Case Report

Berneese Periacetabular Osteotomy for Residual Hip Dysplasia in adults - a case report and review of literature

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Abstract

Pelvic osteotomy for acetabular dysplasia has been introduced to improve acetabular coverage of the femoral head and reduce the risk of secondary osteoarthrosis. Several surgical methods for acetabular reorientation have been proposed for this purpose by reorientation of the acetabulum single, double ,triple , spherical and periacetabular osteotomies .We report our first experience with periacetabulur berneese osteotomy described by Prof. R. Ganz and now the procedure of choice in appropriately selected patients. Fifteen years old boy who presented with complaints of fall and pain in the right gluteal region for 5 days duration that increased

with walking. Examination revealed an antalgic gait. Rest of his examination was normal except mild tenderness in the right buttock area. His plain X-rays revealed an incidental finding of dysplastic left hip with deficient lateral coverage, deformed femoral head, coxa magna and mild coxa valga. In addition he had focal arthritic changes over the superolateral acetabulam with sclerosis and cyst formation. His anterior center-edge angle was 24 degrees with an acetabular index of 44 degrees. He had grade II arthritic changes according to the Tonnis classification of osteoarthritis . A periacetabulur ganz osteotomy was performed.Correction was confirmed with intraoperative X-rays. His post operative course was smooth and he was allowed full weight bearing at 8 weeks when X-rays showed satisfactory healing of osteotomy.

Introduction

Pelvic osteotomy for acetabular dysplasia is a standard procedure to improve acetabular coverage of the femoral head and reduce the risk of secondary osteoarthrosis.[1] Several surgical methods for acetabular reorientation have been described. Single, double, triple and periacetabular osteotomies have been proposed for this purpose by reorientation of the acetabulum.[1-3]

We report our first experience with periacetabular Berneese osteotomy described by Professor Reinhold Ganz in 1980 in Berne, Switzerland.[4]

Case Report

A fifteen years old boy presented with complaints of mild pain in the left groin and around the greater trochanteric region for the last 5 months. The pain increased with weight bearing. His general physical examination was unremarkable except that he walked with an antalgic gait. There was no flexion contracture. The Trendelenberg sign was positive. Range of motion at the right hip was normal and painless.

X-rays of the pelvis revealed a dysplastic left hip with deficient lateral coverage, subluxation and coxa valga (Figure). He also had localized arthritic changes over the superolateral acetabulum with early sclerosis and cyst formation (Class 2 osteoarthritis according to the Tonnis classification of hip osteoarthritis Table).[5] His anterior center-edge angle was 24 degrees with an acetabular index of 44 degrees. The deformity of the hip joint was stage IIa according to Severin's classification system.[6]

Figure. Preoperative x-ray showing the dysplastic femoral head and arthritic changes with subchondral sclerosis and cyst formation in the superolateral weight bearing surface.

Table: Tonnis classification of osteoarthritis by radiographic changes.

Grade	Description
0	No signs of osteoarthritis
1	Mild: increased sclerosis , slight narrowing of the joint space ,no or slight loss of head sphericity
2	Moderate; small cysts , moderate narrowing of the joint space ,moderate loss of head sphericity
3	Severe: large cysts ,severe narrowing of obliteration of the joint space ,severe deformity of the head

Considering his age, and early arthritis, a Ganz osteotomy was performed in the supine position through a single Smith Peterson approach. Curved osteotomes were used to facilitate deeper cuts. Correction was confirmed with intra-operative X-rays. Fixation was achieved with two 3.5 mm cortical screws. The patient required four units of packed cells postoperatively.

Ambulation was started with partial weight bearing on the 3rd post operative day on two crutches. He was allowed full weight bearing at 8 weeks when his X-rays showed satisfactory healing of the osteotomy. The Trendelenberg gait persisted for about 4 months after surgery. He gradually recovered from it after regular abductor strengthening exercises.

Discussion

The management of a young adolescent with

an asymptomatic dysplastic hip and concurrent early degenerative joint disease is complex and controversial. Options include non operative treatment, arthrodesis, salvage or reconstructive osteotomies and total hip arthroplasty. With non operative treatment the osteoarthrosis often progresses. Total hip arthroplasty in young and active patients demands perfection, and failure requiring early revision arthroplasty is common.[7] Hip arthrodesis includes loss of motion, shortening of the extremity, increased energy expenditure during walking and increased stress on the low back and ipsilateral knee.[8] Salvage osteotomies including the Chiari and shelf procedures do not provide coverage of the femoral head with hyaline cartilage.[9] Anterior coverage of the head is difficult to obtain with a medial displacement osteotomy. The shelf procedure provides greater lateral coverage, but the original steep inclination of the acetabulum persists.

The most physiological solution for a young adult who has a dysplastic hip with early degenerative osteoarthrosis is redirection of the acetabulum. This provides a biomechanical re-alignment, allowing better coverage of the femoral head by hyaline articular cartilage. Often the posteroinferior aspect of the hip is spared from the disease as seen on the false profile roentgenogram. Previously described reconstructive procedures have included single, double and various types of triple and periacetabular osteotomies. A Salter innominate osteotomy is a very useful procedure for children and adolescents with moderate degree of mal-alignment but lateralizes the hip joint which is undesirable in a dysplastic hip. Triple innominate osteotomies were developed to overcome these problems; they avoid lateralization and allow greater correction. Lecoeur reported his technique of triple innominate osteotomy in 1965 and recommended division of the pubis and ischium close to the symphysis pubis. Re-alignment is limited by the size of the fragments, the attached muscles and the contracted ligamentous attachments to the sacrum. In the steel osteotomy the ischial cuts are made quite far from the joint and it is performed through three separate incisions. All of these triple innominate osteotomies can lead to notable asymmetry of the pelvis if a substantial amount of correction is obtained.

The Berneese periacetabular osteotomy has become the procedure of choice in many centers for the treatment of young patients with dysplastic hip even in the presence of early degenerative changes. It is, however, contraindicated in cases with severe degenerative arthritis. It has many advantages compared with previously described periacetabular osteotomies. The series of straight reproducible cuts can be performed through a single incision. The posterior column of the hemipelvis remains intact allowing for immediate mobilization of the patient without the need for a spica cast or brace postoperatively. A considerable degree of correction can be obtained laterally and anteriorly with medialization of the hip joint; the shape of the true pelvis is not altered; the vascularity of the acetabular fragment is preserved because the external aspect of the ischium is not dissected and the vascular supply from the inferior gluteal artery remains intact. The labrum can also be examined without the risk of further devitalization of the osteotomized fragment.

The surgical technique has been extensively described but continues to evolve and improve. Most surgeons use some form of approach that spares the abductor muscles, performing osteotomies from the inner aspect of the pelvis. These include an osteotomy of the ischium, a complete osteotomy of the pubis and a biplanar osteotomy of the ilium. The continuity of the posterior column of the acetabulum is preserved. Once the osteotomies are completed, the periacetabular fragment is mobilized. The most challenging part of the operation is to obtain proper correction. The periacetabular segment typically is displaced medially, rotated anteriorly and laterally (maintaining proper anteversion), and provisionally fixed with two smooth wires. A true anteroposterior radiograph of the pelvis is obtained. The acetabular position is judged by six criteria.[10]

1. When the roof is horizontal or slightly under corrected

2. The femoral head is congruous with and centered under the radiographic roof

3. Adequate anterior plus posterior rim coverage of the femoral head (acetabulum anteverted)

4. Medial displacement of the pubic portion of the acetabulum without loss of contact at the superior pubic ramus.

5. Medialization of the femoral head to within 5 to 15mm of the ilioischial line.

6. Shenton's line should become normal.

After definitive fixation, final position is again

confirmed with an additional pelvis AP radiograph before wound closure .If necessary, femoral intertrochanteric osteotomies are performed, as determined by preoperative planning or intraoperative evaluation to improve congruence between the femoral head and acetabulum.

Considering the advantages mentioned above, we think that Ganz osteotomy is the procedure of choice in a patient with dysplastic hip with minimal but progressive symptoms. From our solo experience, we do consider this a technically demanding operation and needs prior exposure to the complex three dimensional regional anatomy with cadaver dissections. This was only possible when expertise was obtained after one of the senior authors (MU) obtained certification in the AO pelvic and acetabular surgery course. Experience was also gained from his visit to a university hospital in Japan, as an APOA traveling fellow, where hip dysplasia is a common entity. This experience provided an insight into the local three dimensional anatomy by way of cadaveric dissection and by assisting many similar surgeries. We recommend a similar minimum surgical experience before any new surgeon embarks on performing this demanding procedure. Considering the degree of coxa magna, we do plan to perform a femoral corrective osteotomy in the future.

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