Cementless total hip replacement after previous intertrochanteric valgus osteotomy for advanced osteoarthritis


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We present a series of 30 uncemented total hip replacements performed between June 1985 and January 2002 with a mean follow-up of seven years (5 to 20) in 27 patients who had previously undergone a valgus intertrochanteric osteotomy. No further osteotomy was undertaken to enable hip replacement. We used a number of uncemented modular or monoblock femoral components, acetabular components and bearings. The patients were followed up clinically and radiologically. We report 100% survival of the femoral component. One acetabular component was revised at five years post-implantation for aseptic loosening. We noted cortical hypertrophy around the tip of the monoblock stems in six patients. We believe that modular femoral components should be used when undertaking total hip replacement in patients who have previously undergone valgus femoral osteotomy.

Intertrochanteric valgus osteotomy is an operation which aims to delay the need for joint replacement in young patients with osteoarthritis (OA) of the hip. If OA progresses with age, the only remaining surgical option for these patients is total hip replacement (THR). Several papers on THR in patients who had previously undergone femoral osteotomies have been published. In a recent report, Iwase et al suggested that following an intertrochanteric valgus osteotomy, the use of cemented stems is preferable to the use of uncemented ones. We are aware of only one paper that reports the long-term results of an uncemented THR following a previous valgus osteotomy. Following an osteotomy, the anatomy of the proximal femur is abnormal and the bone in the metaphyseal region sclerotic. As a consequence, the preparation of the femoral canal during THR can be challenging and a number of intra-operative complications, such as fracture, should be anticipated. We present our experience and mid-term results of the use of uncemented THR in patients who had undergone previous intertrochanteric valgus osteotomy.

Patients and Methods

We present 27 patients (26 women, one man) with 30 hips who underwent THR between June 1985 and January 2002 following a previous femoral osteotomy. The mean age at the time of operation was 57 years (37 to 70). The mean time between the osteotomy and hip replacement was 149 months (21 to 360). The mean follow-up after THR was 87 months (60 to 246). All the patients were followed up routinely both clinically and radiologically. None was lost to follow-up. A previous isolated femoral valgus osteotomy had been undertaken in 19 hips (63.3%). An additional acetabular shelf procedure (Spitzy method) was undertaken in the remaining 11 hips (36.7%) because of severe acetabular dysplasia. An extension osteotomy was added if there was a flexion contracture.

Routine pre-operative anteroposterior (AP) pelvis and lateral hip radiographs allowed evaluation of the anatomy of the proximal femur. Templating was used to determine the appropriate femoral component. A number of different monoblock or modular type uncemented femoral and acetabular components were used (Table I, Fig. 1). The bearing surfaces used were metal (CoCr)-on-polyethylene in 23 hips, ceramic-on-polyethylene in two and ceramic-on-ceramic (Al2O3) in five.

All operations were performed through a posterolateral approach with the patient in the lateral decubitus position. Despite the presence of scar tissue at the previous osteotomy site, we could still identify the sciatic nerve. The medullary cavity at the previous osteotomy site was sclerotic.

All patients were evaluated pre- and post-operatively using the Harris Hip score (HHS).
Intra-operative blood loss, complications and duration of surgery were recorded. Post-operative complications, leg-length discrepancy or thigh pain were noted.

All the radiographs were examined by two independent experienced orthopaedic surgeons (KS, SK) for alignment of the femoral component, subsidence, radiolucent lines, cortical hypertrophy, osteolysis, signs of stress shielding, and presence of heterotopic ossification. The radiological stability of the implant was judged using Engh’s criteria.9

The femoral component was considered to be loose if in a series of radiographs there was a change in its position, such as subsidence (> 2 mm) or varus-valgus tilting (> 5˚).

Gruen’s classification was used to record the radiolucent areas around the stem.10 DeLee and Charnley’s classification11 was used to describe radiolucent areas around the acetabular component. A continuous radiolucent line > 2 mm thick around the acetabular component was considered to suggest impending failure.12 Any migration > 2 mm was considered a failure.

The radiological evaluation of leg-length discrepancy was calculated by drawing a horizontal line across the inferior aspect of the ischia and the eminence of the lesser trochanter is measured to determine leg-length discrepancy.

Results

The mean duration of surgery was 94 minutes (65 to 170) and the mean intra-operative blood loss was 563 g (216 to 1100). One patient at surgery sustained a proximal femoral fracture which was stabilised with cerclage wiring. No post-operative complications, such as dislocation, infection or pulmonary embolism were recorded.

The mean follow-up was seven years (5 to 20). The mean pre-operative HSS was 43 points (26 to 57) and at the latest evaluation was 93 points (86 to 99). No patient complained of thigh pain at the final follow-up.
The mean radiological leg-length discrepancy was -7 mm (-20 to 10) pre-operatively and 3 mm (-5 to 10) at follow-up. No patient had neuropraxia of the sciatic nerve secondary to leg lengthening. One patient with a Crowe type 4\textsuperscript{14} dysplastic hip was excluded from the leg-length discrepancy measurements. Radiological evaluation showed that all the femoral components had good bony integration. In one hip, radiolucent lines were present in zones 1 and 7, with no other radiological or clinical signs of loosening.\textsuperscript{9} Bone hypertrophy was observed in zones 3 and 5 in six hips. One acetabular component was radiologically and clinically loose and was revised five years post-operatively.

Discussion

Our midterm clinical and radiological results using an uncemented THR after valgus osteotomy were satisfactory, without post-operative complications.

Breusch et al\textsuperscript{6} have reported the ten-year results of uncemented THR following intertrochanteric osteotomy but they included a variety of osteotomies which were performed for a number of conditions, including avascular necrosis of the femoral head and trauma. In our study, all patients had progression of OA following valgus intertrochanteric osteotomy for acetabular dysplasia.

Using cumulative survival curves Iwase et al\textsuperscript{5} reported better results using cemented rather than uncemented femoral components following femoral osteotomy. Survival at seven years was 100% for cemented components and 40% for uncemented components. However, we believe that good results can be achieved with uncemented components if the patients are carefully selected.

The medullary cavity around the osteotomy site is sclerotic and a separate procedure prior to THR at the deformed intertrochanteric region may be necessary. As a result, operating time may be longer and intra-operative blood loss more extensive. We were able to penetrate the hardened medullary cavity with routine instruments, and the use of autologous blood minimised the transfusion requirements.

The use of a monoblock stem in patients with an intertrochanteric deformity may cause over-anteverision. Modular type stems, such as the S-ROM (DePuy, a Johnson and Johnson Company, Warsaw, Indiana), can be useful for these patients because its anteversion angle is adjustable. This will minimise the possibility of dislocation caused by implant impingement.\textsuperscript{15} After a valgus osteotomy the tension of the abductor muscles may be high as the greater trochanter tends to be translated in a postero-lateral direction. This higher muscle tension may reduce the possibility of dislocation in these patients when compared with those who had a varus osteotomy.\textsuperscript{16} Leg-length discrepancy in our series was greatly improved after THR.

In patients who have undergone a previous osteotomy the intertrochanteric and subtrochanteric regions lose their normal anatomy such that a further corrective osteotomy may be required in order to proceed to a THR.\textsuperscript{17} In our series, no patients required an osteotomy in order to achieve implantation of the femoral component.

Radiological examination revealed cortical hypertrophy at the distal end (zones 3 and 5) of the femoral component in six patients, all of whom had received components of monoblock design but none had pain at the thigh. Although longer follow-up is required, cementless THR yielded excellent clinical and radiological mid-term results. However, modular stems may be more suitable to deal with the residual deformity and sclerosis in the metaphyseal region after previous intertrochanteric valgus osteotomy.

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References


