Total Hip Arthroplasty for Fused Hips

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Arthrodesis of the hip has been used extensively in the past as the procedure of choice for many disabling diseases of the hip. A successful arthrodesis should provide a stable, painless hip. After hip fusion, patients usually have a short leg and will walk with a slightly slower pace than an individual with normal hips. They will likely walk with a perceptible limp and a gait described as asymmetric and arrhythmic, although they will be pain free in the affected hip. The majority of patients will consider their overall activity level to be limited. The most troublesome limitation of activities of daily living involves those that require hip flexion, eg, bending, sitting, bicycling, or putting on socks or shoes. Sitting can be uncomfortable for prolonged periods or in cramped spaces.

In the long term, most patients develop symptomatic arthritis in the spine, ipsilateral knee, and contralateral hip, usually due to the abnormal stress to which these regions are subjected. Furthermore, the position of hip fusion usually entails 5° to 7° of adduction, which interferes with normal sexual function in women. Many problems are associated with such surgery, including altered anatomy, atrophy of the abductor musculature, and limb-length discrepancy.

This article presents the results of a retrospective study converting 16 fused hips to total hip arthroplasty (THA), either surgically (arthrodesis) or spontaneously following juvenile rheumatoid, ankylosing spondylitis, or septic arthritis. Meticulous preoperative planning is required for proper positioning of the acetabulum, leg-length restoration, and abductor moment arm restoration.

MATERIALS AND METHODS

From January 2001 to March 2008 at Assiut University Hospital, 15 arthrodesed hips were converted to THA. Four men and 8 women had an average age of 29 years (range, 16-48 years). The hip was surgically fused in 5 patients (due to Perthes’ disease in 1, old femur neck fracture in 1, advanced osteoarthritis in 1, and old septic hip in 2) (Figure 1). Hips were spontaneously fused due to chronic juvenile arthritis in 2 patients and ankylosing spondylitis in another 2. In 3 patients, hips were spontaneously fused, but the cause could not be identified. Average length of arthrodesis was 15 years (range, 3-38 years) (Table). In unilateral cases, the fused side was shorter than the other side by 2 to 5 cm.

The indication for surgery in our study was the inability to walk except for short distances. In patients with bilateral hip fusion, the situation is even more difficult due to the inability to abduct the lower limbs, with consequent diffi-
culty with personal hygiene, inability to have a normal sexual life, limitation of activities of daily living, and low back pain (Figure 2).

Preoperative radiographs were obtained to determine the site of the true acetabulum, the size of the implant, and the site of the femoral neck cut. Lumbo-

bosacral spine radiographs were obtained to determine the degree of spondylosis and to detect any adaptive changes in the spine that may affect the outcome.

**Surgical Technique**

Patients were positioned in the lateral decubitus position. The Hardinge approach was used in all cases. Any implant present was removed first.

Adquate visualization of the neck–pelvis junction was obtained by subperiosteal dissection. The neck should be clear of any soft tissue all around. The lesser trochanter was identified by palpation as no femoral rotation was possible. Two Hohmann retractors were positioned behind the femoral neck, 1 superior and 1 inferior to the neck to protect important structures like the sciatic nerve, to be sure the neck is not fused to the ischium, and to avoid any accidental injury of the acetabulum or the ischial ramus by the saw (Figure 3).
The femoral neck was cut in a direction perpendicular to the neck as near as possible to the acetabulum; this freed the femur and allowed flexion and external rotation of the leg. A slice of bone approximately 1.5 cm thick was removed from the neck by another saw cut extending from the trochanteric fossa to 1 centimeter above the lesser trochanter to allow femoral retraction. This was done by a Hohmann retractor anterior to the neck and posterior to the posterior wall of the acetabulum to provide space to work on the acetabulum (Figure 4).

Acetabular preparation was done by identifying the anterior and posterior walls of the acetabulum, as the site of neck fusion to the acetabulum was not always central, and then reaming centrally using a small reamer (usually 36 mm) and gradually increasing the size. Care was taken not to violate the acetabular walls, and a cup was fixed with the proper orientation.

Femoral preparation was done in the usual way, taking care of the degree of anteversion, and trial reduction was done to determine the proper neck length. A modular neck version design can be helpful.

Adductor tenotomy was routinely done percutaneously after completion of the procedure to increase the range of abduction by lifting the leg up while the patient was still on his or her side.

Cementless THA was performed in 11 hips (Figure 5) and cemented THA in 4 hips. In 1 patient (surgical arthrodesis), the procedure was not performed due to thin iliac bone. We were not able to fix the cup, so arthrodesis was redone in a better position as the hip was fused in 40° of adduction (Figure 6).

Weight bearing as tolerated on crutches was started 48 hours postoperatively, and when patients felt confident, walking with 1 crutch or a cane was allowed.

RESULTS

Average Harris Hip Score improved from 42 preoperatively (range, 39-51) to 76 postoperatively (range, 44-86) (Table). Patients were generally satisfied with the increased range of motion (ROM) and activities of daily living. The most appreciated results were the ability to flex the hip to ≥90° and the ability to abduct the hip to ≥25°, thereby increasing the ability to use public transportation, sit comfortably in a chair, regain normal sexual function (in women), and climb the stairs. This was achieved in 10 of the 11 THA patients. The accompanied low back pain and knee pain were less improved. Leg-length discrepancy was improved; however, restoring the same length for both limbs was not achieved in 4 patients due to gross leg-length discrepancy preoperatively, with shortening ranging from 1 to 3 cm. The use of 1 crutch or a cane in the opposite hand continued for up to 1 year postoperatively.

DISCUSSION

Hip arthrodesis can provide complete pain relief and allow strenuous activity in patients too young for THA. However, in adolescents and young adults aged 16 to 30 years, long-term durability of the hip replacement and the prospect of multiple revisions are of concern.5 Unfortunately, temporal and cultural changes, as well as anecdotal evidence from other (usually older) patients who have had excellent THA outcomes, have increased the expectations for these young patients.6 Hardinge et al11 reviewed 112 arthrodesed hips (104 patients) converted to THA. The indications for conversion were pain in the lumbar spine (71% of patients), ipsilateral knee (48.1%), and contralat-
eral mobile hip (34%). This was not the case in our patients, whose most common indication was limitation of activities of daily living. This was likely due to the absence of facilities for disabled people in our country, as compared to European society.

Conversion of an arthrodesed hip to a THA is a logical solution for patients with bilateral hip fusion or for women seeking a normal sexual life. Converting a fused hip to a THA is not an easy procedure. It entails many difficulties for the surgeon and risks for the patient. Patients should be aware that THA results in fused hips are less than that of primary hip arthroplasty, and that the complication rate is higher. These complications include intraoperative fractures, neurovascular injury, infection, and heterotopic ossification.

No attempt should be made to lengthen the leg by >4 cm, as this may lead to sciatic nerve injury.\(^8,12\)

Beaulé et al\(^7\) reported that the failure rate of THA at a mean follow-up of 7 years (range, 2-16.5 years) was 8% for spontaneous fusion vs 23% in surgically fused hips. We did not perform conversion THA for patients who had fused hips with a Cobra plate (Synthes, Grenchen, Switzerland) and osteotomy of the greater trochanter used as a graft to enhance fusion, as it is not possible to retain abductor muscle function after the first operation with the risk of dislocation and persistent instability.

**REFERENCES**