Developmental Dysplasia Of The Hip At Five Years Of Age Treated With Open Reduction And Femoral Osteotomy: A Case Report

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Abstract

Developmental dysplasia of the hip when presenting late is always a great challenge for orthopaedicians. Once the diagnosis is made by A.P. & lateral view radiographs; operative treatment should preferably include osteotomy on pelvic side with open reduction and femoral shortening. We describe 3 cases who presented late and were treated with open reduction, femoral shortening and pemberton osteotomy. Salter and Pemberton osteotomy are the commonly done procedures on pelvic side in these cases. In our centre earlier we were using Salter osteotomy. The present case report details the usage of the Pemberton osteotomy in 3 cases of developmental dysplasia of the hip who presented late, when treated with Pemberton osteotomy resulted in a good reduction of the acetabular head. We thus strongly recommend Pemberton osteotomy over Salter osteotomy.

INTRODUCTION

Normal hip development depends on proportionate growth of the acetabular triradiate cartilages and the presence of a concentrically located femoral head. Various genetic factors, hormonal factors, intrauterine mal-positioning and postnatal factors play a role in etiology of the developmental dysplasia of the hip (DDH). A child may be born with acetabular dysplasia without dislocation of the hip, and the latter may develop weeks or months later.

Westin et al. reported the late development of dislocation of the hip in children with normal neonatal clinical and radiographic examinations; they termed this developmental dysplasia as opposed to congenital dysplasia of the hip. Diagnosis based on clinical suspicion that is limitation of abduction, asymmetrical skin folds, positive Galezzi sign, waddling or Trendelenburg gait and followed by radiographs taken in anteroposterior (AP) view and lateral view (frog leg position). In AP view approximate position of cartilaginous head is ascertained by following the ossified femoral neck. Lateral view gives idea regarding the anteversion of the neck. DDH when diagnosed at birth and treated at earliest results in normal development of the hip without any surgical intervention, but for delayed presentation surgery is required. Treatment options start with conservative treatment to keep the head within the acetabulum for plastic modulation in position of abduction and flexion. If detection is late various surgical options available are reduction of the head with femoral or innominate or acetabular surgeries. There is no doubt that open reduction and femoral shortening with capsulorraphy can relocate the head but there is always the scope of reorientation of the acetabulum to improve head coverage and acetabular index1, 2, 3.Salter and Pemberton osteotomy are the commonly done procedures on the pelvic side2, 3. The present case report details the usage of Pemberton osteotomy in 3 cases of developmental dysplasia of the hip who presented late. When treated with Pemberton osteotomy they resulted in a good reduction of the acetabular head.

CASE REPORT

3 females (2.5, 3, and 3.5 year old) presented to our institution with a limp of the affected side. After history, clinical examination and necessary investigation, they were diagnosed having developemental dysplasia of the hip with the head either subluxated or dislocated and with a high riding head. [Figure-1] The patients were taken up for surgical reduction and Pemberton type osteotomy was done in each one.

In all the 3 cases reduction of the femoral head was done through anterior approach through bikini incision. After

incision along the iliac crest, sub-perisoteal dissection of the gluteal muscle followed by retraction the rectus femoris, the capsule was opened. Femoral shortening in the sub-trochantric region was done through another incision and reduction of the femoral head into the acetabulum was done. A femur bone segment equal to overlapping of fragments was removed and fixation of femoral fragments with plating was done and graft removed from pelvic osteotomy was put at the shortening site. Then a Pemberton osteotomy was done which was started at AIIS and then proceed posteriorly and inferiorly to enter the tri-radiate cartilage. This was done with curved osteotome under C-ARM guidance. Osteotomy was first done on an outer table as it is a semicircle and it ends at the posterior aspect of the tri-radiate cartilage, then the osteotomy was completed at the inner table either at the same level or inferiorly depending on whether coverage was required superiorly or anteriorly. Then the osteotomy was opened and fixed with bonegraft removed from the femur. No internal fixation was required. The patient was put in one and half spica for 3 weeks, followed by abduction cast for the next 3 weeks. A single cut CT scan was taken post-operatively to confirm reduction, Weight bearing was started after 2 months. The patient was followed up with serial radiographs which showed reduced head within the acetabulum. [Figure-2 & 3] No residual defect or any obvious complication or complaint was recorded.

Figure 1

X-ray showing a dislocated hip on the left side with the femoral head above the acetabulum, making a pseudo acetabulum.

Figure 2

X-ray showing the femoral head within the acetabulum after femoral shortening and Pemberton osteotomy.

Figure 3

X-ray showing the femoral head within the acetabulum after 2 months.

DISCUSSION

Normal acetabular development depends on a normally placed femoral head. Reduction should be gentle and the joint should not be placed under strain1. Some time closed reduction can be done but maintenance of the reduction without strain is not possible. If reduced under strain it can lead to necrosis of the head or dislocation occurs again specially during movement of extension and external rotation of the hip. At higher age closed reduction is not possible at all1, 2.

Nomay et al presumed that after open reduction of the hip, the acetabulum which is shallow will remodel around the femoral head in response to pressure exerted by the femoral head1, 4, 5. Usually this results in gradual deepening of the

acetabulum and improved coverage of the femoral head. But many times this remodeling is incomplete and the acetabulum remains shallow and the roof remains inclined. Kim et al found that patients between 4-5 years of age, an acetabular widening was predictive of failure of acetabular development and these findings represented an indication for acetabular reconstructive procedures 6.

Salter and Pemberton are two recommended osteotimies to reposition the acetabulum after correct reduction in age groups younger than 8 years 7, 8. Salter osteotomy redirect the acetabulum while Pemberton reshapes the acetabulum. Pemberton osteotomy repositions the acetabulum to improve anterior and lateral head coverage 9. Osteotomy begins at AIIS and proceeds inferior and posterior to enter the tri-radiate cartilage 10.

The osteotomy hinges around the tri-radiate cartilage which decreases the volume of the acetabulum and is especially recommended for wide acetabulum and when more than 15 degree change in the acetabular index is required 9. Osteoarthritis of the hip following operative treatment of DDH directly depend upon pressure exerted on the head by the acetabulum. If there is a wide zone of contact between the head and the acetabulum, there is better distribution of stress, but if the contact is minimal after reduction, point pressure across the acetabulum and the head will lead to early damage of the cartilage. So widening of the acetabulum is never a desirable situation.

Salter osteotomy does not improve widening of the acetabulum and there is modest improvement in the acetabular index. Salter osteotomy needs internal fixation therefore the child needs another procedure, though minor, to remove k wire 11.

Pemberton osteotomy can achieve better improvement in the acetabular index, decreases the volume of the acetabulum and does not need internal fixation. Complications have been reported with this procedure like premature closure of the tri-radiate cartilage and growth disturbance 9, 12. These complications can be prevented by not passing the osteotomy through the tri-radiate cartilage.

LIMITATIONS

There are several limitations of this study like a small number of cases and a limited follow up of 5 years. Despite limitations of this study, we recommend this osteotomy, though long term follows up and a large number of cases is required for making strong recommendation

References

1. Birnbaum K, Pastor A, Prescher A, et al: Complications of Chiari and Salter osteotomies: a cadaver study. Surg Radiol Anat 2000; 22:225
2. Ganger R, Radler C, Petje G, et al: Treatment options for developmental dislocation of the hip after walking age. J Pediatr Orthop B 2005; 14:139.
3. Galpin RD, Roach JW, Wenger DR, Herring JA, Birch JG. One- stage treatment of congenital dislocation of the hip in older children, including femoral shortening. J Bone Joint Surg Am 1989; 71: 734-741.
4. Lipton GE, Bowen JR: A new modified technique of triple osteotomy of the innominate bone for acetabular dysplasia. Clin Orthop Relat Res 2005; 434:78
5. Luhmann SJ, Bassett GS, Gordon JE, et al: Reduction of a dislocation of the hip due to developmental dysplasia: implications for the need for future surgery. J Bone Joint Surg 2003; 85A:239.
6. John H Hering:Developemental dysplasia of hip. Tachdijan text book of orthopedics 2007; 4:245.
7. Wada A, Jufii T, Takamura K, et al: Pemberton osteotomy for developmental dysplasia of the hip in older children. J Pediatr Orthop 2003; 23.
8. Saleh JM, O'Sullivan ME, O'Brien TM. Pelvic remodeling after Salter osteotomy. J Pediatr Orthop 1995;15: 342-345.
9. Tavares JO: Modified Pemberton acetabuloplasty for the treatment of congenital hip dysplasia. J Pediatr Orthop 2004; 24:501
10. Vengust R, Antolic V, Srakar F: Salter osteotomy for treatment of acetabular dysplasia in developmental dysplasia of the hip in patients under 10 years. J Pediatr Orthop 2001; 10:30.
11. Macnicol MF, Bertol P: The Salter innominate osteotomy: should it be combined with concurrent open reduction? J Pediatr Orthop B 2005; 15:415.
12. Trousdale RT: Acetabular osteotomy: indications and results. Clin Orthop Relat Res 2004; 429:182.

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