First Series of Exeter Small Stem Primary Total Hip Arthroplasty Minimum 5 Years of Follow-Up

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Abstract: We carried out a prospective study of 47 Exeter (Stryker Inc, Warsaw, Ind) small stem total hip arthroplasty in 42 patients with an average age of 58 years and a mean follow-up of 8.5 years. The Oxford hip score improved from a preoperative mean of 47 to 17 at last follow-up. More than 87% patients had excellent or good Harris hip scores, and 90% were able to walk with little or no pain. Stem subsidence within the cement mantle was observed in 26% of cases, and none showed evidence of aseptic loosening or implant failure. Two stems were removed due to infection. The survival rate of this implant was 95.7% at 10 years. This first series of Exeter small stem showed excellent medium-term results, comparable to its larger counterparts. **Keywords:** Exeter, small stem, total hip arthroplasty.

Although a few modifications have been made to the Exeter total hip arthroplasty (THA) (Stryker Inc, Warsaw, Ind) since it was first implanted in October 1970 [1], the basic design of this collarless and double-tapered stem has remained largely unchanged. Reports from the original and European centers have been very encouraging [1-4]. The survivorship for a series of the first 325 Exeter Universal hips with the end point of reoperation for any cause was 92%, and the survivorship for aseptic loosening of the stem was 100% at 12 years of follow-up [1].

For the past few years, the success of THA and the increase in aging population have resulted in increased demand for this surgery in Asia. However, it is noted that the Asian population, in particular the Chinese, has significant different anatomy of the femur compared to the whites [5]. For example, the Chinese patients are likely to need smaller femoral components than the Western population [6], and as a consequence, the femoral stem oversizing was common [7]. For some patients, the small congenital dislocation of the hip stem with a 35.5 mm offset was suitable, but for others, this was still too large. As a result, the smaller femoral stems were introduced to the Asian market in the mid nineties to cater for the need of this population (Fig. 1).

These Exeter small stem implants are dissimilar to the smaller stems available in Europe for revision THA. They are shorter with a modified angle of taper and different offsets of 30 mm, 33 mm, and 35.5 mm, compared to 44 mm offset for the smaller stems for revision. We report the first series of Exeter small stem primary THA with medium-term results in Asian population. Our aim was to establish whether published results for the Exeter Universal stem were reproducible in smaller stem implants and to assess whether the implants behave the same way as their larger counterparts.

Materials and Methods

Between December 1995 and December 2002, a total of 110 Exeter THA was performed at our center. Of these, 60 patients with 65 hips underwent small stem Exeter THA. Twelve patients had revision THA using Exeter small stems and were excluded from this study. Six patients were lost to follow-up or had incomplete records. Sixteen patients died with the prosthesis in situ from causes not related to the surgery. All 16 patients had index operation more than 5 years ago and had complete records at the last follow-up, and none had revisions of the stem. Therefore, a total of 42 patients with 47 replaced hips were included in this study.

There were 9 male and 33 female patients. The mean age of the patients at the time of operation was 58.3 years (range, 23-90 years). The average body weight and height of the patients was of 57.1 kg (range, 40-82 kg) and 154.5 cm (range, 143-175 cm), respectively. The most common diagnosis was osteoarthritis (15 hips), followed by avascular necrosis (AVN) of the femoral head (12 hips). Other diagnoses included previous fracture (11 hips), developmental dysplasia of

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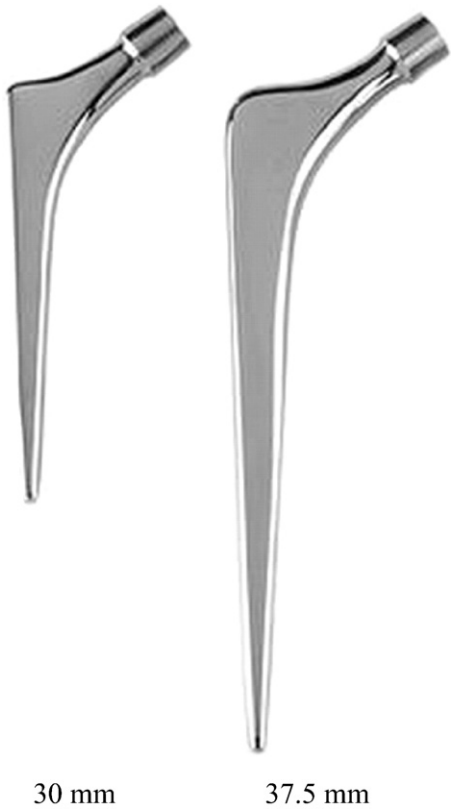

Fig. 1. Small stem implant of 30 mm offset compared to standard implant of 37.5 mm offset.

the hip (1 hip), rheumatoid arthritis (7 hips), and ankylosing spondylitis (1 hip). The functional classification, according to Charnley's criteria [8], was class A (unilateral disease with no additional limitations) in 14 patients, class B (bilateral disease with additional limitation) in 21 patients, and the remaining patients in class C (multiple joint disease with other disease limiting mobility).

The mean follow-up for was 8.5 years (range, 5-12 years) in this series. The distribution of the sizes of small stems and cups used are shown in Fig. 2 and Table 1, respectively. Most (74.5%) femoral components had heads of 26 mm diameter, and the others were 28 mm diameter.

Operative Details

Operations were performed either by the senior surgeon or by trainees under his supervision, using the anterolateral approach to the hip in all cases. The small stem was cemented using a second-generation cementing technique, including cement restrictor, pressurized lavage, retrograde introduction of cement with a cement gun, and a proximal femoral cement pressurizer. Simplex P radiopaque bone cement (Stryker Inc, Warsaw, Ind) was used in all cases. All cups used were all-polyethylene and cemented with the same type of cement.

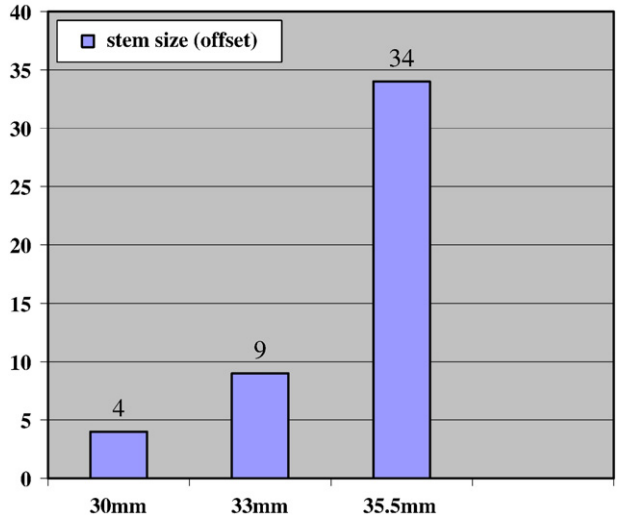

Fig. 2. The distribution of the small stem sizes among the patients.

Clinical Assessment

All the clinical and operative data were collected prospectively. Clinical evaluation was carried out preoperatively and postoperatively using the grading system of Oxford hip score [9], and at review, both the Merle D'Aubigné and Postel [10] and Harris hip score [11] were also recorded. All the clinical and functional assessments for the study were conducted by either a specialist arthroplasty fellow or research associate and not by the operating surgeons.

Radiographic Evaluation

Radiologic assessment was performed from the anteroposterior radiographs of the pelvis and the lateral views of the affected hips. Radiographs were taken preoperatively and postoperatively at every assessment, notably at 1 week, 1 year, and then annually thereafter. All radiographs were examined by independent radiologists for any evidence of loosening. Stem alignment and axial subsidence of the stem were measured. Stem failure was classified according to the criteria described by Gruen [12]. Completeness of cement mantle (Barrack's method) [13] and cement fracture were also noted. Any evidence of migration of the cup was measured [7], or radiolucent line around the cup was assessed at 3 regions [14]. Ectopic ossification, if present, was graded according to Brooker's classification [15]. All radiographic measurements were

Table 1. Acetabular Cup Size Distribution of the 47 Small Stems Used in the Study

Size (mm)	n (%)
44	20 (42.6)
46	1 (2.1)
48	19 (40.4)
52	6 (12.8)
56	1 (2.1)
Total	47 (100)