Cementless Hemispheric Acetabular Component for Acetabular Revision Arthroplasty

A 5- to 19-Year Follow-Up Study

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Abstract: This study evaluated the 5- to 19-year clinical and radiographic results of cementless acetabular revision. Between 1986 and 1998, 130 hips (125 patients) underwent cementless acetabular revisions. Ten patients were lost to follow-up; 6 patients died. One hundred nine patients (114 hips) were reviewed at a mean follow-up of 8.8 years. The mean Harris hip score improved from 62.1 to 90.7 at final follow-up. Two hips underwent repeat revision. Twenty-two hips developed cavitary osteolysis. Kaplan-Meier survivorship at 121 months was 98.2% with repeat revision for any reason as the end point and 89.5% with repeat revision or radiographic loosening as the end point. Cementless acetabular revision provides favorable clinical and radiographic results, and the initial disease and age may adversely affect the outcomes. **Key words:** hip, cementless, total hip arthroplasty, acetabular revision, survivorship.

As more primary total hip arthroplasties (THAs) are being done, failure can be expected over a long period and the number of revision hip arthroplasties will continue to increase. With the presence of acetabular bone defect, nonanatomic rotational center of hip, complications of operating techniques, and uncertain long-term postoperative results, revision of the acetabular component presents a special surgical challenge for total joint surgeons. Although several acetabular revision techniques with cemented and cementless components have been documented in the literature, cementless fixation in acetabular reconstruction has improved outcomes over cemented components [1-10]. Repeat revision rates of up to 50% have been reported at follow-up of 10 years for cemented acetabular component [4,5,11,12]. When acetabular bone defect was present, the cemented component was not the optimal selection for acetabular revision arthroplasty. Acetabular bone defect made mechanical setting difficult and its eburnated surfaces made poor anchorage for bone cement. The failure rate of cementless acetabular component revision was less than 18% at follow-up of 15 years, which showed improved long-term results compared with cemented acetabular revision [1-3,6-10,13-20] (Table 1). However, because of bone stock loss, abnormality of anatomy, and different approach of reconstruction in acetabular revision arthroplasty, the results of cementless acetabular revision documented in the literature are inferior to those of primary arthroplasty.

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Table 1. Results of Cementless Acetabular Revision Arthroplasty

Authors	Year	No. of Hips	Follow-up	Results
Dorairajan et al [7]	2005	50	2.7	6% Failure (recurrent dislocation)
Morag et al [19]	2005	63	9.9	5.9% Failure (normal center) 17.7% Failure (high center)
Hallstrom et al [6]	2004	122	12.9	4% Radiographic loosening
Della Valle et al [18]	2004	138	15	13.8% Failure
Elke et al [20]	2003	123	7.4	4.8% Failure
Templeton et al [3]	2001	61	12.9	3.5% Radiographic loosening
Whaley et al [8]	2001	89	7.2	4.5% Loosening
Leopold et al [1]	1999	138	10.5	1.8% Radiographic loosening
Chareancholvanich et al [14]	1999	40	8	12.5% Loosening
Garcia-Cimbrelo [15]	1999	65	8.3	10.8% failure; 27.7% radiographic loosening
Jasty [9]	1998	19	10	No failure for loosening
Silverton et al [10]	1996	138	8.3	0.7% loosening

The purpose of this study was to evaluate the 5- to 19-year clinical and radiographic results of cementless acetabular revision arthroplasty.

Materials and Methods

Patients

A review of our database for all revision hip arthroplasties was used to identify the patients who had revision hip arthroplasty with the cementless acetabular component. Between November 1986 and December 1998, 125 patients (130 hips) underwent acetabular revision arthroplasty with hemispherical, cementless components. Of the original 125 patients (130 hips), 16 patients' data were excluded because of loss of follow-up (n = 10) and death (n = 6). This left 109 patients (114 hips) (70 men and 44 women) eligible for study. The mean age of patients at the index revision surgery was 46.2 years (range, 19-74 years). The mean duration of follow-up was 8.8 years (range, 5-19 years).

The diagnosis at the time of the primary arthroplasty was avascular osteonecrosis of femoral head in 48 hips (42.1%), osteoarthritis (OA) secondary to congenital dysplasia or dislocation in 9 hips (7.9%), OA secondary to trauma in 4 hips (3.5%), OA secondary to previous infection in 23 hips (20.2%), OA secondary to Legg-Calvé-Perthes disease in 4 hips (3.5%), OA without sufficient information to determine the cause in 7 hips (6.1%), fracture of the femoral neck in 9 hips (7.9%), and ankylosing spondylitis in 10 hips (8.8%). In primary arthroplasty, a cemented acetabular component was inserted in 37 hips (32.5%) and a cementless acetabular component in 77 hips (67.5%). The mean interval between the primary arthroplasty and revision was 117.4 months (range, 8-268 months).

The causes for revision were aseptic acetabular loosening in 46 hips (40.4%), aseptic acetabular and femoral loosening in 52 hips (45.6%), aseptic acetabular loosening with polyethylene liner dislodging in 7 hips (6.1%), and infectious sequelae after primary THA in 9 hips (7.9%). In 64 hips (56.1%), the femoral component was also revised at the time of the revision.

The preoperative radiographs were evaluated for position of hip rotational center and acetabular bone defects. The hip rotational center was defined by the criteria described by Dearborn and Harris [13] for placement of the hip center in relation to the interteardrop line. The normal rotational hip center was located by drawing the Ranawat triangle [21]. Acetabular bone defects were classified according to the American Academy of Orthopaedic Surgeons' (AAOS) system. The deficiency was categorized as type II (cavitary defect) in 71 hips (62.3%) and type III (combined defect) in 43 hips (37.7%).

Surgical Technique

All patients were placed in the lateral decubitus position and surgery was performed through a posterolateral approach to the hip. The entire socket of the acetabulum was exposed, from the transverse ligament to the superior margin and from the posterior wall to the anterior wall. After being tested for loosening, acetabular components were extracted and all cement was carefully removed in the cemented primary acetabula. The soft-tissue membrane was thoroughly debrided and the acetabular bone stock was inspected to select the suitable approach for acetabular reconstruction. Depending on the quality of the host bone, a technique of undersized reaming by 2 to 4 mm was used for acetabular reaming. The acetabulum was reamed with sequentially larger hemispheric reamers until an adequate bony bed was created and the acetabular component was inserted with 2- to