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Outcome of Surgical Treatment of Developmental Dysplasia of the Hip in Aden, Yemen

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ABSTRACT

Background: Developmental dysplasia of hip is a common condition presenting to a pediatric orthopedic surgeon.
Objective: To evaluate the outcome of surgical treatment of developmental dysplasia of the hip.
Materials and Method: This retrospective study conducted at the Department of Orthopedic Surgery in Alnaqeeb private hospital in Aden.
The study children were 52 who were operated in the period from January 2016 to December 2018. Patient charts were reviewed and the collected data were sex, age, side, avascular necrosis, stiffness, re-dislocations, persistent acetabular dysplasia, and infection. The operations were open reduction and Pemberton's osteotomy plus minus femoral osteotomy without rotation.
Statistical analyses were performed using SPSS version 22. We expressed distribution of variables using means and standard deviation (SD). Fisher test was used and p-value ≤ 0.05 was considered as statistically significant.
Results: The majority of study children were females (80.8%). The age of the children ranged between 18 – 72 months. The mean age of children at surgery was 37 ± 17.5 months. The mean age of females was 37.2 ± 18.9 months while the mean age of males was 37.5 ± 10.7 months.
The most common side was in the left side (51.9%). The mean time of follow-up was 34.7 ± 6.4 (range 24-48) months.
Avascular necrosis found in (5.8%) children and stiffness found in (3.8%) children. Re-dysplasia of the hip were found in (5.8%) children. Persistent acetabular dysplasia was found in (3.8%) children. Additionally, we found superficial infection in (5.8%) children.
Conclusion: The open reduction approach produces a better clinical outcome. The outcome of treatment in our study was comparable to published studies.

Key words: Developmental Dysplasia, hip, surgical treatment, outcome.

INTRODUCTION

Developmental dysplasia of hip (DDH) is a common condition presenting to a pediatric orthopedic surgeon. Early management is of utmost importance to achieve normal development of hip and prevent residual acetabular dysplasia (RAD). In infants below 6 months of age, Pavlik harness is the gold standard of treatment. Once the child achieves walking age, treatment becomes more extensive. In the management of age group 18-24 months, majority of surgeons agree on open reduction and hip spica and a supplementary procedure like a proximal femoral osteotomy is usually not necessary in this age group [1,2].
DDH appears as a dysplastic disorder. It describes anomalies of articular and periarticular anatomy, and their effects on

biomechanics, explaining the hip instability, capsular laxity, and abnormal growth of the acetabulum [3].

DDH is one of most frequent deformities in children [4-6]. The goal of treatment of DDH is to achieve a stable and painless hip [7,8].

Understanding the description of DDH and the following spectrum of hip abnormalities requires expert knowledge of hip joint growth and development [9]. The development of the acetabulum and head of the femur are intimately related. Dysplasia of the hip may occur in utero, perinatally, postnatally, during infant age, or later in childhood [9,10]. DDH includes unstable hips, subluxation, dislocation (luxation), and malformed acetabula [9,11].

Open reduction with or without pelvic and femur osteotomy is reserved for cases of failed closed reduction and for patients with late presentations [12,13]. Successful management of DDH can be reviewed based on the radiographs and clinical assessments.

Treatment by either closed or open reduction has been shown to lead to favorable outcomes in many short- to middle-term studies [14]. In a walking-age child with DDH, open reduction with concomitant pelvic osteotomy would provide the best results according to a recent systematic review [15]. Long-term studies suggested that older age at first surgery and complication of avascular necrosis are associated with poor outcomes [16].

Objective

To evaluate the outcome of surgical treatment of developmental dysplasia of the hip.

MATERIALS AND METHOD

This retrospective study conducted at the Department of Orthopedic Surgery, in Alnaqeeb private hospital in Almansoora, Aden, Yemen. The study patients were 52 who suffered from developmental dysplasia of the hip and were operated by the author and a senior surgeon in the period from January 2016 to December 2018. In this retrospective study, patient charts, surgery reports and pre- and post-operative reports were reviewed.

The collected data were sex, age, side, avascular necrosis, stiffness, re-dislocations, persistent acetabular dysplasia, and infection.

The type of operations were open reduction and Pemberton's osteotomy plus minus femoral osteotomy without rotation.

Statistical analyses were performed using the Statistical Program SPSS, version 22. We expressed distribution of variables using means and standard deviation (SD). Fisher test was used and p-value ≤ 0.05 was considered as statistically significant.

RESULTS

A total of 52 children diagnosed with DDH were selected for our study. The majority of children were females 42 (80.8%) and there were 10 (19.2%) males. The age of the children ranged between 18-72 months. The mean age of children at surgery was 37 ± 17.5 months. The mean age of females was 37.2 ± 18.9 months while the mean age of males was 37.5 ± 10.7 months, as shown in Table 1 and Figure 1.

Table 1: Distribution of demographic variables among the study children (n=52)

Variables	Range	Mean	No	%
Sex:				
Females			42	80.8
Males			10	19.2
Age range (months):	18-72			
Mean age (months):				
Females	18-72	37.2 ± 18.9		
Males	18-54	37.5 ± 10.7		
All patients	18-72	37.2 ±17.5		

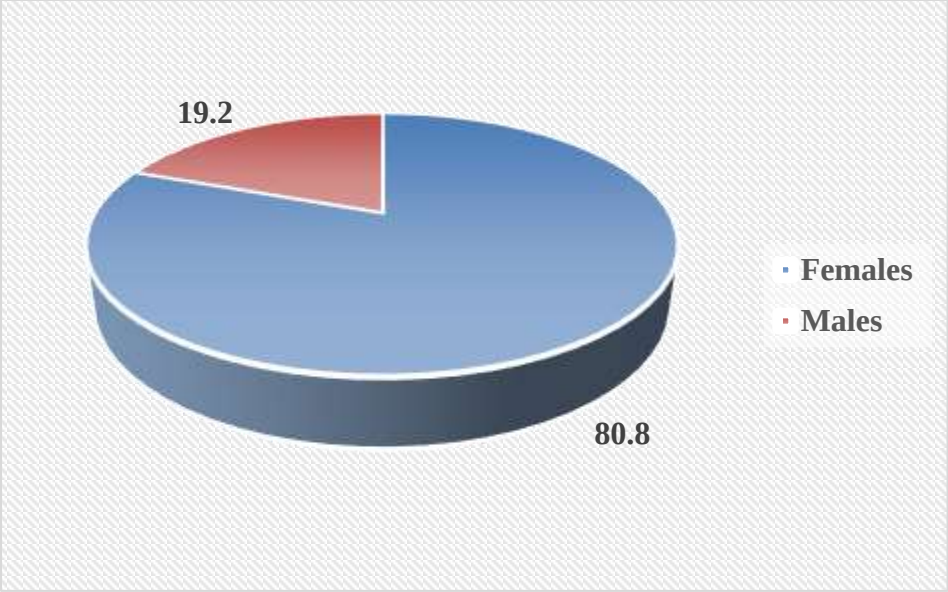

Figure 1: Proportion of study children related to sex.

Table 2: Frequency of study findings among the study children (n=52)

Variables	No	%
Side involvement:		
Left	27	51.9
Right	20	38.5
Bilateral	5	9.6
The mean period follow-up (months):	34.7 ± 6.4	
The range of follow up period (months)	24 – 48	

Table 2 showed the most common side of DDH was in the left side 27 (51.9%), followed by the right side with 20 (38.5%) then bilateral sides with 5 (9.6%). The mean time of follow-up was 34.7 ± 6.4 (range 24-48) months.

Avascular necrosis found in 3 (5.8%) children and stiffness found in 2 (3.8%) children. Re-dysplasia of the hip were found among 3 (5.8%) children. Persistent acetabular dysplasia was found in 2 (3.8%) children. Additionally, we found superficial infection in 3 (5.8%) children, Table 3 and Figure 2.

Table 3: Frequency of study findings among the study children (n=52)

Complications	No	%
Avascular necrosis:		
Yes	3	5.8
No	49	94.2
Stiffness:		
Yes	2	3.8
No	50	96.2
Re-dysplasia:		
Yes	3	5.8
No	49	94.2
Persistent acetabular dysplasia:		
Yes	2	3.8
No	50	96.2
Superficial infection:		
Yes	3	5.8
No	49	94.2

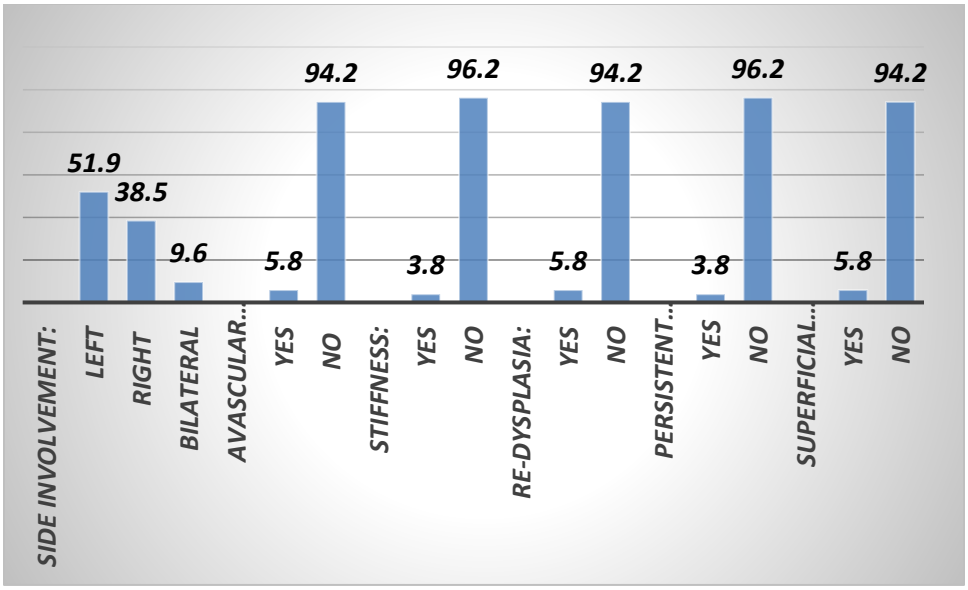

Figure 2: Frequency percentage of the study findings

Picture 1a: DDH before operation

Picture 1b: DDH after operation

DISCUSSION

Classically, DDH in children between 18 and 24 months is treated by open or closed reduction followed by hip spica immobilization. According to a study by Zionts and Macewen (1986) [17], secondary procedures on the hip were indicated only when residual subluxation was noted after bracing had been discontinued and the child had resumed walking [18].

In the present study, there were 52 children diagnosed with DDH. The majority of children were females (80.8%) and there were (19.2%) males. The age of the patients ranged between 18 – 72 months. The mean age of children at surgery was 37 ± 17.5 months. The mean age of females was 37.2 ± 18.9 months while the mean age of males was 37.5 ± 10.7 months. Chidambaram et al [19] from Malaysia reported to some extent similar to our findings. They mentioned that a total of 66 patients were selected with the mean age at surgery of 3.8 - 2.6 years and 11.9 - 4.8 years at the last follow-up. They mentioned that the majority of children were females (86.4%) and males were (13.6%).

In the current study, we found the most common side of DDH was in the left side

(51.9%), followed by the right side with (38.5%) then bilateral sides with (9.6%).

Liu et al [20] reported in their published study, they had a total of 60 hips of 45 patients. They were 5 male (11.1%), and 40 (88.9%) females. They reported that bilateral involvement was seen in 15 (33.3%) cases. They operated 35 (58.3%) right hips and 25 (41.7%) left hips.

In our study, we found the mean time of follow-up was 34.7 ± 6.4 (range 24-48) months. Liu et al [20] reported similar findings.

In our study, we found avascular necrosis in (5.8%) children. Avascular necrosis is the most serious complication from DDH surgery. Post-operative AVN has been reported to be as low as 0% but up to 67% in various studies [21]. A study conducted in Morocco [22] found the AVN rate 20%. This rate was greater than our study results. Several authors have studied the risk of AVN: Glorion [23] suggests that this necrosis can be iatrogenic. It may be due to excessive traction on the posterior vessel-carrier blade or its direct surgical attack, or following an extreme hip abduction position in immobilization. It can also be due to hypertension on the epiphysis if the femur has not been shortened. Sankar et al [24] recommend a femoral shortening osteotomy when the height of the head exceeds the width of the acetabulum by more than 30% for children over 18 months. This necrosis can also be due to previous vascular lesions of a dislocated hip following failures of closed reduction [22].

In our present study stiffness found in (3.8%) children and this percent was more lower than that reports by Alhunaishe et al [25] who mentioned that stiffness is a well-known complication, with (21.4%) patients out of 126 developing this complication with a higher percentage in open reduction pelvic osteotomy and open reduction pelvic osteotomy with femoral shortening than closed mode.

Joint stiffness is asymptomatic complication that affects a patient's individual daily life in the earlier stages. Karakas emphasized the importance of hip joint functionality. Early recovery of range of motion (ROM) is a basic element of successful surgical hip joint treatment [26]. Tachdjian stated that excess pressure on the hip joint after Salter innominate osteotomy (SIO) is a reason for joint stiffness [27]. Ege stated that joint stiffness can be prevented by treating tissue with increased care [28].

In our current study, we found the re-dislocations of the hip were among (5.8%) children and persistent acetabular dysplasia was found in (3.8%) children. Re-dysplasia and residual acetabular dysplasia are inevitable complications during treatment of DDH. It has been reported that incidence of these complications after open reduction is 0–8% [29,30,31]. Ning et al [32] reported similar results to our findings. They found that children had redislocation (1.6%) and residual acetabular dysplasia (3.0%), and they required reoperation. Our results were also similar to published studies [30,33].

We found in our present study, infection in (5.8%) children. Less than our finding was reported by Ezirmik et al [34] who observed that 2 (3.5%) patients had superficial infections in the first month after the operations. Superficial infection is another complication in the earlier postoperative stages that generally derives from perioperative or postoperative asepsis. Mergen et al. reported 3%, and Morin reported 9.4% [35,36].

CONCLUSION

Developmental dysplasia of hip is a common condition presenting to a pediatric orthopedic surgeon. Early management is

of utmost importance to achieve normal development of hip and prevent residual acetabular dysplasia. The majority of children were females. The open reduction approach produce a better clinical outcome. The outcome of Developmental dysplasia of hip surgery in our study is comparable to published studies.

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