

TREATMENT OF CONGENITAL DISLOCATION OF THE HIP*

Results of Closed Reduction and Immobilization in the Hip Spica Cast

M. Talat Göğüş MD**, M. Cemalettin Aksoy MD***, Ö. Ahmet Atay MD***
R. Emre Acaroğlu MD****, Adil Surat MD**

SUMMARY: Göğüş MT, Aksoy MC, Atay ÖA, Acaroğlu RE, Surat A. (Department of Orthopedics and Traumatology, Hacettepe University Faculty of Medicine, Ankara, Turkey). Treatment of congenital dislocation of the hip. Results of closed reduction and immobilization in the hip spica cast. 1997; 39: 499-503.

Treatment of congenital dislocation of the hip (CDH) by closed reduction and immobilization in the hip spica cast is one of the accepted methods for use in patients under one year of age. We report 74 congenitally dislocated hips treated with premanipulation skin traction, closed reduction under anesthesia, adductor tenotomy and immobilization in the hip spica cast. Satisfactory results were obtained in 60 hips. In seven hips, avascular necrosis of the capital femoral epiphysis was observed with careful amangement, closed reduction and immobilization in a spica cast provides good results for treatment of CDH. *Key words: congenital dislocation of the hip, closed reduction.*

Closed reduction of a congenitally dislocated hip was probably first performed by Pravez in 1838¹. Today, closed treatment of congenital dislocation of the hip (CDH) is still the preferred method of treatment for patients under one year of age. Many methods of treatment have been described, but all have complications and result in a number of hips which develop imperfectly². For example, Renshaw³, Ferguson⁴, Ludloff⁵ and Mau et al.⁶ have all recommended open reduction for a hip which is slightly lateralized after closed reduction. Thus, there is no real consensus in literature regarding the best method of treatment. The purpose of this study is to determine the effectiveness of this method of treatment and to investigate the rate of complications in this age group.

Material and Methods

We retrospectively evaluated the hospital records of patients under one year of age diagnosed with congenital dislocation of the hip, who were treated between 1976-1992 at Hacettepe University Faculty of Medicine, Department of Orthopedics and Traumatology. The study group consisted of 60 children (48 female, 12 male) with 74 congenitally dislocated hips. There were 12 dislocations initially seen and treated in patients under three months of age,

* From the Department of Orthopedics and Traumatology, Hacettepe University Faculty of Medicine, Ankara.

** Professor of Orthopedics, Hacettepe University Faculty of Medicine.

*** Instructor in Orthopedics, Hacettepe University Faculty of Medicine.

**** Associate Professor of Orthopedics, Hacettepe University Faculty of Medicine.

28 dislocations in patients between three and six months, and 34 dislocations in patients between six and twelve months. Cases associated with other disorders or syndromes and those involving hips with subluxation or dysplasia, without frank dislocations, were excluded.

First, preliminary skin traction was used on all patients, at home, for two to four weeks. Closed reduction was then performed under general anesthesia; subartaneous adductor tenotomies were necessary in 40% of the cases. Adductor tenotomies were performed if the hip adductors were contracted, since they would resist the abduction of the hip that is essential for reduction. Patients were then immobilized in hip spica casts for three months in the human position. In this position, hips are flexed more than 90° and abducted 30-60°. After three months of immobilization in a plaster cast, if full abduction was possible there was no instability, and plain radiographs showed perfect reduction of the femoral head, the treatment in the cast was discontinued and a splint was applied. The splint allowed flexion and extension but kept the hips moderately abducted. If acetabular remodeling was not considered satisfactory, at that time, another cast was applied for three more months. If there was any question of stability or depth of reduction, an arthrogram was performed. The maximum period of immobilization time for these patients period was nine months.

The average age of patients at the onset of treatment was 5.2 months and the average duration of the treatment in cast was 5.7 months. The mean follow-up was 6.8 ± 3.535 (range, 2-15) years.

Cases of avascular necrosis (AVN) the most noted complication of this treatment, were categorized as described by Bucholz and Ogden⁷. Types 1 and 4, compatible with normal growth, and leading to eventual minimal deformity, are classified as mild AVN. Types 2 and 3 are associated with more severe subsequent disturbances and are classified as severe AVN.

Four criteria were proposed as desirable radiographic findings at the time of the cessation of the treatment. They were: an acetabular angle less than 25°, a center edge (CE) angle greater than 20°, an intact Shenton line and no AVN (Table I).

Table I: Results of Treatment of 74 Congenitally Dislocated Hips

End of Treatment	Severin Grade		
	I	II	III-VI
All criteria met	58	4	0
3 criteria met	2	2	0
2 criteria met	0	0	4
1 criteria met	0	0	3
0 criteria met	0	0	1

Final results were evaluated according to Severin's classification⁸ (Table II) with grades being determined using the criteria described above.

Table II: Severin's Classification

Severin Grade	
I	Well developed hip joints
II	Moderate deformity of the femoral head, neck, or acetabulum
III	Dysplasia but not subluxation
IV	Subluxation
V	Femoral head articulating with secondary acetabulum
VI	Redislocation

Results

According to Severin's classification, 60 hips were Severin grade-I, six were Severin grade-II, six were Severin grade-III and two were Severin grade-VI. Thus, of the 74 hips treated with closed reduction and immobilized in hip spica casts, 60 had good or excellent results, six had acceptable results and eight had poor results or failure. The mean acetabular index, $39^{\circ} \pm 3.092$ before treatment, improved to $23^{\circ} \pm 2.427$ at the final control. The CE angle, which describes the femoral head coverage more meaningfully than the acetabular index after six years of age, was $21^{\circ} \pm 2.582$ at the final control. Seven patients had AVN at the final examination (2 had Type-3 and 5 had Type-1).

Discussion

Treatment of CDH in patients under one year of age is difficult, but with careful management, good results can be obtained. An adequate period of premanipulation traction, gentle closed reduction, an adductor tenotomy if needed, and avoidance of extreme positions (excessive abduction) for immobilization are the important requisites of this method of treatment. The main challenge is to avoid AVN during treatment. Premanipulation traction may help by stretching the contracted soft tissues and the muscles spanning the hip, intraarticular pressure is diminished^{9, 10}. Forcible positioning of the hip that would lever the femoral head into the acetabulum with a taut adductor muscle acting as a fulcrum is another factor causing AVN. In the series of Gage and Winter¹¹, incidence of AVN was reduced from 30 to 15 percent with preliminary traction and adductor tenotomy. Salter et al.¹², in their article, emphasize the importance of the adductor tenotomy for reducing the incidence of AVN in the closed treatment of CDH. Avoiding extreme positions during immobilization also helps to reduce the incidence of AVN. Immobilization in a less-forced position (the human position) would diminish the probability of extra-capsular

compression of vessels. Schonecker et al.¹³ demonstrated decreased blood flow to the immature femoral head when the hip was placed in extreme positions. Baki et al.¹⁴ in their article also advocate the human position for avoiding AVN. In our series, the AVN rate was 9.2 percent (5% severe and 6.7% mild). This result, when compared to that in found literature, should be accepted as successful. In addition, the final acetabular index and CE angle show that acetabular remodeling was satisfactory.

In conclusion, we advocate the following program for the treatment of CDH in a child under one year of age: After a period of skin traction at home, a closed reduction should be performed under general anesthesia, with adductor tenotomy performed if the adductor muscles are contracted. Immobilization should be in the human position in a hip spica cast until the hip becomes stable, plain radiographs demonstrate a perfect reduction of the femoral head, and the acetabular index reaches 25°. Our results indicate that a satisfactory rate of favorable outcomes can be obtained with this treatment.

REFERENCES

1. Severin E. Contributions to the knowledge of congenital dislocation of the hip joint. Late results of closed reduction and arthrographic studies of recent cases. *Acta Chir Scand (Suppl)* 1941; 63.
2. Williamson DM, Benson MK. Late femoral osteotomy in congenital dislocation of the hip. *J Bone Joint Surg (Br)* 1988; 10: 614-618.
3. Renshaw TS. Inadequate reduction of congenital dislocation of the hip. *J Bone Joint Surg (Am)* 1981; 63A: 1114-1121.
4. Ferguson AB. Primary open reduction of congenital dislocation of the hip using a median approach. *J Bone Joint Surg (Am)* 1973; 55: 671-689.
5. Ludloff K. The open reduction of the congenital hip dislocation by an anterior incision. *Am J Orthop Surg* 1913; 10: 438-454.
6. Mau H, Dorr WM, Henkel I, Lutsche J. Open reduction of congenital dislocation of the hip by Ludloff's method. *J Bone Joint Surg (Am)* 1971; 53: 1281-1288.
7. Bucholz RW, Ogden JA. Pattern of ischemic necrosis of the proximal femur in non-operatively treated congenital hip disease. In: *Proceedings of the sixth open scientific meeting of the hip society*. St. Louis: CV Mosby; 1978: 43-63.
8. Severin E. Congenital dislocation of the hip. Development of the joint after closed reduction. *J Bone Joint Surg (Am)* 1950; 32: 507-518.
9. Buchanan JR, Greer RB 3rd, Cotler JM. Management strategy for prevention of avascular necrosis during treatment of congenital dislocation of the hip. *J Bone Joint Surg (Am)* 1981; 63A: 140-146.
10. Weiner DS, Hayt WA, O'Dell HW. Congenital dislocation of the hip. The relationship of premanipulation traction and age to avascular necrosis of femoral head. *J Bone Joint Surg (Am)* 1977; 59A: 306-311.
11. Gage JR, Winter R. Avascular necrosis of capital femoral epiphysis as a complication of closed reduction of congenital dislocation of the hip. *J Bone Joint Surg (Am)* 1972; 54A: 373-388.

12. Salter RB, Kostuik J, Dallas S. Avascular necrosis of the femoral head as a complication of treatment for congenital dislocation of the hip in young children. *Canadian J Surg (Am)* 1969; 12: 44-61.
13. Schonecker PL, Bitz DM, Whiteside LA. The acute effect of position of immobilization on capital femoral epiphyseal blood flow. A quantitative study using the hydrogen washout technique. *J Bone Joint Surg (Am)* 1978; 60A: 899-904.
14. Baki C, Tokgözoğlu N, Akkoyunlu Ü, Memikoğlu Ş. Douştan kalça çıkığı konzervatif tedavisinin geç sonuçları. V. Milli Türk Ortopedi ve Travmatoloji kongre kitabı 1978; 110.