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Original Article

The Association Between Congenital Posteromedial Bowing of the Tibia and Developmental Dysplasia of the Hip

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ABSTRACT

Objective: Congenital posteromedial bowing of the tibia is a very rare birth defect characterized by a decreasing deformity and gradually increasing limb shortening. Although studies have investigated the etiology, course, and treatment algorithm of this deformity, we consider that there is still a lack of information concerning accompanying anomalies. Our aim was to present the relationship of congenital posteromedial bowing of the tibia with developmental dysplasia of the hip which we frequently observe as an accompanying condition in these patients.

Methods: This study included 27 patients and their radiographs were reviewed retrospectively. The radiographic evaluation included the anteroposterior pelvis x-ray, lower limb orthoroentgenogram, and hip ultrasonography.

Results: Of the 27 cases included in the study, 15 were boys and 12 were girls. Developmental dysplasia of the hip, one of the accompanying musculoskeletal diseases, was seen in 18% of our patients, who responded well to brace treatment.

Conclusions: We recommend that patients with congenital posteromedial bowing of the tibia be included in developmental dysplasia of the hip screening programs because the rate of accompanying developmental dysplasia of the hip is higher in these patients than in the healthy population.

Keywords: Posteromedial bowing, tibia, pediatric, developmental dysplasia of the hip, incidence

INTRODUCTION

Heyman and Herndon originally identified the unusual birth abnormality known as congenital posteromedial bowing of the tibia (CPMBT) in 1949.[1] It can be accepted as a benign, self-solving, single oblique deformity given its remodeling capacity.[2-4] Intrauterine fetal malposition and intrauterine fetal compression are generally implicated in the etiology of CPMBT, which is defined as a unilateral and isolated deformity.[1-4] Although studies have investigated the etiology, course, and treatment algorithm of this deformity, we consider that there is still a lack of information concerning accompanying anomalies. For example, in our clinical follow-up of patients, we often observe tibial bowing to be accompanied by developmental dysplasia of the hip (DDH). However, we were not able to confirm this observation using literature data.

In this study, we investigated a series of children presenting with CPMBT, who were treated at a single institution. Our aim was to present the relationship of CPMBT with DDH which we frequently observe as an accompanying condition in these patients.

METHODS

The study was initiated after receiving the approval of the Ethical Review Board and conducted in accordance with the principles of the Declaration of Helsinki. The ethics committee approval and permission for the study were obtained from the Health Science University Baltalimani Bone Diseases Education and Research Hospital Clinical Research Ethics Committee with the decision number 72/505 and date April 14, 2021. After obtaining approval from the Institutional Review Board, we reviewed the database of our institution to identify pediatric orthopedic

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Table 1. Demographic Details of CPMBT Patients Included in Study (n = 27)

Characteristics	Value
Mean (range) age at the last control (years)	6.8 (1-19)
Gender	
Female	12 (44%)
Male	15 (56%)
Side	
Left	13
Right	14
DDH	
Yes	5
No	22

CPMBT, congenital posteromedial bowing of the tibia; DDH, developmental dysplasia of the hip.

patients who presented to our hospital with posteromedial bowing of the tibia from January 1, 2000, to December 31, 2019. The case records and radiographs of children with CPMBT treated over these 19 years were reviewed. Patients who were followed up with a CPMBT diagnosis were included in the study. Patients with incomplete radiographic data (3 patients) and initial evaluation being conducted in another hospital (3 patients) were excluded from the study.

Radiographic Evaluation

Ultrasonography (USG) was performed on both hips of the patients using the Graf method. The alpha and beta angles were measured digitally in all USGs and grouped according to the Graf classification system.[5] The acetabular index of the patients who did not undergo hip USG and presented to our hospital after 6 months of age was measured in leg-length radiographs. The presence of an acetabular index of more than 30° was accepted as dysplasia.[6] Eighteen patients underwent hip USG. Graf types I and IIa (–) were considered normal and Graf types IIb, IIc, D, III, and IV were considered abnormal.[5] For the remaining 9 patients who were older than 6 months, the acetabular index was measured in the leg-length radiographs within the first year of life. Measurements above 30° were considered to indicate dysplasia.[6]

MAIN POINTS

- Intrauterine fetal malposition and intrauterine fetal compression are generally implicated in the etiology of congenital posteromedial bowing of the tibia (CPMBT) and developmental dysplasia of the hip (DDH).
- Our aim in this study is to present the relationship between CPMBT and DDH.
- The most important finding of our study was that DDH, one of the accompanying musculoskeletal diseases, was seen in 18% of our patients.
- We recommend that patients with CPMBT be included in DDH screening programs.

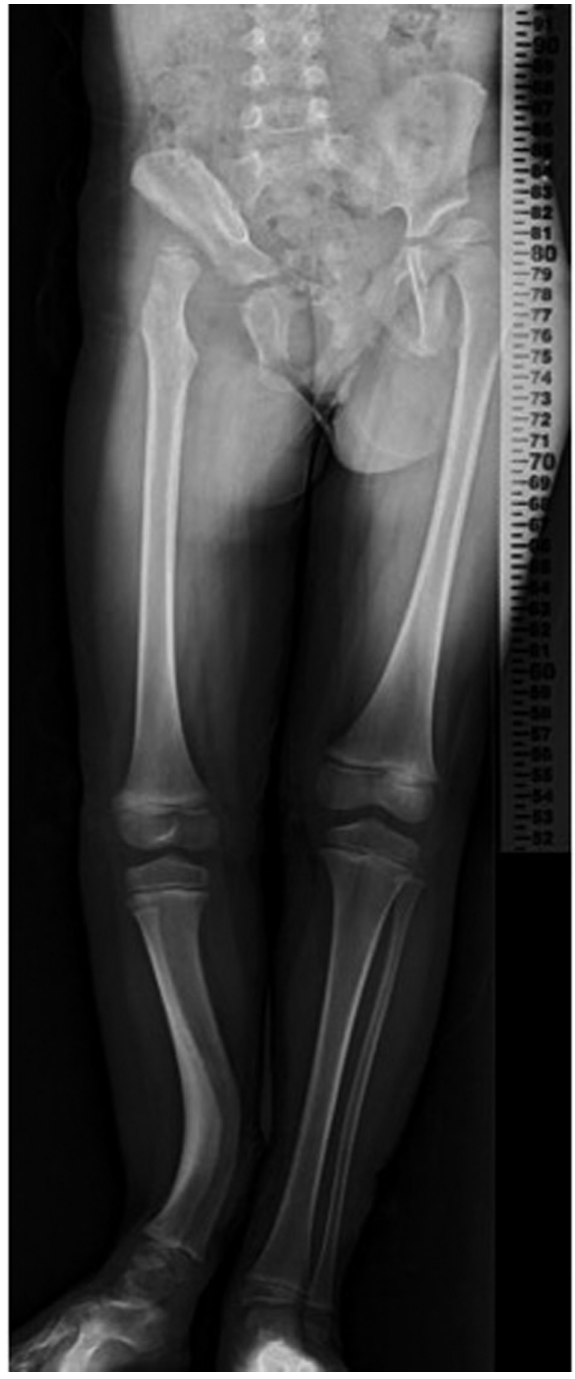

Figure 1. Untreated natural course of congenital posteromedial bowing of the tibia in a patient with accompanying developmental dysplasia of the hip. Closed reduction was recommended when the patient was 6 months old. Open reduction was suggested during follow-up but was not accepted by the parents.

Table 2. Demographic and Treatment Characteristics of Patients with CPMBT and Accompanying DDH

Case ID	Current Age (Years)	Gender	Graf Type		CPMBT Side	DDH Surgery (+/–)	LLD Surgery (+/–)	Treatment
			R	L				
1	6	Female	Type 1	Type 2b	L	No	No	Abduction orthosis for DDH
2	5	Female	Type 1	Type 2c	L	No	No	Abduction orthosis for DDH
3	2	Male	Type 2c	Type 2b	R	No	No	Still using abduction orthosis for DDH
4	5	Female	Grade 4[a]	Type 1	R	No	No	Surgery was recommended, but the patient dropped out of follow-up
5	1	Male	Type 3	Type 2c	R	No	No	Still using abduction orthosis for DDH

CPMBT, congenital posteromedial bowing of the tibia; DDH, developmental dysplasia of the hip; L, left hip; LLD, limb-length discrepancy; R, right hip; y, years.
[a]Grade 4 according to the Tonnis classification.

Statistical Analysis

Descriptive analysis was performed by using Statistical Package for the Social Sciences software 25.0 (IBM SPSS Corp.; Armonk, NY, USA). Numerical variables were given as means and standard deviations, and categorical variables were given as frequencies and percentages.

RESULTS

A total of 27 cases, 15 boys and 12 girls, were included in the sample. The mean follow-up time was 6.8 ± 4.4 years (range, 1-19 years). Table 1 shows the demographic data and DDH frequency of the study groups. Developmental dysplasia of the hip accompanied CPMBT in 5 (18%) patients, of whom 4 were treated with braces and 1 was offered surgery for DDH, but her parents did not approve the surgery (Figure 1). Other detailed variables of the patients with DDH are presented in Table 2.

DISCUSSION

The most important finding of our study was that DDH, one of the accompanying musculoskeletal diseases, was seen in 18% of our patients.

To the best of our knowledge, there is no study in the literature indicating the association between CPMBT and DDH. In a prenatal pathology study, De Maio et al[7] emphasized that CPMBT occurred as a result of intrauterine pressure and argued that oligohydramnios developed after amniotic band rupture, and then CPMBT occurred due to compression.[7] In addition, many textbooks indicate that intrauterine pressure may be responsible for the etiology of CPMBT.[8,9] It is known that the first pregnancy and the presence of oligohydramnios increase the risk of DDH.[8,9] These are factors that cause intrauterine compression. After the identification of this compression, the association of DDH, metatarsus adductus, and congenital muscular torticollis was defined and referred to as intrauterine packing phenomena.[8,9] The higher rate of DDH in our patient population (18%) than in children without CPMBT suggests that this disorder may also be a part of the intrauterine packing phenomenon. More comprehensive studies are needed on this subject, but in light of this information, we strongly recommend screening for DDH in newborns with CPMBT.

Our study has several limitations. First, it included a limited number of patients, which may have skewed the data. Second, patients with severe deformities may have been referred to our center; therefore, DDH frequency could vary. In particular, cases with mild posteromedial deformities may not have been referred to our center, potentially leading to an overestimation of the DDH frequency. We recommend that patients with CPMBT be included in DDH screening programs because the rate of accompanying DDH is higher in these patients than in the healthy population.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Health Science University Baltalimanı Bone Diseases Education and Research Hospital Clinical Research Ethics Committee (Date: April 14, 2021, Decision No: 72/505).

Informed Consent: Written informed consent was obtained from the families of the patients participating in this study.

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Declaration of Interests: The authors have no conflicts of interest to declare.

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