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Total Hip Arthroplasty With an Uncemented Tapered Femoral Component in Patients Younger Than 50 Years of Age: A Minimum 20-Year Follow-Up Study

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ABSTRACT

Background: Previously, we reported the mean 16-year results of primary uncemented total hip arthroplasty using a tapered femoral component in patients <50 years. The purpose of this study was to update our previous report using the Taperloc femoral component in young patients who had been followed for a minimum of 20 years postoperatively.

Methods: Between 1983 and 1990, 108 consecutive uncemented total hip arthroplasties were performed in 91 patients of age <50 years, with use of the Taperloc femoral component. Every patient was followed for a minimum of 20 years after surgery or until death. At a mean of 25 (range, 20-29 years) postoperatively, 76 patients (91 hips) were living. The Harris Hip Score, radiographic results, complications, and Kaplan-Meier survivorship were evaluated.

Results: In the entire cohort of 108 hips, 9 femoral components (8%) have been revised, none for aseptic loosening. Five well-fixed stems were removed during acetabular revision, 3 stems were revised for infection, and 1 stem was exchanged because of a peroneal nerve palsy. Distal femoral osteolysis was identified around 1 hip. With failure defined as stem removal for any reason, implant survival was 90% (CI = 82-95) at 29 years. With failure defined as stem removal for aseptic loosening, implant survival was 100% at 29 years.

Conclusion: Primary total hip arthroplasty with the Taperloc femoral component in young patients was associated with a high rate of survival at 29 years.

Primary total hip arthroplasty in young patients presents several challenges. Difficult anatomic considerations including developmental dysplasia, posttraumatic osteoarthritis, and prior femoral or acetabular osteotomy increase surgical complexity [1-7]. High patient expectations, active lifestyles, and longer life expectancies place extreme demands on prosthetic components. In addition, because of the increased stress placed on arthroplasty components, there is an increased risk of polyethylene wear and periprosthetic osteolysis [8-10]. To determine the long-term durability of uncemented femoral components in young and active patients, studies with a minimum of 20 years are needed.

Previously, we reported the mean 16-year results using the Taperloc femoral component (Zimmer Biomet, Warsaw, IN) in a consecutive series of 108 total hip arthroplasties in 91 patients <50 years [11]. In that review, 3 femoral components (3%) had been revised. One stem had been revised during acetabular revision, 1 stem for sepsis, and 1 for excessive leg lengthening. Distal osteolysis was identified in 1%. The purpose of the present study was to determine the 29-year survivorship of the femoral component in this group of patients. In addition, we evaluated the clinical outcomes, radiographic results, and complications.

Materials and Methods

We reviewed 108 consecutive primary total hip arthroplasties performed in 91 patients <50 years. All surgeries were performed

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by a single surgeon using the Taperloc femoral component between October 1983 and January 1990. All 91 patients (108 hips) were followed until death, femoral component revision, or a minimum of 20 years. Fifteen patients (17 hips) died before obtaining a minimum 20-year follow-up. All 15 patients died with their femoral components in place. This left 91 hips in 76 patients. Among those living patients. 9 femoral components have undergone revision surgery. In the remaining 82 hips in 67 patients, complete clinical and radiographic follow-up was obtained at a mean of 25 (range, 20-29) years. The mean age of the 34 women (43 hips) and 33 men (39 hips) at the time of surgery was 36.4 (range, 20-49) years. The average weight of the 67 living patients at the time of surgery was 86 (range, 50-134 kg), and the average body mass index was 29 (range, 20-43) kg/m^2. The indication for primary total hip arthroplasty was osteoarthritis in 27 hips (33%), developmental dysplasia of the hip in 29 hips (35%), avascular necrosis in 19 hips (23%), rheumatoid arthritis in 6 hips (7%), and Legg-Calvė-Perthes disease in 1 hip (1%).

The Taperloc femoral component was used in all hips in this series. The stem has a tapered rectangular shape designed to achieve fixation mediolaterally with the proximal femur. The implant is noncollared and made of wrought titanium alloy Ti-6Al-4V. The proximal 40% of the implant is coated with the identical titanium alloy applied with a pressure plasma spray technique. The distal non–porous-coated portion of the stem has a satin surface finish. All of the femoral components had a 28-mm articulating head. Thirty-nine femoral components had a monoblock design and a titanium femoral head. Fifty-two femoral components had a modular head-neck articulation and a cobalt chromium femoral head (Fig. 1). The acetabular component consisted of a conically shaped, threaded-ring titanium shell (T-tap; Biomet). The articulating surface was 28 mm in diameter. In the first 29 acetabular components, ultrahigh-molecular-weight polyethylene powder HiFax 1900 (Himont USA, Wilmington, DE) was directly compression molded into the shell. In 62 acetabular components, a modular liner consisting of ram-extruded bar stock polyethylene (GUR 415; Hoechst-Celanese, Houston, TX) was used.

Clinical Follow-Up and Radiographic Analysis

One author, who was not the operating surgeon, performed the clinical evaluation. The Harris Hip Score [12] was used to determine functional level and evaluate pain. Activity level was evaluated by the classification of Johnston et al [13]. We performed radiographic analysis with use of anterior-posterior radiographs of the hip and pelvis and a true lateral view of the hip. Postoperatively, we evaluated the hips with respect to radiolucencies and osteolysis in each of the 7 Gruen zones [14,15]. Osteolysis was defined as a radiolucency >2 mm in width, which was not present on the immediate postoperative radiograph, or as a radiolucency with a scalloped or cystic appearance. Femoral component loosening was evaluated by the criteria of Engh et al [16]. Definite femoral component loosening was defined as progressive migration of the implant.

Statistical Analysis

Data analysis was calculated using the SAS software version 9.3 (SAS Institute Inc., Carey, NC). The Kaplan-Meier method [17] was used to generate survivorship curves with corresponding 95% CIs. The end points were revision of the femoral component for any reason and revision of the femoral component for aseptic loosening. All 108 hips in this series were included in the survivorship analysis.

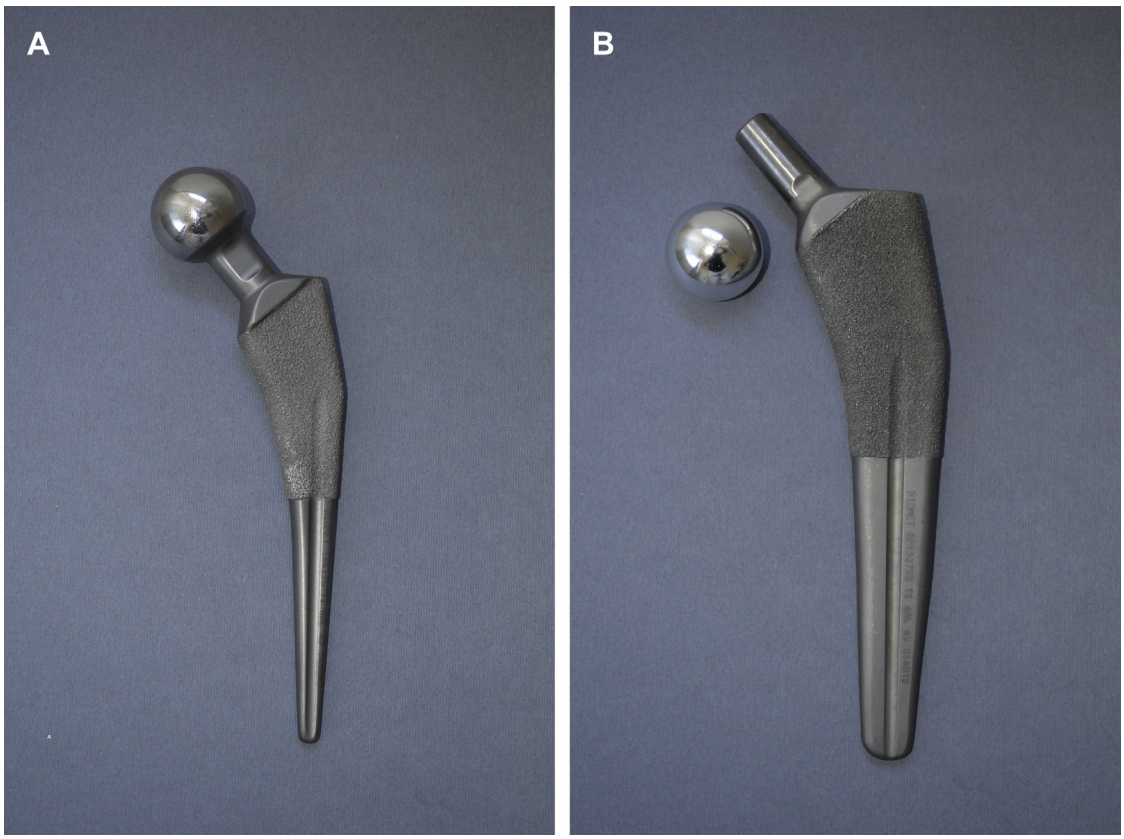

Fig. 1. The Taperloc femoral component used in this study. (A) A nonmodular stem was used in 39 total hip arthroplasties. (B) A modular stem was used in 52 total hip arthroplasties.