

Intermediate- to Long-Term Results After Hybrid Total Hip Arthroplasty in Patients With Rheumatoid Arthritis

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Abstract: There have been few reports describing intermediate- to long-term results after hybrid total hip arthroplasty in patients with rheumatoid arthritis. We followed up 52 hips in 44 patients aged 5 men and 39 women, with a mean of 11.5 years (range, 5-23.5 years). Revisions had been performed in 6 hips in 6 patients: 1 both acetabular and femoral components for infection, 1 acetabular component for aseptic loosening, 3 acetabular components for recurrent dislocation, and 1 acetabular component for dislodgement of the polyethylene liner from the metal shell. None of other acetabular or femoral components were revised or found to be loose at the final follow-up. Although postoperative dislocation remains a concern, hybrid total hip arthroplasty had an acceptable result in patients with rheumatoid arthritis. **Keywords:** hybrid total hip arthroplasty, rheumatoid arthritis, cementless acetabular component, cemented femoral component, clinical results.

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Rheumatoid arthritis (RA) is a systemic disease characterized by multiple-joint involvement. Total hip arthroplasty (THA) has been one of the successful options for patients with RA in terms of pain relief and functional improvement with patient satisfaction. Good results have been reported with the use of cemented and uncemented THAs [1-4]; however, there have been few reports describing intermediate- to long-term results after hybrid THA [5,6].

The hybrid THA combines insertion of an acetabular component without cement and a femoral component with cement. We now assess retrospectively whether a hybrid THA is a viable option for the treatment for patients with RA. We reviewed the intermediate- to long-term clinical and radiologic results of hybrid THA in nonselected, consecutive patients with RA.

Patients and Methods

Between December 1987 and October 2006, 73 hybrid THAs were performed in 61 patients with either juvenile or adult-onset RA. Nine patients (11 hips) died before a minimum of 5-year follow-up. We were unable to trace 8 patients (10 hips) as a result of refusal to participate, deterioration of health precluding return for assessment, or loss to follow-up. At last follow-up, all 21 THAs were radiographically well fixed at an average of 27 months (range, 6-54 months) postoperatively. We were able to follow up 44 patients (52 hips [71%], 36 unilateral and 8 bilateral) for more than 5 years. The average duration of follow-up was 11.5 years (range, 5-23.5 years). The average age at the time of the index operation was 52.2 years (range, 17-74 years). The average weight was 48 kg (range, 35-65 kg), and the average height was 148 cm (range, 130-180 cm). Five patients were male and 39 were female. There were 25 right hips and 27 left hips. According to the functional classification of the American Rheumatism Association, 19 patients had class II, 23 patients had class III, and 2 patients had class IV capacity [7].

All procedures were performed through the posterolateral approach without trochanteric osteotomy. One of 2 different hybrid THA systems was used. A Harris Precoat, Precoat Plus, or CDH Precoat stem with titanium hemispherical Harris-Galante porous-coated 1 or 2 acetabular components (Zimmer, Warsaw, Indiana) was used in 40 hips, and a 4-U Hip System (Nakashima

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Submitted January 11, 2012; accepted June 7, 2012.

The Conflict of Interest statement associated with this article can be found at <http://dx.doi.org/10.1016/j.arth.2012.06.002>.

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0883-5403/2802-0018\$36.00/0

<http://dx.doi.org/10.1016/j.arth.2012.06.002>

Medical, Okayama, Japan) was used in 12 hips. The acetabular component was inserted with a line-to-line fit. An average of 3.4 screws (range, 2-5 screws) was used for fixation. The diameter of the prosthetic femoral head was 22 mm in 40 hips and 26 mm in 12 hips. Standard polyethylene liner was used in 41, and elevated liner was used in 11. The average surface roughness was 2.0 μm in the Harris Precoat stem, 2.2 μm in the Harris Precoat Plus or CDH Precoat stem, and 2.0 μm in the proximal half and 1.0 μm in the distal half in the 4-U stem. The surface of the 4-U stem is equivalent to the matte finish. We asked the manufacturers to provide femoral rasps for each final component, which overrasped by 0.5 mm. All final femoral rasps used in this study for canal preparation overrasped by 0.5 mm. A so-called second-generation cementing technique was used with Simplex cement (Stryker-Howmedica-Osteonics, Mahwah, New Jersey) and a cement gun for the retrograde introduction of cement. A methyl methacrylate plug was used in all hips. We did not use vacuum-mixing, centrifugation, proximal cement pressurizers, or stem centralizers. We did not repair the external rotators and the posterior aspect of the capsule.

Clinical evaluations were made using a hip scoring system [8]. Hips with the score of 90 to 100 points were defined as showing excellent results; 80 to 89 points, as good results; 70 to 79, points as fair results; and less than 70 points, as poor results. An anteroposterior radiograph and a true lateral radiograph were made preoperatively and at each follow-up examination. Anteversion of the acetabular component was measured [9]. The acetabular interface on the anteroposterior radiograph was divided into 3 zones [10]. The acetabular component was classified as migrated if there was a change of at least 4 mm in the horizontal or vertical position of the center of the component [11]. Linear head penetration into the polyethylene liner was measured [12]. Anteversion of the femoral component was calculated by the anteversion angle measured on true lateral radiographs and the neck-shaft angle of each femoral component [13].

Cementing of the femoral stem was classified as grades A, B, C-1, C-2, and D [14]. The dimensions and location of radiolucent lines at the bone-cement interface of the femoral component and osteolytic lesions were recorded [15]. The *canal filling ratio* of the femoral component was defined as the percentage of component width to intramedullary width at the midpoint of the component on an anteroposterior radiograph taken within 1 month after surgery [16]. *Loosening of the femoral component* was defined using the criteria described by Harris et al [17].

The study design was approved by the ethics committee of Asahikawa Medical University.

Statistical analyses were performed using SPSS software (SPSS Inc, Chicago, Illinois). Clinical, radiographic,

and surgical factors were evaluated using χ^2 tests or Mann-Whitney *U* test, where appropriate. Preoperative and postoperative Harris hip scores were compared using the Wilcoxon signed rank test. Probability values less than .05 were considered significant. Kaplan-Meier survival curves with *end points* defined as revision for any reason and aseptic loosening of the acetabular and femoral component were calculated. All survivorship data were reported with 95% confidence interval.

Results

At the time of the most recent follow-up, revisions had been performed in 6 hips in 6 patients. Both acetabular and femoral components of 1 hip with postoperative infection were simultaneously removed 3 months after the index surgery. One acetabular component was revised for aseptic loosening 4 years postoperatively. Three acetabular components were revised for recurrent dislocation 2 and 7 months and 3 years postoperatively, respectively. One acetabular component was revised for dislodgement of the polyethylene liner from the metal shell 9 years postoperatively. None of other acetabular or femoral components were revised or found to be definitely loose at the final follow-up (Fig). Kaplan-Meier analysis revealed that a 10-year survival rate was 98.1% (95% confidence interval, 96.2%-100%) with revision for aseptic loosening of the acetabular or femoral component as the end point and 89.5% (95% confidence interval, 85.0%-94.0%) with revision for any reason as the end point, and a 20-year survival rate was 98.1% (95% confidence interval, 96.2%-100%) with revision for aseptic loosening of the acetabular or femoral component as the end point and 85.4% (95% confidence interval, 79.5%-91.3%) with revision for any reason as the end point.

The Harris hip score increased from a preoperative average of 37 points (range, 22-62 points) to 75 points (range, 46-96 points) at the most recent follow-up of patients who did not have a subsequent revision ($P < .001$). The result was excellent in 5 (10%) hips, good in 11 (21%) hips, fair in 23 (44%) hips, and poor in 13 (25%) hips.

The average angle of abduction of acetabular components at the latest follow-up was 43.8° (range, 38°-60°). The average anteversion of the acetabular components was 13.2° (range, 2°-30°), and the average combined anteversion of the acetabular and femoral components was 48.2° (range, 22°-80°). None of the acetabular components showed radiographic migration, rotation, or a continuous radiolucent line other than 1 component that underwent subsequent revision for aseptic loosening. Radiolucent lines were observed around 7 (14%) acetabular components. These lines were all 1 mm wide or less, and no sockets showed a continuous radiolucent line. Small pelvic osteolytic lesions were observed adjacent to the acetabular component in 12

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