Long-term results of rotational acetabular osteotomy in young patients with advanced osteoarthrosis of the hip

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Abstract Between 1974 and 1987, we performed 38 rotational acetabular osteotomies to treat advanced coxarthrosis caused by acetabular dysplasia in 38 patients who were aged 40 years old or less at the time of surgery. Of these patients, 28 were followed-up for more than 10 years after surgery. The pre-operative severity of coxarthrosis was graded as stage III in 21 hips and as stage IV in 7 hips, according to our modification of the classification of coxarthrosis advocated by the Japanese Orthopaedic Association. At the time of follow-up, 27 patients retained their own hip joints on the operated side 10 to 18 years (average, 13 years) after surgery, and the remaining patient had had a secondary total hip replacement 7 years after the surgery. Of the 27 patients who retained their own hip joints on the operated side, 20 had little or no pain and none suffered from severe pain in the operated hip; the severity of coxarthrosis was graded as stage II in 4 hips, as stage III in 9 hips, and as stage IV in 14 hips. We conclude that rotational acetabular osteotomy can be a useful procedure in young patients who have advanced coxarthrosis secondary to acetabular dysplasia.

Key words Osteoarthrosis · Hip · Rotational acetabular osteotomy · Acetabular dysplasia · Coxarthrosis

Introduction

Untreated acetabular dysplasia leads to early degeneration of the hip joint. In some patients with untreated acetabular dysplasia, radiographs show findings of advanced coxarthrosis before age 40, and a series of operations are, presumably, necessary. Among possible procedures selected as the primary operation for these patients, periacetabular osteotomies have the theoretical advantage of preservation of bone stock and acetabular cover of the femoral head. They are expected to relieve pain and delay the need for total hip replacement (THR). However, little has been reported on the long-term results of these osteotomies.7,26 In the present study, we evaluated the results of rotational acetabular osteotomy (RAO),16 one type of periacetabular osteotomy, in 28 patients who had had advanced coxarthrosis before surgery. These patients were aged 40 years or less at the time of surgery and were followed-up for more than 10 years.

Patients and methods

Between 1974 and 1987, we performed RAO on 267 hips in 240 patients with dysplastic hips. Of these procedures, 46 were performed for advanced coxarthrosis in 44 patients aged 40 years or less at the time of surgery who were without concomitant femoral osteotomies. Three patients were excluded from the study group because they had systemic diseases which seriously influenced locomotion. Another 3 patients were also excluded because of previous operations. An effort was made to contact the remaining 38 patients. It was found that 4 patients were unavailable for follow-up, and a further 6 patients did not come to our hospital. We studied the hospital records of the 4 patients unavailable for follow-up and found that none of them had undergone a THR 1 to 9 years after surgery. We sent questionnaires to the 6 patients who did not come to our hospital and received answers from all of them 11 to 20 years after surgery. All the patients could walk without limitations, and all had minimal or no pain in the operated hip, while no patient had undergone a secondary THR until the time of our inquiry.

The remaining 28 patients attended for clinical and radiological assessment, a recall rate of 74%. In patients with bilateral procedures, only the first procedure was included in the data.13,18 Thus, 28 hips in 28 patients are included in this study.
There were 26 women and two men; 22 patients had had a history of developmental dysplasia of the hip in infancy. The average age at operation was 33 years (range, 19 to 40 years). Seven patients were operated when they were aged less than 30 years; 8 when aged between 31 and 35 years; and 13 when aged between 36 and 40 years. We had performed the following concomitant minor procedures with RAO in 10 patients: excision of osteophytes of the femoral head or the acetabular floor, or both, in 8; incision of the joint capsule in 1; and autogenous bone grafting to the acetabular cyst in 1.

The severity of osteoarthrosis of the dysplastic hip was radiographically staged from I to IV, as defined by the following classification, that is, a modification of the classification for coxarthrosis advocated by the Japanese Orthopaedic Association (JOA). Stage I, no findings of osteoarthrosis, with the center-edge angle less than 20°; stage II, slight narrowing of the joint space, sclerosis or small cysts, or both, in the acetabulum or femoral head; stage III, the subchondral bones of the acetabulum and the femoral head in contact in a localized area, and osteophytes or cysts, or both, in the acetabulum or femoral head; and stage IV, obliteration of the joint space, and large osteophytes in the acetabulum or femoral head. According to this classification, 21 hips were graded as stage III, and 7 hips as stage IV.

The indications for RAO were: (1) significant hip pain, (2) a dysplastic hip, (3) antero-posterior radiographs showing improved congruity in abduction, and (4) the patient’s willingness to use crutches for more than 6 months after surgery. Details of the surgical procedures have been published elsewhere. Active range-of-motion exercises for the hip were introduced in the third week after surgery. Kirschner wires that were used to transfix the osteotomized acetabulum to the bone graft and the pelvis were removed at the sixth or seventh week postoperatively. Partial weight-bearing on two crutches was then allowed. The crutches were discarded 6 months after surgery and a cane was then used.

Assessment

The center-edge angle and the acetabular roof obliquity of all the 28 hips were measured, using the antero-posterior radiographs taken before and 3 months after surgery. We clinically assessed the patients who retained their own hip joints at the time of follow-up, using the system of Merle d’Aubigné and Postel, which has a full score of 18 points; from zero to six points each, for pain, mobility, and ability to walk, respectively. The severity of coxarthrosis was also assessed, using the radiographs taken at the time of follow-up.

In addition, we evaluated the results regarding patients as units of observation. For this purpose, we classified the conditions of both hips in a patient into six classes, as follows. Class I, both hips were classified as stage I or II osteoarthrosis; class II, one hip was classified as stage I or II, the other, as stage III or IV; class III, one hip was classified as stage I or II, the other was replaced with an artificial joint; class IV, both hips were classified as stage III or stage IV; class V, one hip was classified as stage III or IV, the other was replaced with an artificial joint; and class VI, both hips were replaced with artificial joints. To simplify the classification, a normal hip was dealt with as stage I osteoarthrosis, and a hip in the state of arthrodesis was regarded as stage IV osteoarthrosis. According to this classification, 18 patients were classified as class II, and 10 patients as class IV before surgery.

Spearman’s rank correlation coefficient was used to determine the correlation between the flexion ranges of the operated hip joint before surgery and at the time of follow-up. A P value less than 0.05 was regarded as significant.

Results

As a direct result of RAO, the center-edge angle was improved from −5° to 36° on average; the acetabular roof obliquity, from 34° to 5° on average. At the time of follow-up, 27 patients retained their own hip joints on the operated side; the remaining 1 patient had had a secondary THR. The details of all 28 patients are summarized in Table 1.

Regarding the conditions of both hips in the patients, 20 patients were classified as being in the same class before surgery and at the time of follow-up (Table 2). Four patients had had a unilateral THR during the follow-up period; no patient, however, had bilateral THR.

At the time of follow-up, the average age of the 27 patients who retained their own hip joints on the operated side was 47 years (range, 31 to 58 years). They had an average follow-up of 13 years (range, 10 to 18 years). Twenty patients had little or no pain, and 24 could walk for a comparatively long time with or without a cane. Five patients, however, had a flexion range under 40°; these patients were among the 20 patients who had had a flexion range of 90° or less before surgery. The flexion range at the time of follow-up was significantly related to the flexion range before surgery (P = 0.02). With regard to the severity of coxarthrosis at the time of follow-up, 4 hips were graded as stage II, 9 hips, as stage III, and 14 hips, as stage