Periacetabular Osteotomy and Total Hip Arthroplasty in Patients Older Than 40 Years

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Abstract: The objective of this study was to investigate quality of life (QOL) in patients with dysplasia who were older than 40 years and who underwent Bernese periacetabular osteotomy (PAO). Quality of life was compared among 28 patients who underwent PAO and 33 patients of the same age who underwent total hip arthroplasty (THA). Outcome tools included the Western Ontario McMasters Universities (WOMAC) Osteoarthritis Index and the 12-Item Short-Form Health Survey. Seventy-three percent of PAO patients achieved a "very good" (75-100) outcome or a "good" (65-75) QOL score in pain dimension and 64% in function dimension at 4 years after operation. WOMAC pain (89 vs 71, $P < .005$) and function (90 vs 74, $P < .005$) scores were significantly better among THA patients (THA vs PAO). Although THA resulted in better QOL, osteotomy still provided excellent QOL outcome in a high percentage of patients older than 40 years. However, given the results of this study, in patients older than 40 years, periacetabular osteotomy should only be done in highly selected cases. **Key words:** periacetabular osteotomy, quality of life outcome, total hip arthroplasty.

Acetabular dysplasia is a well-known precursor of osteoarthritis. With the description of the acetabular rim syndrome it became apparent that dysplasia could be symptomatic before the development of osteoarthritis [1]. Most modern-day joint-preserving treatments for dysplasia have 2 goals: improved quality of life (QOL) and preservation of the native hip joint for as long as possible. Previous work by Siebenrock et al [2] has shown that the Bernese periacetabular osteotomy (PAO) can successfully preserve the hip joint beyond 10 years. They found that the Bernese PAO was successful in preserving the hip joint in 82% of hips at an average 11.2-year follow-up [2]. In addition, numerous authors have shown that Bernese PAO can significantly improve the patient's QOL [3,4].

However, there is little evidence in the literature and less agreement regarding patients with dysplasia who are older than 40 years. Most surgeons would accept osteotomy as an attractive option only in younger patients. In a Japanese study, the results of rotational osteotomy were compared in patients who were older or younger than 46 years [5]. There was no difference found in clinical outcomes between the 2 groups. Other studies have suggested that older age may be a negative predictor for a good outcome after Bernese PAO [2]. To date, no study has evaluated treatment outcomes in patients older than 40 years with dysplasia.

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Submitted April 6, 2007; accepted August 22, 2007.
No benefits or funds were received in support of the study.
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0883-5403/08/2307-0003$34.00/0
doi:10.1016/j.arth.2007.08.015

The purpose of this article is to investigate QOL in patients older than 40 years undergoing a Bernese PAO for treatment of dysplasia.

Materials and Methods

The study design was a cross-sectional, cohort comparison study in patients with an underlying diagnosis of dysplasia who had undergone either PAO or total hip arthroplasty (THA). Periacetabular osteotomy cases were identified at a single hospital between 1995 and 2003. The study was granted ethical approval by the institutional review board. Inclusion criteria were a primary diagnosis of dysplasia, minimal or no osteoarthritis (Tonnis grade 0 or 1), age older than 40 years, and the potential of at least 2-year follow-up. A control group of patients was defined as patients who had undergone THA during the same period, who had a primary diagnosis of dysplasia, aged older than 40 years, and a potential 2-year follow-up.

There were 28 eligible patients who had undergone PAO and 61 eligible controls. Twenty-eight PAO cases and 34 THA controls were available for evaluation. The mean follow-up was just more than 4 years in both groups.

All outcomes were based on self-assessment using mailed-out instruments: the Western Ontario McMasters Universities (WOMAC) Osteoarthritis Index [6], the 12-Item Short-Form Health Survey (SF-12) [7], the University of California at Los Angeles (UCLA) Activity Index [8], and the Hip and Knee Arthroplasty Satisfaction questionnaire [9]. The primary outcome variables were scores for the WOMAC pain and functional domains. We used 2 analytic approaches. We first analyzed the primary outcomes as continuous variables with a t test of means. We then categorized WOMAC scores into 3 clinically relevant levels: very good (>75), good (65-75), and poor (<65). The χ^2 test was used to compare the proportion of very good, good, and poor outcomes within the 2 groups.

Results

The mean age of PAO and THA patients were 45.4 and 47.1 years, respectively ($P = .2$, t test). Ninety percent (25/28) of PAO patients were women compared with 88% (30/34) of THA patients ($P = .9$, χ^2 test).

Quality-of-life outcomes are summarized in Figs. 1 and 2. There were statistically significant differences in WOMAC pain and functional scores at 4 years favoring treatment with THA, as shown in

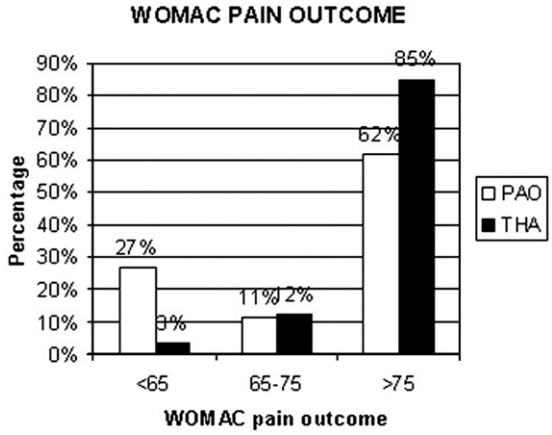

Fig. 1. The percentage of very good/good WOMAC pain outcome is shown. The WOMAC pain outcomes were significantly better among the THA patients.

Figs. 1 and 2. In the pain dimension, the mean WOMAC scores (THA vs PAO) were 89.2 vs 70.9 ($P < .005$, t test). For function, the mean WOMAC scores were 90.6 vs 73.7 ($P < .005$, t test). The power of the t tests to detect the observed difference in pain and functional outcome was 0.96 in each. A significantly greater number of THA patients enjoyed very good or good results in terms of pain relief (85% [29/34] and 62% [17/27] for THA and PAO, respectively; $P = .03$, χ^2 test) and functional improvement (85% [29/34] and 53% [15/28] for THA and PAO, respectively; $P = .01$, χ^2 test). Ordinal regression analysis shows that the QOL outcome is strongly associated with treatment choice. The odds ratio is 0.19 (0.06-0.62) in the function subscale (PAO vs THA) and 0.22 (0.07-0.76) in the pain subscale.

Similar results were seen for the SF-12 physical component score (52.6 and 43.9 for THA and PAO, respectively; $P < .0005$, t test). Satisfaction was higher in the THA group (93.6 and 75.0 for THA and PAO, respectively; $P = .02$, t test). In terms of achieving a higher activity level (UCLA activity index ≥7), the results favored the THA group with 41% (12/29) of patients reaching this level of activity vs 19% (4/21) of the PAO group ($P = .09$, χ^2 test).

Complications were more frequent in the osteotomy group. Thirty-six percent of patients (10/28) who underwent osteotomy sustained a complication. Of the 28 patients, 18 had no complications. Complications in this group included 4 lateral femoral cutaneous nerve of the thigh paresthesias, 2 deep vein thrombosis, 1 partial sciatic nerve injury, 1 nonunion of the ischium, 1 disruption of the posterior column, and 1 wound infection. In the THA cohort, only