Clubfoot and Congenital Muscular Torticollis Prevalence in Children Diagnosed with Developmental Dysplasia of Hip: Review of 594 DDH Patients

Ayman H. Jawadi

Department of Surgery, King Saud bin Abdulaziz University for Health Sciences, Saudi Arabia

*Corresponding author: Ayman H. Jawadi, Associate Professor, Pediatric Orthopedic Consultant, Department of Surgery, King Saud bin Abdulaziz University for Health Sciences, Riyadh, Saudi Arabia, Tel: 966-50-546-9606; E-mail: dr.jawadi@gmail.com

Rec date: May 06, 2016, Acc date: May 18, 2016, Pub date: May 24, 2016

Copyright: © 2016 Jawadi AH. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited.

Abstract

Background: Developmental dysplasia of the hip (DDH) refers to a spectrum of disease, including hips that are unstable, subluxated, dislocated, and/or has dysplastic acetabula. Feet deformities such as clubfoot were mentioned in the literature as associated congenital anomalies in DDH patient with variable results. Multiple studies reported the correlation between DDH and congenital muscular torticollis (CMT) at a rate between 20% and 29%. In this study we determined the overall prevalence of clubfoot and/or CMT in children who were diagnosed as idiopathic DDH in our tertiary care hospital.

Materials and methods: The charts of 594 patients diagnosed as idiopathic DDH between January 2007 and December 2014 were retrospectively evaluated in this study. Demographic data and patient’s history were obtained from medical files and pelvic X-rays of DDH patients associated with clubfoot and CMT were reviewed. The outcome was evaluated according to the DDH risk factors. Statistical analysis of the data was performed using Excel program (Microsoft Office version 2011).

Results: Out of 594 DDH patients; male were 105 (17.7%), and female 489 (82.3%). Bilateral DDH was found in 252 patients (42.4%), left DDH in 180 patients (30.3%), and right DDH in 162 patients (27.3%). None of the cases had CMT, while 11 patients (1.9%) had clubfeet. All DDH patients with clubfeet but one, showed severe form of DDH; Tonnis classification type IV.

Conclusion: Although the association between DDH and clubfoot and/or CMT has been reported in literature with variant results, careful clinical examination is recommended to detect such disorders that can be treated earlier.

Keywords: DDH; CMT; Clubfoot; Risk factors; Prevalence

Introduction

Developmental dysplasia of the hip (DDH) (Figure 1) is a spectrum of disease, including hips that are unstable, dysplastic acetabula, subluxated, and/or dislocated [1-3]. Although clubfoot diagnosis is made clinically (Figure 2), DDH has to be diagnosed clinically and confirmed by imaging modalities. There are some factors that are known to be associated with DDH, such as positive family history, breech presentation, female sex, oligohydramnios and associated congenital anomalies [4]. Feet deformities like metatarsus adductus, calcaneovalgus, clubfoot and congenital muscular torticollis (CMT) have been mentioned in the literature as associated congenital anomalies in DDH patients [5]. Metatarsus adductus has been reported as an associated anomaly with a wide range of 1.5% to 39% [6-8]. Abu Hassan and Shannak [5] reported a 2.16% calcaneovalgus and 0.54% CMT in 370 children who were evaluated in the pediatric orthopaedic clinic and diagnosed as DDH. No congenital clubfoot or metatarsus adductus were reported in their study. The association of DDH with CMT is quite strong [4,9]. Multiple studies reported a correlation between CMT and DDH at a rate between 2% and 29% [10]. Perry et al. [11] studied 119 babies with clubfeet and found DDH in 7 cases only (5.9%). Idiopathic clubfoot affects approximately 1-2 per 1000 births [12], while the incidence of CMT is reported as 0.017% to 1.9% in infants [10].

Figure 1: Congenital club foot.

The aim of this study is to determine the overall incidence of clubfoot and CMT in children who were diagnosed as idiopathic DDH in tertiary care hospitals in Riyadh, Saudi Arabia.

Methods

Between January 2007 and December 2014 a total of 594 patients diagnosed as idiopathic DDH were retrospectively evaluated in the pediatric orthopedic clinic in two main hospitals in Riyadh, Saudi Arabia.
Arabia. Demographic data and patients’ history were obtained from medical files, including presentation at delivery, sex, 1st baby, history of oligohydramnios during pregnancy, family history of DDH, and method of delivery. Pelvic X-rays of DDH patients associated with clubfoot or/and CMT were reviewed to categorize the hips to subluxated, dislocated, and dysplastic hips. Tonnis classification [13] was used to identify the severity of DDH using the relative position of the ossific nucleus to Perkin’s (P-line) and Hilgenreiner’s lines (H-line) (Table 1).

![Figure 2: Pelvic X-ray (anterior-posterior view) showed bilateral hip dislocation.](image)

The diagnosis of CMT was based on clinical criteria including limited range of motion of the head and head tilt. Clubfoot was diagnosed clinically and severity was classified according to Pirani score [12,14]. Statistical analysis of the data was performed using Excel program (Microsoft Office version 2011).

**Results**

The study included 594 patients diagnosed, as idiopathic DDH with 105 males (17.7%), and 489 female (82.3%). Bilateral DDH was found in 252 patients (42.4%), left DDH in 180 patients (30.3%), and right DDH in 162 patients (27.3%). None of the cases had CMT, while 11 patients (1.9%) had clubfoot (Table 2). One patient had right clubfoot, 3 had left clubfeet, and 7 had bilateral clubfeet. Associated risk factors in children with DDH who had clubfoot deformity are shown in Table 3. All clubfoot patients but one, showed severe form of DDH; Tonnis classification type IV.

| Patient No. | Gender | Full term | Presentation | Cephalic/Breech (B) | Delivery | First born baby | Oligohydramnios | Positive family history | Tonnis classification | Site of DDH | Site of clubfoot |
|-------------|--------|-----------|---------------|--------------------|----------|-----------------|-------------------|------------------------|----------------------|-------------|-----------------|
| 1           | Male   | Yes       | C             | Normal             | No       | No              | No                | No                     | III                  | R           | R               |
| 2           | Male   | Yes       | C             | Normal             | No       | No              | No                | No                     | IV                   | B           | B               |
| 3           | Male   | Yes       | C             | Normal             | No       | No              | No                | No                     | IV                   | L           | L               |
| 4           | Female | Yes       | B             | Normal             | No       | No              | Yes               | IV                     | L                    | B           | B               |
| 5           | Male   | Yes       | C             | Normal             | No       | No              | No                | No                     | IV                   | L           | L               |
| 6           | Female | Yes       | B             | Normal             | No       | No              | Yes               | IV                     | L                    | B           | B               |
| 7           | Male   | Yes       | C             | Normal             | No       | No              | Yes               | IV                     | B                    | L           | L               |
| 8           | Male   | Yes       | C             | Normal             | No       | No              | No                | No                     | IV                   | R           | L               |
| 9           | Female | Yes       | C             | Normal             | No       | No              | Yes               | IV                     | B                    | B           | B               |
| 10          | Male   | Yes       | C             | Normal             | No       | No              | Yes               | IV                     | R                    | B           | B               |
| 11          | Female | Yes       | C             | Normal             | No       | No              | Yes               | IV                     | B                    | B           | B               |

R: Right; L: Left; B: Bilateral

Table 2: DDH associated with clubfoot.
Discussion

DDH and idiopathic clubfoot are common pediatric orthopedic conditions that represent a spectrum of diseases [15]. The underlying etiology of both is unknown but an association between the two has been suggested [11]. The diagnosis of clubfoot is clear by clinical examination, while DDH diagnosis is more difficult to be confirmed clinically because affected individuals can appear normal when examined in infancy and routine clinical screening tests lack high sensitivity [16-18]. This study showed an association between DDH and clubfoot with one in 54 neonates (1.9%) with DDH having severe clubfoot requiring treatment. Plain X-rays diagnosed all DDH patients, alone. Ibrahim et al. [15] searched databases from 1946 to 2014 that included patients with clubfoot and DDH with CMT has been reported in the literature with variant rates, our findings suggest a lower rate of association. Never the less careful clinical examination is recommended to detect such disorders that can be treated earlier.

Table 3: Associated risk factors in children with DDH and clubfoot.

| Associated factors | Number of children (%) | Site of clubfoot | Types of DDH (Tonnis classification) |
|--------------------|------------------------|------------------|-------------------------------------|
|                    | R | L | B | III | IV |
| Full term delivery | 11 (100%) | 1 | 3 | 7 | 10 |
| Female sex         | 4 (36.4%) | 0 | 0 | 4 | 0 |
| 1st child          | 0 (0%) | 0 | 0 | 0 | 0 |
| FH of DDH          | 6 (54.5%) | 0 | 1 | 5 | 0 |
| Normal delivery    | 11 (100%) | 1 | 3 | 7 | 10 |
| Breech delivery    | 2 (18.2%) | 0 | 0 | 2 | 0 |
| Oligohydranios     | 0 (0%) | 0 | 0 | 0 | 0 |

R: Right; L: Left; B: Bilateral

In conclusion, although the association between DDH and clubfoot and DDH with CMT has been reported in literature with variant rates, our findings suggest a lower rate of association. Never the less careful clinical examination is recommended to detect such disorders that can be treated earlier.

References

1. Klisic PJ (1989) Congenital dislocation of the hip—a misleading term: brief report. J Bone Joint Surg Br 71: 136.
2. Bennett JT, MacEwen GD (1989) Congenital dislocation of the hip. Recent advances and current problems. Clin Orth Relat Res : 15-21.
3. Committee on Quality Improvement, American Academy of Pediatrics (2000) Clinical practice guidelines: early detection of developmental dysplasia of the hip. Pediatrics 105: 896-905.
4. Herring JA (2002) Tachdjian’s pediatric orthopedics. 3rd edn. W. B. Saunders Company, Philadelphia p 514-526.
5. Abu Hassan FO, Shannak A (2007) Associated risk factors in children who had late presentation of developmental dysplasia of the hip. J Child Orthop 1: 205-210.
6. Grill F, Bensahel H, Canadell J, Dungl P, Matasovic T, et al. (1988) The Pavlik harness in the treatment of congenital dislocating hip: report on a multicenter study of the European Paediatric Orthopaedic Society. J Pediatr Orthop 8: 1-8.
7. OmeroÖlu H, Koparal S (2001) The role of clinical examination and risk factors in the diagnosis of developmental dysplasia of the hip: a prospective study in 188 referred young infants. Arch Orthop Trauma Surg 121: 7-11.
8. Jones DA (1989) Importance of the clicking hip in screening for congenital dislocation of the hip. Lancet 1: 599-601.
9. Walsh JJ, Morrissey RT (1998) Torticollis and hip dislocation. J Pediatr Orthop 18: 219-221.
10. von Heideken J, Green DW, Burke SW, Sindle K, Denneen J, et al. (2006) The relationship between developmental dysplasia of the hip and congenital muscular torticolis. J Pediatr Orthop 26: 805-808.
11. Perry DC, Tawfiq SM, Roche A, Shariff R, Garg NK, et al. (2010) The association between clubfoot and developmental dysplasia of the hip. J Bone Joint Surg Br 92: 1586-1588.
12. Jawadi AH (2010) Clubfoot management by the Ponseti technique in Saudi patients. Saudi Med J 31: 49-52.
13. Tonnis D (1987) Congenital dysplasia and dislocation of the hip in children and adults. Berlin, Germany: Springer-Verlag.
14. Pirani S, Outerbridge H, Sawatzky B, Stothers K (1999) A reliable method of clinically evaluating a virgin clubfoot evaluation. 21st SICOT congress.
15. Ibrahim T, Riaz M, Hegazy A (2015) The prevalence of developmental dysplasia of the hip in idiopathic clubfoot: a systematic review and meta-analysis. Int Orthop 39: 1371-1378.
16. David TJ, Parris MR, Poynor MU, Hawnaur JM, Simm SA, et al. (1983) Reasons for late detection of hip dislocation in childhood. Lancet 2: 147-149.
17. Jones D (1998) Neonatal detection of developmental dysplasia of the hip (DDH) J Bone Joint Surg Br 80: 943-945.
18. Godward S, Dezateux C (1998) Surgery for congenital dislocation of the hip in the UK as a measure of outcome of screening. MRC Working Party...
on Congenital Dislocation of the Hip. Medical Research Council. Lancet 351: 1149-1152.

19. Westberry DE, Davids JR, Pugh LI (2003) Clubfoot and developmental dysplasia of the hip: value of screening hip radiographs in children with clubfoot. J Pediatr Orthop 23: 503-507.

20. Joiner ER, Andras LM, Skaggs DL (2014) Screening for hip dysplasia in congenital muscular torticollis: is physical exam enough? J Child Orthop 8: 115-119.

21. Kim SN, Shin YB, Kim W, Suh H, Son HK, et al. (2011) Screening for the coexistence of congenital muscular torticollis and developmental dysplasia of hip. Ann Rehabil Med 35: 485-490.