

*Original Article***Perthes Disease, Results of Conservative Management at Soba University Hospital**Samir Shaheen^{1*} and Mohammed B. Awed Aljeed²**Abstract**

Background: Legg-Calve- Perthes' Disease (LCPD) is an idiopathic avascular necrosis of the femoral head. It affects children between four and 10 years. Male : female ratio of 4:1. The main aim of treatment is to get an acceptable containment of a spherical head with good range of motion. Ideal way of treatment remains controversial.

Objectives: To study patterns of presentations and outcome of management of patients with LCPD treated at Soba University Hospital.

Materials and Methods: Records of patients with LCPD who were treated at Soba University Hospital between 2005 and 2013 were reviewed. There were 43 patients (46 hips). Their patterns of presentation, follow up notes and imaging as well as clinical and radiological outcome were reviewed.

Results: There were 43 patients 29 Males and 14 females (2:1) with 46 hips. Their ages ranged between 4 and 12 years (mean 7.7). 74.4% of patients were from low socioeconomic strata of the society. 9.3% of patients had family history and 58.1% had history of trauma. Painless limp was the presenting complaint in 88.4%. Herring lateral pillar classification was used; 43.5% group A, 37.0% B, 13.0% B/C and 6.5% C.

Thirty four hips (73.9%) had conservative treatment using Ischial Weight Bearing Calliper and physiotherapy in Lotus (Fagir) sitting Position and 12 hips (26.1%) had surgical treatment. Thirty one hips (67.4%) of those who were treated conservatively healed with Stulberg I or II, while 7 hips (58%) of those who underwent surgery with Stulberg I or II. Most of patients who presented at age less than 6 years healed with Stulberg I or II.

Conclusion: LCPD affects children of low class. Prognosis is generally good when the age at onset less than 6 years. Herring's lateral pillar classification is a reliable method of classification. Conservative treatment using Ischial Weight Bearing Calliper and physiotherapy in Lotus (Fagir) sitting Position has good outcome.

Keywords: Perthes' Disease, Conservative Management, Soba.

Legg-Calve-Perthes Disease (LCPD), other synonyms include ischemic necrosis of the hip, Coxa-Plana, Osteochondritis and avascular necrosis of the femoral

Head¹, is a common paediatric femoral head osteonecrosis with a prevalence ranging between 5.1 and 16.9 per 100,000². It was first described in 1910 independently by Legg of the United States, Calve of France, and Perthes of Germany. It is an idiopathic juvenile avascular necrosis of the femoral head in children³. The pathology includes ischemia of the femoral head, resorption collapse

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and repair. Majority of patients do well but untreated, 50% will develop a disabling arthritis by the age of 55 years⁴. Treatment depends on physician's preference as the literature offers little scientific evidence to suggest superiority of one treatment over another or even to conclusively establish the efficacy of any treatment over the natural history of the disease⁵.

The most popular classification is Catterall's four group classification. It depends on the amount of head involved and the presence of head at risk sign in x-ray⁶. Group I shows anterior central involvement of the head, group II 50% involvement, group III 75% of the head is involved lateral column and in group IV the entire head is involved. This classification gives a clue to the prognosis; groups I and II have favourable outcomes while groups III and IV have a poorer prognosis. The only disadvantage of this classification is that group designation may change as the disease proceeds.

After reviewing the radiographs of 1,264 children with Legg-Calve-Perthes disease, Salter and Thompson⁷ concluded that the extent of the subchondral fracture correlated precisely with the subsequent extent of maximum *resorption*, thus the use of Ischial Weight Bearing Calliper (IWBC) as a newly introduced line of treatment is so justified as IWBC relieves weight from the head and forces the patient to abduct the hip thereby improving the head containment. In physiotherapy sessions, the newly introduced Lotus (Fagir) position was also advised. The main objective of this work is to study demographic characteristics as well as patterns of presentation and outcome of management of Perthes disease. Outcome of management using IWBC will also be studied

MATERIALS AND METHODS:

This was a retrospective hospital based study that took place between the period of

2005 and 2013. There were 43 patients (46 hips) affected with Legg-Calve-Perthes' Disease, and had full follow up and radiological records. Two other patients were excluded due to deficient documents. The study was conducted in Soba University Hospital. Demographic characteristics and patterns of presentations were studied. Severity was assessed according to Herring's lateral pillar classification⁸ as follows:

- Group A: No involvement of the lateral pillar.
- Group B: There is >50% of lateral pillar height maintained.
- Group B/C: There is a loss of lateral pillar height is at 50%.
- Group C: There is <50% of lateral pillar height maintained.

Outcome at skeletal maturity was evaluated according to Stulberg classification⁹.

Hospital authorities were informed and a written approval to access patients' data was obtained. Patients who presented for follow up during the study were informed that they will be part of a research.

Statistical Package for Social Sciences was used to analyse results.

RESULTS:

There were 43 patients diagnosed as Legg-Calve-Perthes disease. 29 males (67.4%) and 14 female (32.6%), male: female ratio was 2:1. Their ages ranged between four and 12 years (mean 7.71) (Table 1). 13 patients (30.2%) were equal or less than six years of age and 30 (69.8%) were aged more than six years.

Table 1: Age and sex distribution of patients with Perthes disease (n=43)

Age Group	Male	Female	Total
0 – 4	1	1	2
5 – 9	23	8	31
10 - 14	5	5	10
Total	29	14	43

74.4% of the patients were from low socioeconomic class. Four patients (9.3%) had a positive family history. History of trauma was present in 25 patients (58.1%). The condition was unilateral in 40 patients (22 right and 18 left hips). Three patients (6.9%) had bilateral affection thus 46 hips in 43 patients. Abnormal gait; limp, was

the presenting symptom in 38 patients (88.4%), pain in 60.5% (26 out of 43 patients) (Table 2). Limitation of movements in the affected hips at presentation is shown in (Table 3).

X-ray alone was requested in 29 patients (63.0%), MRI together with X-ray in 16 patients (34.8%) and only one patient

Table 2: Presenting symptoms; Pain and Limp in 43 patients with Perthes disease.

Symptom	No pain	Pain				Limping	
		Hip & groin	Hip, groin & knee	Hip & knee	Hip & thigh	No Limp	Limp
Number of Patients	17 (39.53%)	11 (25.58%)	1 (2.33%)	5 (11.63%)	9 (20.93%)	5 (11.63%)	38 (88.37%)

Table 3: Type of limitation of movement in 46 hips with Perthes disease

Limitation of Movement	No limitation	Limitation			
		Internal Rotation	Abduction	Internal rotation and abduction	Global restriction
Number of hips	17 (39.53%)	3 (6.98%)	2 (4.65%)	21 (48.84%)	3 (6.98%)

Table 4: Herring and Stulberg classification

Herring (lateral Pillar) classification		Stulberg Classes				Total
		I	II	III	IV	
Herring (lateral Pillar) classification	Group A	17	3	0	0	20
	Group B	7	8	2	0	17
	Group B/C	0	3	2	1	6
	Group C	0	1	2	0	3
Total		24	15	6	1	46

P value <0.002.

(2.2%) had CT in combination of X-ray. X-ray evaluation according to Herring's classification showed, 20 hips (43.5%) to be group A, 17(37.0%) group B, 6(13.0%) group B/C and 3 (6.5%) group C.

Of the 20 hips of herring group A, 17(85%) were Stulberg I and three were Stulberg II. Of the 17 Herring Group B hips, 7 (41.2%) reached Stulberg I, 8 (47%) reached Stulberg II and 2 hips(11.8%) reached Stulberg III. Of the six Herring group B/C, 3 reached Stulberg II, 2 reached Stulberg III and one reached Stulberg IV. Of the three Herring group C, 2 reached Stulberg class III and one

reached Stulberg class VI. (P value <.0002) (Table 4).

The age cut off line is 6 years to affect the prognosis. Of the 13 patients who were less than six years, 11(84.6%) were Stulberg class I and 2 were class II. While from 30 patients who were older than 6 years, 11(36.7%) were Stulberg I, 12 (40%) were Stulberg II and six (20%) were Stulberg III and one (3%) was Stulberg IV. (P value <0.000) (Table 5)

Conservative measures were mounted in 34 hips (73.9%) (Table 6) and 12 hips (26.1%) had operative treatment in the form of either adductor tenotomy (11 hips)

or sub-trochanteric osteotomy (one hip) (Table 7). From the 34 hips treated conservatively, 22 were treated using IWBC (Figure 1 a & b and Figure 2)

followed by physiotherapy adopting Lotus position. 11 hips were treated using physiotherapy alone and one hip was treated by hip abduction splint.

Table 5: Categories of Age and Stulberg Class

		Stulberg Classes				Total
		I	II	III	IV	
Categories of Age	≤ 6 years	11	2	0	0	13
	> 6 years	11	12	6	1	30
Total		22	14	6	1	43

***P value <0.000

Table 6: Outcome of conservative treatment according to Stulberg Classification (n=34)

		Stulberg Class				Total
		I	II	III	IV	
Management (Non-operative)	Weight bearing abduction brace	0	1	0	0	1
	Ischial weight bearing Clipper and Lotus position in physiotherapy	15 (68.5%)	4 (18%)	2 (9%)	1 (4.5%)	22 (100%)
	Physiotherapy alone	7 (63.6)	4 (36.4%)	0	0	11 (100%)
Total		22 (64.7%)	9 (40.9%)	2 (5.8%)	1 (2.9%)	34 (100%)

*** P value < 0.000.

Table 7: Outcome of operative management according to Stulberg Classification (n=12)

Type of surgery	Number of patients according to Stulberg Class			Total
	Class I	Class II	Class III	
	Management (operative)			
Tenotomy	0	1	0	1
Femoral varus osteotomy	1	4	5(50%)	10
Tenotomy and Femoral Varus Osteotomy	0	1	0	1
Total number of patients	1 (8.33%)	6 (50%)	5(41.67%)	12(100%)

*** P value <0.001

DISCUSSION:

LCPD is a juvenile idiopathic avascular necrosis of the femoral head. It is one of the most controversial conditions in paediatric orthopaedics². In this series we had 43 patients (46 hips) diagnosed with

Legg-Calve-Perthes disease. There was male predominance; with a ratio of 2:1, similar to what was reported by many other authors^{10,11}.

In this current series, bilateral involvement was found in 6% of patients, similar to previous reports by Rowe *et al*¹² and

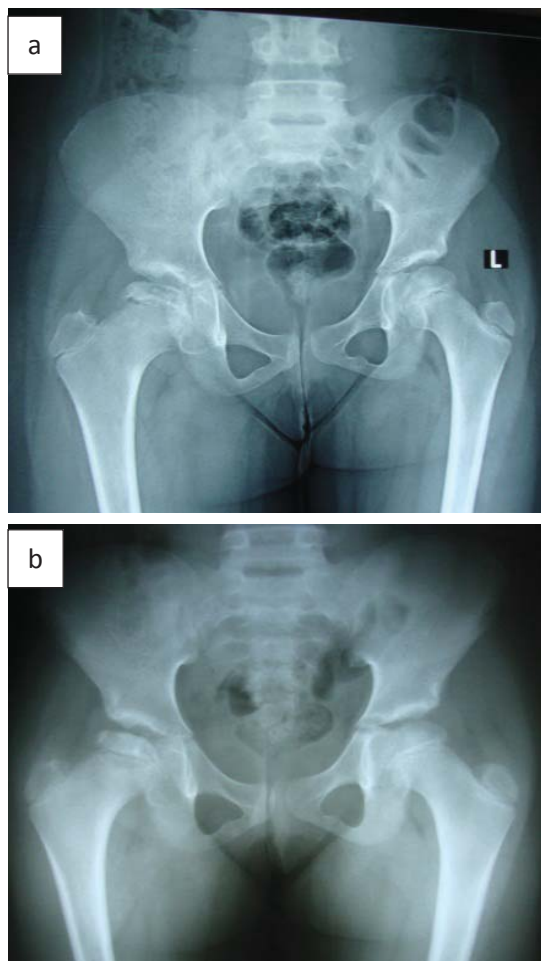


Figure. (1) a and b: Left sided Perthes, before and after IWBC, with signs of revascularization.

Fulford *et al*¹³, but lower than the 12% reported by Mobeg *et al*¹⁰. In our series right hip was a bit more affected than the left 47% and 39% respectively. This is similar to reports by Fisher¹⁴ and Rowe¹², but different from the experience of Wange¹⁵ where the left side was predominantly affected.

Family history was present in about 9% in our series, similar to the figure of 10% reported by Wynne-Davies *et al*¹⁶, but than that of Faraj *et al*¹⁷, Fisher *et al*¹⁴ and Kim *et al* series¹⁸ who reported figures of 7, eight and 4.5% respectively.

In this series a history of trauma was there in 58% of patients. Hailer *et al*¹⁹ reported that LCPD patients are hyperactive and have blood supply of femoral head which

is more sensitive to trauma compared to control group of non LCPD subjects.

It seems that socioeconomic status is a risk factor, as nearly three quarters of our series were from the low socioeconomic group. Similar reports were observed by many other authors^{11,20,21}.

In our series a painless limp was the presenting symptom for 88% of patients, similar to what was reported by Kaggs⁵.



Figure (2): The same patient using the Ischeal Weight Bearing Calliper.

In this current series, severity according to Herring's lateral pillar classification⁸ was found to be well correlated with the outcome using Stulberg classification. This confirms a report by Ritterbusch *et al*²², and Ismail *et al*²³ who reported in two different studies that Herring's classification to be more correlated to Stulberg classification than Cottrell or Salter-Thompson classification. In this current work, the cut-off age between good and poor prognosis was six

years; those who were younger than six years at presentation had better outcome based on Stulberg classification compared to those who were older than six years. Mac Andrew⁴ had a cut-off age at 8 years while, Terjesen *et al*²⁴, stated without any cut-off point that there was a clear association between the radiographic outcome and the age of the patient at time of the diagnosis; younger patients had better results than older patients no matter the age was.

In Soba University Hospital most patients with Legg-Calve-Perthes disease are treated non-operatively. The main idea is to decrease weight from the affected head using Ischeal Weight Bearing Calliper (IWBC) a non-containment conservative treatment²⁵ together with Lotus position (Fagir sitting position) which improves range of motion. 68% of patients reached Stulberg I. To the best of our knowledge, no study compared conservative treatment using IWBC and Lotus position (Fagir position) to other modalities of treatment. Herring *et al*²⁶ reported that patients more than 8 years with severity of B or B/C lateral pillar do better with surgery and group B children less than 8 years have favourable outcome regardless of the modality of treatment, while group C of all ages and all treatment modalities have poor prognosis. Recently Wiig *et al*²⁷ found no difference in the outcome of treatment in patients less than 6 years at time of diagnosis regardless of the modality of treatment; physiotherapy, Orthotics or proximal femoral varus osteotomy.

CONCLUSION:

LCPD is a disease that mainly affects children in communities of low socioeconomic, limp is the most common presenting symptom. The prognosis generally is good when the age at onset is less than 6 years. Herring's lateral pillar classification is a

simple and reliable method for classification of Perthes disease.

Non operative treatment using Ischial Weight Bearing Calliper and physiotherapy in Lotus (Fagir) Position is of good outcome.

LCPD is still poorly understood difficult to predict and to put an agreed upon protocol to manage.

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