

Five Years Follow up of One Stage Surgery for Congenital Dislocation of Hip in Children of 2-5 Years of Age

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ABSTRACT

Objective: To evaluate the results of a single stage combined procedure for congenital dislocation of the hip in 2-5 years group.

Material and Methods: This descriptive study was conducted in the Department of Orthopaedics and Spine Surgery, Hayatabad Medical Complex, Peshawar, from September 2003 to December 2011 on 25 patients with 30 hips who were operated for congenital dislocation of hip that presented after two years of age. The procedure consisted of arthrotomy, femoral shortening, derotational varus osteotomy and capsulorrhaphy. Pelvic osteotomy was done as and when required. Pre-operative and post-operative clinical and radiological assessment was done according to modified McKay and Severin criteria. Patients were followed up for five years.

Results: There were 17 girls and eight boys in this study. Mean age was 3 years with minimum 2 and maximum 5 years. Five cases had bilateral dislocation. According to modified Severin classification, at the last follow up 7(28.0%) hips were graded as 1A, 4(16.0%) hips were graded as 1B, 11(44.0%) hips were graded as II and 3(12.0%) hips were graded as III. Avascular necrosis (AVN) of the head of femur as classified by Kalamchi and MacEwen at the time of last follow up was graded as I in 1(4%) cases and III in 3(12%) cases. Functional assessment was done according to modified McKay criterion. According to that criterion, in last follow up 15 (60%) were graded excellent 6(24%) good and 4(16.0%) fair.

Conclusion: One stage correction of congenital dislocation of the hip in an older child is a safe and effective treatment with good results in the short to medium term.

Key words: Hip, Dysplasia, Dislocation, Developmental.

INTRODUCTION

Neonatal screening in most of the patients with developmental dysplasia of hip (DDH) is not conducted in Pakistan. Therefore not only the early diagnosis is missed but it is also common to see an older child who has untreated congenital dislocation of the hip¹. Reported prevalence of established dislocation of the hip in children in European and American white population varies from 0.7 to 1.6/1000². Many studies show that clinical examination is not reliable⁸⁻¹⁰ and the parents often notice limp when the child starts to walk³⁻⁵. There are different types of treatment in different age groups but in older children it remains an unsolved problem⁶.

Late diagnosis poses major problems in treatment of DDH, which are; high femoral head, contracted soft tissues and a dysplastic acetabulum⁷. For such types of neglected dislocation a combination of procedures are in vogue nowadays which includes open reduction with femoral shortening and varus derotational osteotomy with or without pelvic osteotomy. The advantages of combined procedure avoid the need for prolonged pre-operative traction⁸, femoral shortening prevents excessive pressure on the femoral head which may predispose to avascular necrosis⁹ dysplastic shallow acetabulum may lead to instability which is prevented by pelvic osteotomy to achieve stable reduction of the hip¹⁸⁻²⁰. The other advantages of a one stage combined procedure for congenital dislocation of hip includes a short hospital stay with little need for long or repeated immobilization and decreased joint stiffness¹⁰.

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We evaluated the radiographic and functional results of a one stage combined procedure for congenital dislocation of hip in twenty five patients (thirty hips) who were two to five years of age.

MATERIAL AND METHODS

This study was conducted in the department of Orthopaedics and Spine Surgery of Hayatabad Medical Complex, Peshawar on twenty five consecutive patients (thirty hips) aged two to five years presenting with congenital dislocation of the hip from September 2003 to December 2011. They were treated by a single staged combination procedure.

All patients had pelvis radiographs showing both hips anteroposterior view and radiographs of the femur with hip in gentle traction to determine the extent of proximal migration of the femoral head, acetabular index, centre edge angle of Wiberg, continuity of the Shenton's line and femoral neck shaft angle.

All the parents were counselled about the conditions of their child's hip which necessitated an urgency of the surgical procedure they had to undergo. Informed written consent was taken from all parents. Preoperative cefuraxime 750 milligrams was given on induction and locally manufactured implants were used.

Surgical Procedure:

A single incision starting over the anterior one third of iliac crest and extending about 2 centimetres (cm) inferior to anterior superior iliac spine, then curving towards greater trochanter and extending for about 4 centimetres over the anterolateral aspect of shaft of femur. This was followed by release of soft tissue including sartorius, rectus, and iliopectineus tendons. Capsule is carefully dissected from the abductor muscles and opened in a T-shape manner. Hip is dislocated, pulvinar and ligamentum teres excised, and multiple transverse cuts made in transverse acetabular ligament. Femur is exposed proximally and shortened at the level of lesser trochanter by a proposed length measured from pre-operative traction X-rays, osteotomized bones were fixed with 4 hole 3.5 millimetres (mm) Dynamic Compression Plate with derotation to correct the excessive anteversion of neck of femur and varus to decrease the neck shaft angle. Hip would then be reassessed for stability and if unstable, pelvic Salter osteotomy would also be added. In pelvic osteotomy bone graft was taken from ipsilateral

ilium and inserted at the osteotomy site. The graft is stabilized with one or two K-wires. Hip would then be reduced, position confirmed with image intensifier and then stabilized with one intra-articular 2mm K-wire. Capsule which was incised initially in T-shape manner would carefully be repaired with one layer falling over the other layer. Wound is closed over suction drain and immobilized in one and a half hip spica for six weeks. Pre-operative traction was not used in any of our patients. Plaster and K-wire were removed after six weeks as a day case. X-rays were done at this stage to confirm the position of the hip and patients are then gradually mobilized over the next few days. Plate was removed after bony union has been achieved.

All patients were assessed functionally and radiologically at one year, 3 years and 5 year after surgery in accordance with the modified McKay criteria (Table 1) and modified Severin classification (Table 2).^{11,12} Clinical evaluation included any pain in the hip, range of movement, limp, limb length discrepancy and Trendelenberg sign. Radiographic changes of avascular necrosis were graded according to Kalamchi and Mac Ewen (Table 3)¹³.

RESULTS

There were 17 girls and eight boys whose hips were congenitally dislocated. Male to female ratio was 1: 2 (Table 4). The mean age at the time of surgery was three years with minimum 2 and maximum 5 years. Five of the children had bilateral dislocations. Left side was involved in eighteen cases (Table 5). Patients were followed up for five years.

The compliance of the parents for follow up was not good. We lost 5 cases in follow-up with the remaining 25 hips. It was not feasible to contact the patients lost for follow up, as most of these patients either have changed their contact number or were not willing to come as they told us by phone that their child is fine.

Radiological Assessment

According to modified Severin classification, at first follow up, nine hips were graded 1A, six 1B; ten graded II and five graded III. At second follow up 8(32.0%) hips were graded 1A, 4(16.0%) hips grade 1B, 9(36.0%) hips grade II and 4(16.0%) hips were grade III according to modified Severin classification while at third follow up 7(28.0%) hips were grade 1A, 4(16.0%) hips grade 1B,

11(44.0%)hips grade II and 3(12.0%)hips were grade III. (Table 6). Only two hips of grade II severity ended in avascular necrosis of the head of femur as classified by Kalamchi and MacEwen. Avascular necrosis of the head of femur as classified by Kalamchi and MacEwen in second follow up was graded I in 2(8%) cases graded II in and 2(8%) cases. While in the third follow up it was graded I in 1(4%) cases and III in 3(12%) cases (Table 7). The mean acetabular index at the final follow up was 15 degree (Normal is 22 degrees, that ranges from 9 degree to 22 degree and mean CE (centre edge angle of Wiberg) was 25 degree - ranges from 18 degree to 30 degree.

Functional Results

We lost five cases in second and third follow up and in the remaining children, most were active and there were no major concerns. All of the hips were stable and pain free while five children had positive Trendlenberg with limp and some limitation of movement of the hip in the first follow up. Redislocation occurred in one patient after three weeks, in whom revision surgery was done with pelvic osteotomy and head in acetabulum fixed with 1.5 mm K-wire which was removed after four weeks. Two patients had external rotation deformities due to excessive derotation of neck of femur. Functional assessment at first follow up was done according to modified McKay criteria. In first follow up out of thirty hips, 18(60%) were graded excellent, 7 (23%) good and 5 (17%)fair. In second follow up out of 25 hips,16(64.0) were graded excellent 5(20.0%) good and 4(16.0%) fair. While in last follow up 15(60%) were graded excellent, 6(24%) good and 4(16.0%) fair. (Table 8)

Table 1: Modified McKay criteria ¹¹

Excellent	Stable, painless hip, no limp, negative Trendlenberg sign, no limb length discrepancies and a full range of movement
Good	Stable painless hip, slight limp negative Trendlenberg no limb length discrepancies and a slight decrease in range of movement
Fair	Stable limp positive Trendlenberg sign, limitation of movement and some pain
Poor	Unstable painful hip positive Trendlenberg sign

Table 2: Modified Severin Classification ¹².

Excellent	1A CE angle > 19 degree
Good	1B CE angle 15-19 degree
	II Moderate deformity of femoral head otherwise same as grade I
Fair	III Dysplastic hip no Subluxation CE angle < 19 degree
Poor	IV Subluxation
	V Femoral head in false acetabulum
	VI Redislocation

Table 3: Kalamchi and MacEwen's classification of avascular necrosis of the hip ¹³.

Group I	Failure of appearance of the ossific nucleus during the 1 st year after reduction
Group II	Damage of the lateral aspect of the growth plate. Lateral metaphysical notch or defect
Group III	Damage of the physis with a large central defect
Group IV	Damage to the entire femoral head and physis

Table 4: Gender of the Patients

Gender	Frequency	Percent
Female	17	68.0
Male	8	32.0
Total	25	100.0

Table 5: Side Involved

Side	Frequency	Percent
Bilateral	5	20.0
Left	12	48.0
Right	8	32.0
Total	25	100.0

Table 6: Radiological Results (Severin Grading).

Grade	1 st follow up	2 nd follow up	3 rd follow up
I a	9 (30%)	8(32.0%)	7(28.0%)
I b	6 (20%)	4(16.0%)	4(16.0%)
II	10(33.33%)	9(36.0%)	11(44.0%)
III	5 (16.67%)	4(16.0%)	3(12.0%)
Total	30(100%)	25(100%)	25(100%)

Table 7: Kalamchi Grading For AVN

Group	1 st follow up	2 nd follow up	3 rd follow up
I	0	2(8%)	1(4%)
II	2(8%)	2(8%)	0
III	0	0	3(12%)

Table 8: Clinical Results According To Modified Mc Kay Criterion.

	1 st follow up	2 nd follow up	3 rd follow up
Excellent	18(60%)	16(64.0)	15(60%)
Good	7 (23%)	5(20.0%)	6(24%)
Fair	5 (17%)	4(16.0%)	4(16%)

DISCUSSION

In this study there were twenty five children with thirty hips having untreated congenital dislocation of the hips. They had a one stage combined surgery, including open reduction, femoral shortening and varus derotational osteotomy. Most of the hips had good to excellent functional results according to modified McKay criteria.

There are no of complications of a dislocated hip like gait abnormality, limitation of motion of the hip, pain in the joint, and arthritis at an early age. The primary goal of treatment of neglected congenital dislocation of the hip in children is to achieve a stable, concentrically located joint and satisfactory development of the hip¹⁴. The exact age at which open reduction is no longer feasible in a child is unknown, although the indications for operative intervention appear to broaden every year. Femoral shortening has been shown to facilitate reduction in children who are more than two years old¹⁵.

The use of pre-operative traction to facilitate reduction of congenital dislocation of the hip and possibly to lower the rate of avascular necrosis of the hip is controversial¹⁴.

The long term functional and radiographic outcome of one stage operation for the treatment of congenital dislocation of the hip in older children has not been evaluated by many investigators. A study done by Vallamshelta et al¹⁶ on 18 hips who were at least four years old, reported excellent results in 12 hips and good in six hips both radiographically and functionally. They reported avascular necrosis in only one hip.

Klasic and Jankovic studied 60 hips and found that 41(68%) hips had a good or excellent radiographic result and 63% hips had a good or excellent overall result¹⁷.

Karakas et al studies forty seven children (fifty five hips) of four year olds with primary one stage combined operation. Excellent or good clinical and radiographic results were reported 37(67%) hips. They found avascular necrosis in only four hips¹⁸.

It is evident from this study that the age of the patient at the time of treatment influenced the radiographic outcome. Residual dysplasia has been more common in children who were more than four years old at the time of initial treatment.

CONCLUSION

Age of the patient at the time of treatment influenced the radiographic outcome. Adequate reduction at the initial operation offers the best chance for a good or excellent long term functional and radiographic appearance of the hip. There are various deformities in the hip at this age and addressing all of them at the same time improves the functional and radiological out come.

REFERENCES

1. Umer M, Nawaz H, Kasi PM, Ahmed M, Ali SS. Outcome of Triple Procedure in Older Children with Developmental Dysplasia of Hip. J Pak Med Assoc 2007; 57:591-4.
2. Oesprechins B, Ernst C, de-Mey J. Screening for developmental dysplasia of the hip. J Bone Joint Surg [Br] 2007; 90: 4-5.
3. Illyas M, Siddiqi N. A multiple cases of neglected DDH in a single family treated by single stage operative method. J. Surg 2001; 23 & 24: 21-7.
4. Ropusch A, Wright JG. Increased diagnostic information and understanding disease uncertainty in the diagnosis of developmental hip dysplasia. Radiology 2007; 242: 355-9.
5. Pan KL, Rasit H. A modified method of traction for young children with congenital dislocation of the hip as a preliminary to reduction. Med J Malaysia 2004; 59: 47-8.
6. Chidambaram S, Abd Halim AR, Yeap JK, Ibrahim S. Revision surgery for developmental dysplasia of the hip. Med J Malaysia 2005; 60:91-8.
7. Chang CH, Chiang YT, Lee ZL, Kuo KN. Incidence of surgery in developmental dysplasia of the hip in Taiwan. J Formos Med Assoc 2007; 106:462-6.

8. Storer SK, Skaggs DL. Developmental dysplasia of the hip. *Am Fam Physician* 2006; 74: 1310-6.
9. Tezeren G, Tukenmez M, Bulut O, Cekin T, Percin S. One-stage combined surgery with or without preoperative traction for developmental dislocation of the hip in older children. *J Orthop Surg*. 2006; 14:259-64.
10. Ozgur AF, Aksoy MC, Kandemir U, Karcaaltncaba M, Aydingoz U, Yazici M et al. *J Pediatr Orthop* 2006;15: 83-6.
11. Tukenmez M, Tezeren G. Salter innominate osteotomy for treatment of developmental dysplasia of the hip. *J Orthop Surg* 2007; 15:286-90.
12. Severin E. Contribution to the knowledge of congenital dislocation of the hip joint, late results of closed reduction and arthrographic studies of recent cases. *Acta Chir Scand* 1941; 63: 1-142.
13. Kalamchi AJ, Mac Ewen DG. Avascular necrosis following treatment of congenital dislocation of the hip. *J Bone Joint Surg [Am]* 1980; 62: 876-88.
14. Malvitz TA, Weinstein SL. Close reduction for developmental dysplasia of hip. Function and radiological results after an average of thirty year. *J Bone Joint Surg [Am]* 1994; 76: 1777-92.
15. Schoenecker PL, Strecker WP. Congenital dislocation of hip in children comparison of the effect of femoral shortening and of skeletal traction in treatment. *J Bone J Surg [Am]* 1984; 66: 21-7.
16. Vallamshelta VR, Mughal E, O'Hara JW. Congenital dislocation of the hip. A reappraisal of the upper age limit for treatment. *J Bone Joint Surg [Br]* 2006; 88: 1076-81.
17. Klisic P, Jankovic L. Combined procedure of open reduction and shortening of the femur in treatment of congenital dislocation of the hip in older children. *Clin Orthop* 1976; 119: 60-9.
18. Domzalski M, Synder M. Avascular necrosis after surgical treatment for development dysplasia of the hip. *Int Orthop* 2004; 28:65-8.