Total hip arthroplasty for arthrodesed hips

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ABSTRACT

The benefits of converting an ankylosed or arthrodesed hip to total hip arthroplasty have been reported in the literature as have the technical difficulties associated with this procedure.1,2,4 This review, however, outlines the experience of a single surgeon (WJMB) at a single institution using uncemented prostheses.

Between November 1991 and June 1996, 5 arthrodesed hips underwent uncemented total hip arthroplasty in 4 males and 1 female. Clinical and radiological follow-up review was for at least three years in all patients.

In general, patients were satisfied with the outcome of their surgery with Harris Hip scores improving from an average of 62 preoperatively to an average of 72 postoperatively. The surgical outcome in these difficult cases was not as satisfactory as for routine total hip arthroplasty.

Meticulous preoperative planning is required to aim toward leg length restoration and restoration of the abductor moment arm5. A modular prosthesis allows versatility at surgery.

Key words: arthrodesis, total hip arthroplasty, uncemented arthroplasty

INTRODUCTION

The conversion of an arthrodesed hip of long standing to a total hip arthroplasty can be a difficult undertaking. It is a relatively uncommon procedure. In just over 4 years, 5 such operations have been performed at our institution, utilizing uncemented components.

Previous published series5,8,11 outlined the fact that the effect of previous operation and altered anatomy, in addition to atrophy of abductor musculature, made the undertaking of conversion arthroplasty difficult. In addition, the ultimate results of arthroplasty are inferior to published series of patients with degenerative arthritis.

However, these series also pointed out the potential benefits to patients undergoing conversion arthroplasty. These include increased maneuverability and ability to sit comfortably.

METHODS

From November 1991 to June 1996 at Concord Repatriation General Hospital, 5 arthrodesed hips were converted to total hip replacement. There were 4 males and 1 female patient with an average age of 46 years (range 24 to 59 years). Surgical arthrodesis had been performed in 3 patients (1 for tuberculous infection, and 2 for post traumatic arthritis) whilst ankylosis had
occurred in 2 patients (1 following fracture dislocation of the hip and 1 following chondrolysis). Average length of arthrodesis was 25 years (range 8–50 years) (Table 1).

The predominant indication for surgery in our patients was back pain and ipsilateral knee pain. In each patient these have been a progressive phenomenon. No arthrodesis was painful preoperatively. In addition, most of our patients reported limited walking distance and difficulty in performing activities of daily living such as climbing stairs and tying shoe laces. All of our patients had hips fused in unsatisfactory positions (Table 1) and patients had measured limb length discrepancies (average 3 cm), with the maximal deformity noted in the patient with previous tuberculous infection of 10 cm.

Preoperatively, X-ray templating was undertaken to carefully plan anatomical reconstruction and to assess the use of the most appropriate approach depending on patient anatomy and previous surgery. Biomechanical restoration was planned by attempting to reconstruct prosthetic offset to match the abductor moment arm with the moment arm at the centre of gravity of the pelvis. This was difficult in early cases as the options for offset were poor in the early prosthetic designs that we employed (Fig. 1b). In addition, acetabular height and inclination were also assessed and an attempt was made at the time of reconstruction to match these parameters with that of the contralateral side.

Surgery was undertaken by the senior surgeon in each case. Perioperative antibiotics and anticoagulation were used and in the patient with a history of tuberculosis, antituberculosis medication was employed for 1 month preoperatively and 6 months postoperatively.

A modified Hardinge approach was used in all cases with the patient in the lateral decubitus position. Trochanteric osteotomy was performed in two patients to gain access when required. The trochanter was reattached using the Dall-Miles cable system (Table 1). Both of these patients had suffered from post traumatic arthritis. Four S-Rom modular prostheses were implanted and one Stability prosthesis was used. The Stability prosthesis, which is non-modular, was chosen in the presence of minimal anatomical deformity. An adductor tenotomy was performed on 2 patients postoperatively. Prophylaxis against heterotopic ossification was used in 3 patients (2 patients with fracture dislocations and 1 patient with tuberculous arthritis). Postoperative Indomethacin was used in these patients. Radiotherapy prophylaxis was also employed for 2 patients with prior fracture dislocations in this subset. Preoperative radiotherapy was used in 1 patient and postoperative radiotherapy used in the other. Clinical information was collected prospectively at follow-up by the treating surgeon.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Outlines of patient demographics and perioperative data</th>
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<tbody>
<tr>
<td>Patient</td>
<td>Sj</td>
</tr>
<tr>
<td>Age</td>
<td>59</td>
</tr>
<tr>
<td>Side</td>
<td>Right</td>
</tr>
<tr>
<td>Cause</td>
<td>Tuberculosis</td>
</tr>
<tr>
<td>Prior surgery</td>
<td>Yes</td>
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<tr>
<td>Duration</td>
<td>50 years</td>
</tr>
<tr>
<td>Preop HHS</td>
<td>53</td>
</tr>
<tr>
<td>Position</td>
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<tr>
<td>Prosthesis</td>
<td>S-Rom</td>
</tr>
<tr>
<td>Troch osteot</td>
<td>NO</td>
</tr>
<tr>
<td>Postop HHS</td>
<td>84</td>
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RESULTS

Follow-up review was undertaken by regular clinical review employing the Harris Hip score evaluation and X-ray examination. Harris Hip scores improved from an average of 62 preoperatively (range 55 to 70) to an average 76 postoperatively (range 62 to 84) (Table 1), in general, patients were satisfied with the outcome of surgery. In each patient the arch of motion of the hip was improved.

Symptomatically, back pain was relieved in all patients. However, the patient who suffered from contralateral hip and knee pain subsequently went onto contralateral total hip replacement and ipsilateral knee replacement. 1 patient with post traumatic arthritis had an antecedent history of common peroneal nerve palsy. This significantly contributed to prolonged rehabilitation and continuing gait difficulties (Fig. 1a & 1b). Leg length was improved in all patients, however, accurately restoring length proved to be difficult, in general, due to anatomic deformity and bone loss (Fig. 2a & 2b). All patients mobilized postoperatively with a Trendelenberg gait, although this has improved to almost normal in 2 patients. These phenomena in the postoperative period would probably be related to change in leg length and abductor weakness. This takes time to strengthen and indeed may never regain normal power. In previous studies it has not correlated with the use of trochanteric osteotomy.6

Fortunately, this persistent abductor weakness did not present marked problems clinically. However, the patient who mobilized preoperatively with a stick continues to do so, and the patient who ambulated previously independently now mobilizes with a walking aid. One of our patients, after an excellent result returned to heavy manual labour against advice. He was progressing very well until after 6 years of post total hip arthroplasty when continuing hip pain necessitated the changing of the acetabular liner. His post operative course from this procedure has been unremarkable.

Complications were few. The patient with previous history of tuberculosis suffered from multiple episodes of leg cellulitis. Responding to antibiotics these episodes continued for 12 months postoperatively and no longer recurred.

After this time, 1 patient who underwent trochanteric osteotomy, the osteotomy migrated slightly although has now united. In addition, both patients’ calcar cracks were noted at the time of operation and these necessitated femoral wiring. No complications from this have developed.

There was no evidence of radiological loosening of any prosthesis at the time of follow up, nor was there evidence of osteolysis or stress shielding of components. Ectopic bone was noted in follow-up X-rays in 2 patients (both Brooker Grade II), 1 of which received oral prophylaxis for this problem. No clinical complications from ectopic bone have been seen.

Figure 1  (a) Preoperative AP radiograph showing arthrodesis present for 17 years performed for post traumatic arthritis. (b) Post operative AP radiograph showing S-Rom prosthesis in situ. Leg length and offset restored.
DISCUSSION

Conversion of ankylosed or arthrodesed hips to total hip arthroplasty are difficult procedures. Although this study outlined a small number of patients treated with this procedure, it is useful in terms of the fact that it outlines conversion arthroplasty undertaken with newer prostheses, in this case uncemented prostheses. Overall, our results are similar to previously published series in the literature. However, we would like to highlight a number of factors evident in our experience which we would consider useful when considering these procedures.

We found preoperative planning to be of value. Preoperative planning allowed consideration of offset and leg length inequality. We believe that accurate reconstruction of the axes gives the previously weak abductor musculature the best chance of strengthening. We recommend the use of a trochanteric osteotomy or slide procedure (depending on preferred approach) in order to maximize access intraoperatively. Leg length correction has to be limited due to the potential risk of damage to the sciatic nerve. Maximum length that can be gained with safety at the time of total hip replacement should be no more than 4 cm. We recommend that leg length be increased and advise the use of some form of intraoperative measuring system to facilitate this aim.

We found a modular prosthesis to be useful in the versatility it provided to alter version and to conform a range of anatomical deformities. The one Stability stem was used in our simplest case. In all others, the S-Rom prosthesis provided an excellent adjunct to reconstruction allowing us to cater for femoral and acetabular deformity.

We felt that prophylactic measures to prevent heterotopic ossification should be made. Although none of our patients developed clinical manifestations of X-ray changes, it would seem prudent to use prophylactic measures in all these types of cases. We recommend nonsteroidal anti-inflammatory drugs for ease of use. Finally careful patient communication is important. Patients must be aware of higher complication rates compared with primary arthroplasty.

Clearly, there is a higher rate of intraoperative fracture due to altered anatomy, and there is a higher rate of infection in patients subjected to previous surgery or where infection has led to arthrodesis. It is vital that patients understand preoperatively that they may sacrifice control of their arthrodesed hip for increased mobility, and therefore must accept that they may require a walking aid indefinitely post conversion arthroplasty.

Figure 2 (a) Preoperative radiograph shows fusion mass present for 19 years. Note leg length discrepancy and lack of offset. (b) Post operative radiograph shows S-Rom prosthesis in situ. In this early design of prosthesis offset options were poor. Compare figure 1b. Some correction of leg length has been achieved.
CONCLUSION

Uncemented prostheses can be used to successfully take down an arthrodesed hip. The results, although satisfactory, are not as good as primary hip replacement. Taking down an arthrodesed hip can be challenging intraoperatively, and postoperatively unaided mobility in these patients may not be possible.

REFERENCES