there are limited data on midterm clinical and radiographic results of minimally invasive approaches, including the 2-incision technique.

In our previous report on the results of a prospective, randomized, clinical trial comparing the 2-incision THA and the mini-posterior THA, recovery was actually slower in the 2-incision patient cohort [15]. Those patients had a longer mean time to discontinue a walker or crutches, to discontinue all walking aids, and to return to normal daily activities. Furthermore, the mean operative time for the 2-incision technique was 24 minutes longer. The clinical outcomes (measured by Short Form-12 scores at 2 months and 1 year) and complication rate were similar in both groups. However, to our knowledge, there are few studies analyzing the effect of a minimally invasive approach on long-term outcomes.

The primary goal of this study is to evaluate the difference in clinical outcomes, radiographic results, survivorship, and complications at long-term follow-up in these 2 groups.

Patients and Methods

Seventy-two patients were previously randomized from November 2004 to January 2006. Thirty-six hips received a 2-incision THA and 36 hips received a mini-posterior THA. In each

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Original Report: Pagnano et al [15].

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group, there were 16 females. One male patient in the mini-posterior cohort was lost to follow-up, leaving 71 patients available for the most recent follow-up. There were no measurable differences in the demographics between the 2 groups including age, gender, body mass index (BMI), ethnicity/race, comorbidities, and preoperative hemoglobin levels [15]. Mean BMI was 30 kg/m^2 (range, 21-45 kg/m^2); 1 patient in the mini-posterior cohort and 2 patients in the 2-incision cohort had a BMI >40 kg/m^2. Mean age was 66 years (range, 40-85 years). All patients enrolled in the study received the treatment as randomized. Minimum potential follow-up was 10 years. We followed patients until death, revision, reoperation, or final clinical follow-up with a mean of 8.5 years (range, 5-11 years). Five patients in the 2-incision cohort and 4 patients in the mini-posterior cohort died before 10-year follow-up and were analyzed at 5 years; these patients were not significantly different in demographics than the original cohort. Institutional board review approval and patient informed consent was obtained before study initiation.

The primary surgeon (MWP) was blinded before the surgical procedure, but not intraoperatively. He was trained in both techniques and had performed >100 THAs with each technique before the study. The specific details of the surgical technique have been described previously [15]. The same fully porous–coated femoral component (VerSys FullCoat; Zimmer; Warsaw, IN), acetabular component (Trilogy Modular Trabecular Metal; Zimmer) without additional acetabular screw fixation, and highly cross-linked polyethylene design (Longevity; Zimmer) were used in every patient. The femoral head size was chosen based on the size of the acetabular component placed. The median femoral head diameter in each group was 32 mm; the mean femoral head diameter was 32.9 mm in the mini-posterior cohort and 32.8 in the 2-incision cohort ($P = 1.0$). All patients were treated with the same perioperative pain management regimen and rapid rehabilitation protocol as described previously [15].

Clinical and radiographic follow-up was completed at 1, 2, 5 years, and every 5 years thereafter according to our total joint registry protocol. Harris hip scores (HHSs) were measured to analyze clinical function [21]. Revision, reoperation, and complications were determined by the medical record at the most recent follow-up. Radiographs were analyzed by 2 authors (MPA and BPC) not involved in the surgical interventions.

Statistical Methods

Data were presented as mean values with ranges. All continuous variables were analyzed with 2-tailed Student *t* tests. Kaplan-Meier survivorship curves were constructed using (1) survivorship free of aseptic revision or reoperation and (2) survivorship free of any revision or reoperation; 95% confidence intervals (95% CIs) were also included. Cox regression analyses were used to compare survivorships. Statistics were analyzed using JMP, version 10.0 (SAS, Cary, NC).

Results

Clinical Outcomes

At the most recent follow-up, the mean HHS was 85 in the 2-incision group and 87 in the mini-posterior group ($P = .4$; Table 1). Patients in the 2-incision group and the mini-posterior group experienced significant improvements from their preoperative HHSs of 55 ($P < .01$) and 55 ($P < .01$), respectively.

Table 1
Clinical Outcomes, Reoperations, Revisions, and Implant Survivorship of the 2-Incision and Mini-Posterior THA Groups.

	2-Incision	Mini-Posterior	*P* Value
Total no. of hips	35	36	—
Harris hip score	85	87	.5
Revisions	4	1	.35
Reoperations	2	3	.9
Revisions and reoperations	6	4	.7
Complications	2	2	1
10-y survivorship free of aseptic revision or reoperation, %	77	90	.15
10-y survivorship free of any revision or reoperation, %	77	83	.7

THA, total hip arthroplasty.

Radiographic Analysis

Radiographic analysis revealed 2 (6%) femoral components with nonprogressive radiolucent lines in the 2-incision group. In the mini-posterior group, there was 1 femoral component (3%) with a nonprogressive radiolucent line and 1 (3%) acetabulum with a nonprogressive radiolucent line. There was no other evidence of loosening or component failure in either group.

Survivorship

There were 4 revisions and 2 reoperations (16%) in the 2-incision group compared with 1 revision and 3 reoperations (11%) in the mini-posterior group ($P = .7$). All 5 revisions (7%) were for recurrent instability; 1 dislocation (3%) in each group was early (within 6 months) while the other 3 dislocations (9%) in the 2-incision group were late (3, 6, and 9 years). Three of these patients, including both the early dislocations, had 32-mm femoral heads whereas 2 of them had 36-mm femoral heads. One reoperation (3%) in the 2-incision group was a hematoma evacuation at 1 week postoperatively. The other reoperation (3%) in the 2-incision group was an open iliopsoas tenotomy for iliopsoas impingement at 7 years postoperatively; the patient did not have any anterior acetabular component prominence on orthogonal radiographs. Two reoperations (6%) in the mini-posterior group were irrigation and debridements with modular exchange for acute postoperative infection within 30 days of the index procedure. The last reoperation in the mini-posterior group was modular exchange for trunnion corrosion at 10 years postoperatively. As such, the 10-year survivorship free of aseptic revision or reoperation was 77% (95% CI, 61%-93%) in the 2-incision group compared with 90% in the mini-posterior group (95% CI, 76%-99%; $P = .15$; Fig. 1). The 10-year survivorship free of any revision or reoperation was 77% (95% CI, 61%-93%) in the 2-incision group compared with 83% (95% CI, 67%-99%) in the mini-posterior group ($P = .7$; Fig. 2).

Minor Complications

Overall minor complication rates were 6% in both groups. In the 2-incision group, 1 patient (3%) had an acute deep venous thrombosis treated with anticoagulation without long-term sequelae. Another patient had an early cellulitis treated with oral antibiotics and local wound care without further issue. In the mini-posterior incision group, 1 patient (3%) experienced a single dislocation at 2 years postoperatively that was treated with closed reduction and bracing without further issue. Another patient (3%) also had an acute deep venous thrombosis treated with appropriate anticoagulation without long-term sequelae.