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TOTAL HIP ARTHROPLASTY FOR FAILED ROTATIONAL ACETABULAR OSTEOTOMY: A REPORT OF THREE CASES

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ABSTRACT

Three female patients with osteoarthrotic hips received total hip replacement arthroplasties after failed rotational acetabular osteotomies (RAO) were reported. In the first case, there was necrosis of the thin acetabular fragment and a collapse of the large grafted iliac bone because of technical problems. The second case had residual developmental dislocation of the hip preoperatively which resulted in pseudoarthrosis and instability of the puble bone postoperatively. This patient was considered to be a bad candidate for rotational acetabular osteotomy. The last case was 65 years old, too old to treat by osteotomy. Deterioration of the articular cartilage was expected. All of them were successfully treated with total hip arthroplasties. The ages of the patients, the stage of osteoarthrosis, the thickness of the osteotomized acetabular fragment, and the size of the grafted bone seemed to be factors influencing the outcome of the RAO.

Key Words: Rotational acetabular osteotomy (RAO), Osteoarthrosis (OA), Total hip arthroplasty (THA)

INTRODUCTION

Rotational acetabular osteotomy (RAO) is a useful method which enables the weight-bearing area of the acetabulum to be covered with physiological hyaline cartilage to treat early osteoarthrosis (OA) with congenital dysplasia in relatively young patients.¹⁾ RAO is also advantageous in connection with some osteotomies requiring postoperative remodeling of the congruity between the femoral head and acetabulum such as Chiari's osteotomy²⁾ and the shelf operation.³⁾ But RAO sometimes fails due to inadequate cartilage application or poor operative technique, mainly because it is technically demanding.⁴⁾ We reviewed three cases received total hip arthroplasty (THA) after RAO for early recurrence of severe pain in the hip. The purpose of this report is to discuss indication problems and RAO operative techniques against OA of the hip.

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CASE REPORTS

CASE 1. The patient had suffered from pain in her right hip since she was 20 years old. A plain radiograph taken at another hospital in September 1994 when she was 45 years showed developmental dysplasia of the hip with early osteoarthrotic changes (Fig. 1a). RAO was performed at that hospital in November 1994. The center-edge (CE) angle was improved from 10 degrees to 45 degrees. A postoperative radiograph showed that the osteotomized acetabular fragment was thin and the grafted bone from the iliac crest was bulky (Fig. 1b). A Dall-Miles' cable grip was used to fix the osteotomized greater trochanter. The pain recurred three months after RAO and did not improve with conservative treatment. On her first visit to our hospital in September 1995, she needed crutches to walk due to severe pain. Her hip score using the Japanese Orthopaedic Association (JOA) scale was 50 points out of 100. Radiographs showed osteonecrosis of the acetabular fragment, collapse of the grafted bone, and narrowing of the joint space (Fig. 1c). Neither osteophytes nor cysts were recognized in the femoral head. In November 1995, THA was performed following reconstruction of the acetabulum with an autologous femoral head bone graft. Both the femoral head and acetabulum developed eburnation, and the articular cartilage was present in only the non-weight-bearing area. Although the bone defect in the anterior portion of the acetabulum was massive after removal of the necrotic bone, bone cement was not used because there was good coverage of the acetabular component. One year and seven months after THA, the JOA hip score improved to 86 points. A radiograph showed no evidence of sinking and loosening of the prosthesis, nor any osteolysis of the femur and acetabulum (Fig. 1d).

CASE 2. The patient had a past history of congenital dislocation in the right hip that was treated with casts. She visited the Nagoya University Hospital for coxalgia when she was 13 years old and the pain gradually decreased with use of non-steroidal anti-inflammatory drugs and rest. She came to our hospital in 1994 at the age of 41 years because the pain in her right hip had increased since 1991. Residual dislocation of the hip and a secondary OA change were observed on the radiograph (Fig. 2a). Her JOA hip score was 73 points. Sugioka's valgus osteotomy of the femur and RAO were performed in June 1994. The CE angle improved from -25degrees to 40 degrees. Medialization and distalization of the femoral head were 8 mm and 5 mm respectively. Continuity of innominate bone was lost in a section of the osteotomy because of preoperative high dislocation (Fig. 2b). Bone chips obtained during osteotomy were reimplanted onto the bone defect. She had no pain during rehabilitation, but severe right hip pain recurred one year after osteotomy. The JOA hip score was 59 points. The plain radiograph showed pseudoarthrosis in the pubic portion of the osteotomy (Fig. 2c). She hoped for quick pain relief. THA was performed in August 1996. There was a large bone defect of $3 \times 2 \times 1.5$ cm in the anterior and central portion of the acetabulum. Dissociation and abnormal mobility between the ilium and ischium were recognized, and an interruption in the defect from surrounding soft tissues including the iliopsoas muscle was observed. These defects were filled using resected femoral head. The acetabular component was cemented because of the large bone defect and the instability of the acetabulum. Eleven months after THA, the JOA hip score improved to 85 points. Radiograph showed no abnormal findings one year after THA (Fig. 2d).

CASE 3. The patient came to our hospital for pain in her right hip in March 1989 at the age of 62 years. Joint space in the weight-bearing area of the hip was 3.5 mm on a radiograph with the hip in maximum abduction, and the articular cartilage was estimated to be sufficient for osteotomy. In February 1992 at the age of 65 years, RAO was performed. The CE angle improved to



1c.



Fig. 1. Radiographs from Case 1. a. On first examination at another hospital, slight narrowing of the joint space and mild osteosclerosis of the acetabulum were observed. b. After RAO at the previous hospital, the CE angle improved to 45 degrees. The acetabular fragment was thin and the grafted iliac bone was large.
c. Resorption of the acetabular fragment and collapse of the grafted bone were observed. d. The picture one year and seven months after cementless THA and bone graft were performed.





2d.

Fig. 2. Radiographs from Case 2. a. High dislocation of the hip due to congenital dysplasia and a secondary OA change were observed. The CE angle was -25 degrees. b. After Sugioka's valgus osteotomy of the femur and RAO was performed, continuity of the innominate bone was lost in the vicinity of the osteotomy.
c. Two years after RAO, pseudoarthrosis developed in the osteotomized portion. d. The picture eleven months after a cemented THA and bone graft were performed.





Fig. 3. Radiographs from Case 3. a. Three years after RAO, the joint space was narrowing but still remained. b. The picture after cemented THA was performed.

55 degrees, and joint congruity became better after osteotomy. She complained of only trivial complications until three years after the operation. Her pain gradually increased from January 1995. The joint space narrowed but still remained 2 mm on a radiograph (Fig. 3a). She received cemented THA in June 1997 at the age of 70 years (Fig. 3b). No defects were seen in the weight-bearing area because enough acetabular coverage was obtained by osteotomy. Six months after THA, the radiograph showed no abnormal findings.

DISCUSSION

In the first case there were problems in the operative techniques. The acetabular fragment was so thin that osteonecrosis occurred, and the dimension of grafted bone was thought to attribute to its collapse.

The indication of RAO was inadequate in the second case because under the presence of residual hip dislocation, the coverage with physiological cartilage had not been expected. Furthermore, there were also problems in the operative technique that caused discontinuity of the innominate bone, resulting in pseudoarthrosis at the osteotomized portion with interruption from surrounding soft tissues.

RAO in the last case was effective in delaying THA because pain relief was obtained for three years postoperatively. But it could not change the natural course of degenerative change in the articular cartilage even after enlargement of the weight-bearing area.

All of the patients were satisfactorily salvaged by THA although there were large bone defects or instability.

There are many opinions that RAO should be carefully applied to older patients and those with advanced OA.^{1,4,5)} Although there is no consensus about the strict indications for RAO, we think the application of RAO to a 65 years old patient was inadequate due to her decreased cartilageous plasticity.⁶⁾

Many authors have pointed out not only the increased dangers of damaging the articular cartilage of the femoral head and acetabulum, but also the increased risk of osteonecrosis of the rotated acetabular fragment when the acetabular fragment was osteotomized too thin.^{1,4,5,7} In addition, the first case suggests that too large a grafted bone may collapse. The second case suggests that pain relief cannot be obtained if continuity and stability of the pelvis are lost through osteotomy.

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