

# ONE STAGE SURGERY OF 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 age group.

**Material and Methods:** This descriptive study was conducted at the Department of Orthopaedic Surgery, Hayatabad Medical Complex, Peshawar, from September 2003 to July 2007. There were 25 patients with 30 hips who were operated for congenital dislocation and who presented after two years of age. The procedure consisted of arthrotomy, femoral shortening, derotational varus osteotomy and capsulorrhaphy. Pelvic osteotomy done where required. Pre-operative and post-operative clinical and radiological assessment was done according to modified McKay and Severin criteria and patients were followed up for 6 months to one year.

**Results:** There were 17 girls and eight boys in this study. Mean age was  $38.56 \pm 12.43$  months. Five cases had bilateral dislocation. Postoperatively, 18 hips operated were rated excellent by using McKay criteria, seven were rated as good and five as fair. Five children had residual pain, limitation of movement of the hip and positive-Trendelenberg post-operatively. The Severin Classification demonstrated 9 hips of grade IA, six of grade IB, ten of grade II and five of grade III. Two patients of grade II had avascular necrosis of head of femur.

**Conclusion:** One stage correction of congenital dislocation of the hip in children of 2-5 years age is a safe and effective treatment with good results in the short to medium term.

**Key Words:** Hip, Congenital Dislocation, Arthrotomy, Femoral Shortening, Derotational Varus Osteotomy, Capsulorrhaphy.

## INTRODUCTION

Due to absence of neonatal screening in developing countries like Pakistan most of the patients with developmental dysplasia of Hip (DDH) are not diagnosed early and it is not uncommon to see an older child who has untreated congenital dislocation of the hip.<sup>1-6</sup> Reported prevalence of established dislocation of the hip in an unscreened population varies from 0.7 to 1.6/1000 children in European and American white population<sup>7</sup>. Clinical examination has been shown to be insufficiently reliable.<sup>8-10</sup> Many children continue to present at a later age with dislocation often noticed when they start to walk.<sup>6,7,11,12</sup> Treatment of developmental dysplasia of the hip in older children remains an unsolved problem.<sup>11</sup>

The major problems in the treatment of dislocations that are diagnosed late are high femoral head, contracted soft tissues and a

dysplastic acetabulum.<sup>13-15</sup> A combination of open reduction with femoral shortening and varus derotational osteotomy is now a well established practice in neglected congenital dislocation of the hip. It avoids the need for prolonged pre-operative traction<sup>11,14-16</sup>, femoral shortening prevent excessive pressure on the femoral head which may predispose to avascular necrosis.<sup>11,14-17</sup> The relocated hip may be unstable due to dysplastic shallow acetabulum and often require pelvic osteotomy to achieve stable reduction of the hip.<sup>18-20</sup> The main advantages of a one stage operation for congenital dislocation of hip include a short hospital stay with little need for long or repeated immobilization and decreased joint stiffness.<sup>16, 21</sup>

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

**MODIFIED MCKAY CRITERIA<sup>22</sup>**

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

Table 1

years of age.

**MATERIAL AND METHODS**

We reviewed twenty five consecutive patients (thirty hips) aged two to five years presenting with congenital dislocation of the hip between September 2003 to July 2007. They were treated by a single staged combination procedure.

All children had X-ray pelvis showing both hips anteroposterior view and X-ray 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.

The procedure consisted of an arthrotomy using a single incision starting over the anterior 1/3 of iliac crest and extending about 2cm inferior to anterior superior iliac spine, than curving towards greater trochanter and extending for about 4cm over the anterolateral aspect of shaft of femur. This was followed by release of soft tissue including sartorius, rectus, and ileopsoas 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 proposed length measured from pre-operative traction X-rays, osteotomized bones are fixed with 4 hole 3.5mm DCP 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 osteotomy (Salter) would also be added. Bone graft is 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. All patients were readmitted as a day case at six weeks for removal of plaster and K-wire. X-rays are done at this stage to confirm the position of the hip and patients are then gradually mobilized over the next

**MODIFIED SEVERIN CLASSIFICATION<sup>23</sup>**

Excellent	IA	CE angle > 19 degree
Good	IB	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 2

**KALAMCHI AND MACEWEN'S CLASSIFICATION OF AVASCULAR NECROSIS OF THE HIP<sup>24</sup>**

Group I	Failure of appearance of the ossific nucleus during the 1st 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 3

**TABLE SHOWING THE PERCENTAGES OF DIFFERENT  
ABNORMAL PARAMETERS**

S No	Sex	Age		Side	Pelvic Osteotomy	Radiological Grading		Severin Grade	Functional (McKey)	AVN (kalamchi)
		Y	M			CE	Acetabular Index			
01	F	2	0	B	+ Salter	32°, 30°	9°, 10°	1a, 1a	Excellent	
02	M	3	4	L	"	30°	9°	1a	"	
03	F	3	10	L	"	24°	18°	II	"	
04	F	4	2	R	"	24°	18°	II	"	
05	F	5	0	L	"	18°	22°	III	Fair	II
06	M	2	0	L	-	28°	9°	1a	Excellent	
07	M	3	0	L	+	25°	16°	1b	"	
08	F	2	2	B	-	32°, 30°	10°, 9°	1a	"	
09	F	3	2	L	+	23°	17°	II	Good	
10	F	4	8	R	Salter	25°	17°	II	Excellent	
11	F	3	4	R	+	25°	17°	II	Good	
12	M	2	4	L	+	24°	15°	1b	Excellent	
13	M	3	6	R	+	24°	16°	II	Good	
14	F	3	0	R	+	22°	14°	1b	Excellent	
15	M	2	0	B	+	29°, 30°	10°, 9°	1a	"	
16	M	2	0	L	+	30°	10°	1a	"	
17	F	3	6	L	+	24°	16°	II	Good	
18	F	4	8	R	Salter	25°	16°	II	"	
19	F	4	8	R	"	19°	21°	III	Fair	
20	F	2	0	R	+	22°	17°	1a	Excellent	
21	M	2	4	L		25°	13°	1b	"	
22	F	2	10	B		23°, 23°	17°, 17°	II	Good	
23	F	4	2	B		18°, 19°	20°, 20°	III	Fair	
24	F	4	8	L	Salter	19°	22°	III	"	II
25	F	2	0	L		23°	15°	1b	Excellent	

CE = Centre edge angle

Table 4

AVN = Avascular necrosis

few days. Plate was removed after bony union has been achieved.

All the patients were followed up for 6 months to one year, both clinically and radiologically in accordance with the modified McKay criteria (Table 1) and modified Severin classification (Table 2) respectively.<sup>22,23</sup> 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).<sup>24</sup>

## RESULTS

There were 25 patients with 30 hips who

were operated for congenital dislocation. There were 17 girls and 8 boys whose hips were congenitally dislocated. Five of the children had bilateral dislocations. Left side was involved in eighteen cases. Male to female ratio was 1:2. The mean age at the time of surgery was  $38.56 \pm 12.43$  months with age ranging from 2-5 years (Table 4).

### Radiological assessment

According to modified Severin classification nine hips were grade 1A, six 1B, ten grade II and five grade III. The mean acetabular index at the final follow up was 15 degree (Normal is 22 degrees, that range from 9 degree to 22 degree and mean CE (centre edge angle of Wiberg) was 25 degree-ranges from 18 degree to

## RADIOLOGICAL RESULTS (SEVERIN GRADING)

Grade	No of Hips (n=30 hips)	% age
I a	9	30
I b	6	20
II	10	33.3
III	5	16.7

Table 5

30 degree (Table 5)

Only two hips of grade II severity ended in avascular necrosis of the head of femur as classified by Kalamchi and MacEwen.

### Functional results

When seen in the last follow up visit majority of the children were active and there were no major concerns. All of the hips were stable and pain free while five children had positive Trendelenberg with limp and some limitation of movement of the hip. 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 was done according to modified McKay criteria. Eighteen hips were graded excellent seven good and five fair (Table 6).

## DISCUSSION

Several methods have been proposed for the treatment of congenital dislocation of the hip in a child who begins to walk.<sup>25-27</sup> The modality of treatment that is chosen usually reflects the training, experience and temperament of the treating orthopaedic surgeon. This choice also is often influenced by the resources and facilities that are available.

NWFP has a large population of children who are walking and have untreated congenital dislocation of the hip. There are several reasons for this situation. The socio-economic and demographic condition makes it difficult to establish and maintain an efficient newborn screening programme. The condition is diagnosed only when the child starts walking and the limp become visible in the gait.

A dislocated hip that is not reduced can lead to 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

## CLINICAL RESULTS OBTAINED ACCORDING TO MODIFIED MCKAY CRITERION

Grade	No of Hips (n=30 hips)	% age
Excellent	18	60%
Good	7	23.3
Fair	5	16.7

Table 6

satisfactory development of the hip.<sup>28</sup> 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 old.<sup>29</sup> Not many investigators have evaluated the long term functional and radiographic outcome of one stage operation for the treatment of congenital dislocation of the hip in older children. Klisic and Jankovic found that forty one (68%) of sixty hips in forty seven patients had a good or excellent radiographic result and 63% had a good or excellent overall result.<sup>30</sup> Karakas et al reported the result of a primary one stage combined operation in forty seven children (fifty five hips) who were at least four years old. They reported that thirty seven hips (67%) had good or excellent clinical and radiographic results after surgery. They found avascular necrosis in only four hips.<sup>13</sup> In the study of Vallamshelta et al<sup>16</sup> who did one stage combined operation in 18 hips who were at least four years old also reported excellent results in 12 hips and good in six hips both radiographically and functionally. They reported avascular necrosis in only one hip. In the present 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. Eight (83%) hips had good to excellent functional results according to modified McKay criteria. The criterion described by Severin commonly is used to assess the radiographic end results after the treatment of congenital dislocation of the hip.<sup>23</sup> We found 25 hips (82%) had a good or excellent Severin rating (class I or class II).

Our analysis showed that the age of the patient at the time of treatment influenced the radiographic outcome. Children who were more than four years old at the time of initial treatment were significantly more likely to have residual dysplasia. 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 controversial.<sup>28</sup> Galpin et al

showed that femoral shortening is preferable to traction.<sup>8</sup> They reviewed the results of one stage operative management. In our study we have only two cases of avascular necrosis that is comparable to Kalamchi et al.<sup>24</sup>

## CONCLUSION

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 outcome.

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