Medium and long term results of cemented double tapered polished stems in patients younger than 40

INTRODUCTION:
Surgical techniques that preserve the femur for the long term in younger patients using total hip arthroplasty surgery remains an important objective for orthopaedic surgeons. Total hip arthroplasty in young patients with a cemented polished femoral stem has good results when performed by high volume hip surgeons. Such results are however not known when the total hip arthroplasty is performed by general orthopaedic surgeons from centres not involved in the implant design. The aims of this study were to determine the clinical outcomes and assess radiographically the preservation of the femur in patients younger than forty undergoing total hip arthroplasty using a cemented polished double tapered stem undertaken by community surgeons.

METHODS:
Between July 1990 and November 2007, 64 hips (52 patients) were treated using a cemented polished double tapered stem by a group of orthopaedic surgeons with varying arthroplasty experience. The median age of the patients at surgery was 34 (16 to 40). The preoperative diagnosis was primary osteoarthritis in 14 hips, inflammatory arthritis in 14, osteonecrosis in 13, trauma in 12, dysplasia in 8 and other diagnoses in three. Median follow-up was eight years (2 to 19).

The procedures were performed by surgeons with varying experience in primary total hip arthroplasty (THA), including 14 supervising consultant orthopaedic surgeons, 18 arthroplasty fellows and 13 orthopaedic trainees. A posterior approach was used in 51 hips (80%). All stems used were the collarless double taper polished design and included 35 modular stainless steel Exeter (Stryker Howmedica Osteonics, Berkshire, UK) and 8 stainless steel CPT and 21 cobalt chrome CPT with 12/14 neck tapers (Zimmer Ltd, Warsaw, Indiana). A cemented Exeter acetabular component was used in 21 hips. An uncemented acetabular component was used in 43 hips.

Anteroposterior (AP) pelvis, AP and rolled lateral hip radiographs were taken at each clinical review. Of the 64 hips, including those that had acetabular or femoral revisions, 55 had radiographs available for review (86%). Prosthesis to cement and cement to bone radiolucencies, cement fractures and osteolysis were recorded in each Gruen and lateral zone. Osteolysis was graded according to Gruen into mild, intermediate and extensive. The femoral component was classified as possibly or probably loose using the criteria of Harris et al. Definite loosening was defined as vertical subsidence of more than 5mm. The distance the stem migrated into the hollow centralizer and the width of any radiolucency at the shoulder of the prosthesis at the p-c interface in Gruen zone 1 measured parallel to the stem long axis was measured to determine stem within cement subsidence. Femoral bone deficiencies were classified according to Paprosky and the EndoKlinik. Post-operative femoral fractures were classified using the Vancouver system. Patients were assessed pre-operatively and at regular post-operative intervals. Outcomes collected included the Harris pain and Hip scores and activity levels using the SICOT Activity Score. Revision was defined as major where all the implant composite at the prosthesis-bone interface, including the cement, was removed or minor if it involved removal of part of the composite, excluding removal at the prosthesis-bone interface, and included head exchange, cement-in-cement stem exchange and acetabular liner exchange.

Survival analyses were undertaken using the Kaplan-Meier method and 95% confidence intervals (CI) were calculated. Survival curves were compared using the log rank test. Survival analysis was not reported after 11 years as there were less than 20 patients in this group. A worst case analysis (WCA) was used to report all patients lost to follow up as a failure.

RESULTS
Three patients (three hips) died. Two patients (two hips) were lost to follow-up. Thirteen patients (13 hips) had revision of either component or revision of both components. The mean follow-up for the surviving 40 patients (46 hips) without acetabular or femoral revision was nine years (median 8, range 2–19). The median pre-operative Harris hip and pain scores were, 39 (range 18-74) and 10 (range 0-44), and at latest follow-up were 80 (range 30-100) and 44 (range 10-84). The level of activity improved post-operatively from semi sedentary to light labour with a difference (p<0.05) in activity levels being reported preoperatively and at 1 year.

Survival of the polished stems using the endpoint revision for aseptic femoral loosening was 100% at 11 years (WCA=95% (95% CI 88-100%) (Figure 1). No stem was revised for aseptic loosening at up to 19 years. Seven stems were revised for other reasons. Six hips were treated with cement-in-cement stem exchange and in two by impaction grafting using standard length stems. Internal fixation was required for one periprosthetic fracture. Radiographic analysis of the femurs revealed one definitely loose stem at 16 years in a patient wheelchair bound by severe rheumatoid arthritis and in the absence of hip pain has declined revision; 6% mild and 3% intermediate osteolysis; 96% had Paprosky type I and 4% had type II defects; 87% had EndoKlinik grade 0 and 13% had grade 1 bone loss.

There were nine acetabular revisions. Two for recurrent dislocation, three at the time of cement-in-cement stem exchange and five for aseptic loosening. One of the five patients, who underwent acetabular revision for aseptic loosening, underwent subsequent acetabular revision for loosening. Seven acetabular components were radiographically classified as loose. Ten acetabular components had osteolysis but this was more common around Exeter acetabular components inserted in the early part of the study.

DISCUSSION:
Good medium to long term outcomes were achieved in these young patients undergoing THA and the femur was well preserved using a collarless polished tapered stem treated by a group of surgeons with varying experience in THA. No polished stem was revised for aseptic loosening and there was minimal femoral osteolysis and bone loss. The performance of these younger groups, current study and the one by De Kam, compares well with other studies reporting on the results of polished stems in the older population. The ability to perform a minor, cement within cement, revision for other reasons than aseptic loosening further promotes the benefit of using these type of implants in young patients.

SIGNIFICANCE:
Using a cemented polished stem in patients younger than 40 have good results when performed by general orthopaedic surgeons. The performance of the cemented polished stem in these young patients compares well with the results of cemented double polished stems in the older population.

REFERENCES: