Introduction

Hip dysplasia is a common hip joint problem, which results from inadequate development of acetabulum resulting in undercoverage of acetabulum over the femoral head.(1)

The incidence of hip dysplasia is considered 1/1000 of population.(2)

There is not uniform consensus on the natural history of this disease in literature, but many article have shown that if moderate to severe hip dysplasia is not corrected, it will lead to hip secondary osteoarthritis in more than half of the affected patients after the age of 50.(3-5)

In symptomatic patients, treatment is indicated to reduce pain and prevent progression of hip osteoarthritis, which itself needs a major surgery such as total hip arthroplasty in a relatively young age. But the main challenge is in the asymptomatic patients with acetabular dysplasia. In this group of patients, surgery is indicated to prevent secondary hip osteoarthritis.

In 1983, Ganz R et al, innovate a new periacetabular osteotomy primarily to treat acetabular dysplasia.(6)

Since then, many articles have evaluated the effect of this osteotomy on the center-edge and roof obliquity angles of the acetabulum.(7-13)

We introduce this case-series to present the short-to-midterm results of this osteotomy in the patients in our center.

Materials and Methods

In this case-series, we have 15 patients with 18 dysplastic hips. According to Severin classification (1), all these hips were type II or III.
There were 4 men and 11 women, three of the latter were operated bilaterally three months apart. Mean age of the patients at the time of operation was 21.7 (13-49).

All the patients were symptomatic and had mechanical hip pain, unresponsive to conservative treatments. None of the patients showed radiographic signs of the hip osteoarthritis.

For each patient, the acetabular center-edge and roof obliquity angles were recorded on the preoperative radiographs as the baseline measures. The center-edge angle is formed by a line drawn from the center of the femoral head to the outer edge of the acetabular roof and a vertical line drawn through the center of the femoral head. The angle greater than 25 degrees are considered normal, and less than 20 degrees indicates severe dysplasia.

Roof obliquity angle is the angle subtended by the line connecting the inferior-most edge of the roof of the acetabulum to the lateral-most edge of the acetabulum with a parallel horizontal line. Normal value for this angle in women is 8 ± 5.9 and in men 5.2 ± 4.8. An angle >20o is considered dysplasia.

We performed Ganz osteotomy with an ilioinguinal approach. For lateral exposure, we elevated the tensor fascia lata from its attachment, but tried not to violate abductor musculature. The superior joint capsule was well exposed and posterior joint and notch was palpated. For medial exposure, we elevated the iliacus and sartorius off their attachments to ASIS and iliac wing. The rectus insertion to the AIIS was elevated. The dissection became complete when psoas tendon, pubis, and iliopubic line were exposed. Then, osteotomy cuts were performed, first the pubis osteotomy and second the ischial osteotomy were performed under the fluoroscopy guide. The biplanar roof shaped osteotomy of the ilium which consists of an anterior and posterior limb, was performed superior to the AIIS, extending to the posterior margin of the capsule; and the posterior limb was directed toward to the ischial spine (taking care not to enter into the joint or sciatic notch). This osteotomy must reach the ischial osteotomy under the fluoroscopy guide, at this stage, the acetabulum was free to rotate. So acetabular fragment was rotated anterior and laterally (maintaining anteversion) and then medialized. After controlling the position of the acetabulum and the degree of correction, the acetabular fragment was secured with three long cortical 4.5-mm screws.

For determining the degree of acetabular rotation, we performed hip arthrotomy in all patients and assessed the over- or undercorrection under direct vision. In patients who had a concomitant problem if proximal femur or femoral head, we performed simultaneous femoral osteotomy.

The day after operation, all patients could walk with the aid of a walker in a toe-touch method until 6 weeks. Then, they progressed to full-weight bearing over a six weeks period. The patients were discharged from hospital within 5 days postoperatively, on average.

Mean postoperative follow-up time in our patients was 25 (7 months to 6 years). The postoperative center-edge and roof obliquity angle were measured and recorded by an orthopaedic resident who was blind to the preoperative values.

Results

Mean acetabular roof obliquity angle changed from 23.8o (13o-32o) preoperatively to 9.6o (3o-19o) postoperatively, showing a 59.6% decrease. Mean acetabular center-edge angle changed from 15.4o (7o-20o) preoperatively to 28.6o (25o-42o) postoperatively, showing a 85.7% increase.

None of our patients experienced thromboembolism, surgical site infection, vascular complications and delayed union at the osteotomy site, postoperatively. One of
the cartilaginous femoral head is increased. This osteotomy, which was introduced in 1983 by Ganz R et al, is indicated in adult persons with dysplastic acetabulum who do not have advanced hip osteoarthritis. The goal of performing this osteotomy is to prevent the formation or progression of osteoarthritis in the acetabulum.(6) Following this osteotomy, the projected loadbearing area of the hip joint increases considerably.(14)

Discussion

Ganz periacetabular osteotomy is a rotational acetabular osteotomy which can change the orientation of the acetabulum theoretically without any change in the acetabular curvature. With this change in the orientation, the coverage of acetabulum over

our patients experienced femoral nerve palsy immediately after the surgery, for who we performed a neurolysis 6 week postoperatively and the symptoms resolved completely. Since this is a short- to midterm follow-up, we could not assess the effect of the osteotomy on the prevention of hip osteoarthritis, which needs a longer follow-up.
roof obliquity. All iliac osteotomy sites healed. Eleven of the thirteen patients (fourteen of the sixteen hips) were satisfied with the result of the surgery, and fourteen hips had a good or excellent clinical result. Major complications included loss of acetabular fixation, which required an additional surgical procedure, in one patient and overcorrection of the acetabulum and an associated ischial nonunion in another patient. There were no major neurovascular injuries or intra-articular fractures. (10)

Steppacher SD et al in a 20-year follow-up study on 75 hips in 63 patients showed that the center-edge angle increased from $60 \pm 9.0$ ($-24$–$25$) preoperatively to $34 \pm 12.3$ (10–55) postoperatively. (11)

Matheney T et al in another study on 189 hips showed that one hundred and two hips (76%) remained preserved at an average of nine years. Two independent predictors of failure (defined as arthroplasty or a high pain score) were identified: (1) an age of more than thirty-five years and (2) poor or fair preoperative joint congruency. The probability of failure requiring arthroplasty was 14% for hips with no predictors of failure, 36% for those with one predictor (either an age of more than thirty-five years or poor or fair joint congruency), and 95% for those with both predictors. (15)

In our report, we found an increase in center-edge angle from 15.4o (7o–20o) preoperatively to 28.6o (25o–42o) postoperatively and a decrease in acetabular roof obliquity angle changed from 23.8o (13o–32o) preoperatively to 9.6o (3o–19o) postoperatively.

Our study has some limitations. First, the number of our cases is limited (18 hips in 15 patients), which is much smaller than other researches. Second, this is a short- to midterm follow-up and we could not assess the clinical results and osteoarthritis progression in our cases and we need a longer follow-up, which will be reported in another article, if possible. Third, we did not have a control group, which is a shortcoming in many studies in orthopaedics.


