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ORIGINAL ARTICLE

Relationship between flexible flat foot and developmental hip dysplasia[☆]



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KEYWORDS

Flat foot;
Hip dislocation;
Joint laxity

Abstract

Purpose: To evaluate the possible relationship between flexible flat foot and developmental hip dysplasia in children between 6 and 15 years of age.

Method: Cross-sectional study including 65 patients that had undergone surgery due to residual hip dysplasia or hip dislocation and compared against 75 healthy patients. Flexible flat foot prevalence was measured in each group, with the results showing that 61% of the group with residual hip dysplasia or hip dislocation had this condition, vs. 12% in the healthy group. The statistical analysis shows that the chances of suffering from flexible flat foot, are five times greater in the hip dysplasia or hip dislocation group, than in the healthy group.

Discussion: There is no evidence in the literature showing a relationship between these two conditions, even though they have a common etiology. This study shows a potential measurable relation between these two conditions.

Conclusion: Patients with hip dysplasia or dislocation may have a higher chance of presenting flexible flat foot during late childhood, adolescence and adulthood, a fact that suggests a relationship between these two pathologies. Also, patients who seek assistance for the first time because of a flexible flat foot condition without having been evaluated during the first year of life for hip dysplasia, would be better off if evaluated for residual hip dysplasia.

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PALABRAS CLAVE

Pie plano;
Luxación de la
cadera;
Laxitud articular

Relación entre el pie plano laxo y la displasia del desarrollo de la cadera**Resumen**

Objetivo: Evaluar la relación entre el pie plano laxo y la displasia de cadera en desarrollo en niños entre los seis y los 15 años.

Material y método: Estudio de corte transversal en el que se evaluaron 65 pacientes entre los seis y los 15 años que habían sido intervenidos quirúrgicamente por displasia o luxación de la cadera en desarrollo y 75 pacientes sanos. Se midieron prevalencias de pie plano laxo en cada grupo encontrando que en el grupo con antecedente de displasia o luxación de la cadera fue del 61% y en el grupo sano fue del 12%. El análisis estadístico muestra que los pacientes con antecedente de displasia o luxación de cadera tienen 5 veces más probabilidad de presentar pie plano laxo.

Discusión: No existen datos en la literatura que cuantifiquen la relación entre estas dos patologías a pesar de tener la hiperlaxitud ligamentosa como una causa común. En este estudio se hace un primer acercamiento a la cuantificación de una relación existente entre ellas.

Conclusión: Los pacientes con antecedente de displasia de la cadera podrían tener mayor probabilidad de presentar pie plano laxo en la infancia tardía, la adolescencia y la vida adulta, lo cual sugiere una relación entre estas dos patologías. Los pacientes que consultan por primera vez por pie plano laxo a los que no se les realizó tamizado para displasia de cadera en el primer año de vida podrían requerir la evaluación de displasia residual de las caderas.

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Introduction

The incidence of flexible flat foot among the general population is 46.3% between the ages of 2 and 6 years and 14.2% between the ages of 8 and 13 years,^{1,2} whereas that of hip dysplasia is 3–4/1000 children,^{3–7} with 80% of cases occurring among females and the rest in males.⁸ Flexible flat foot is a common reason for consultation, associated to ligamentous hyperlaxity. In our institution, it has traditionally been related to a personal history of hip dysplasia or to the search for this pathology in patients who attend the clinic for the first time due to flexible flat foot and who did not undergo screening during the first years of life. The literature does not reflect any relationship between these two pathologies. The objective of this work is to determine the existence of a possible relationship between flexible flat foot and developmental hip dysplasia, and to identify data to support the clinical practices and approaches derived from such a relationship.

Material and method**Study design**

This was a cross-sectional study. Group A included 65 patients from the Roosevelt Childhood Orthopaedics Institute who underwent surgery in the previous 10 years due to developmental hip dysplasia or dislocation. Group B included 75 patients from a healthy school population with no history of hip pathologies. Patients with associated neuromuscular disorders were excluded from both groups, as were patients outside the age range between 6 and 15 years, according to the prevalence of the disease.

Patients in both groups were evaluated using suggestive criteria for flexible flat foot in the international literature, such as flattening of the internal longitudinal arch, valgus of the talus and adequate subtalar movility⁹ (Fig. 1), after signing the informed consent form approved by the ethics committee of the institution.

Statistical analysis

Data were collected and the statistical analysis through quantitative and qualitative analyses were carried out using the STATAv11 system. The hypothesis was tested according to the type of variable and a prevalence analysis.

Results

The total population evaluated included 140 patients, 62% of whom were female and 38% were male, with an age range between 6 and 15 years.

The overall prevalence of flexible flat foot found in the study population was 35%. The prevalence of flexible flat foot among group A was of 61% ($n=40$) and among group B it was 12% ($n=9$), with a prevalence ratio of 5.12 (CI 2.69–9.74). These results indicate that it was 5 times more likely for individuals with a history of hip dysplasia to present flexible flat foot compared to individuals without a history of hip dysplasia.

Given the well-known association of female gender with a higher incidence of developmental hip dysplasia,⁹ an analysis by subgroups was conducted, differentiating by gender. This analysis found among female subjects ($N=87$) a prevalence of flexible flat foot of 46% ($n=40$), which was of 63% ($n=36$) among group A ($N=57$), and of 13% ($n=4$) among

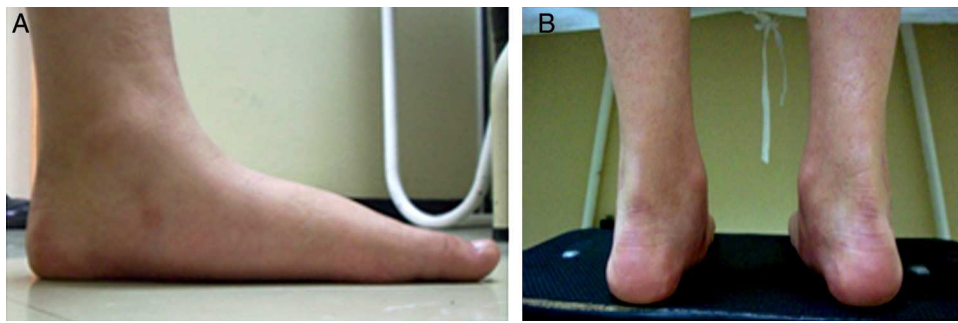


Figure 1 (A, B) Images obtained from one of the patients evaluated for flexible flat foot with the criteria described.

group B ($N=30$), with this difference being statistically significant with a $P<.0001$. For male subjects ($N=53$), the prevalence of flexible flat foot was 17% ($n=9$), which in group A ($N=8$) was of 50% ($n=4$) and among group B ($N=45$) was of 11% ($n=5$), with this difference also reaching statistical significance, with a $P<.007$.

Discussion

Traditionally, at our institution it has been considered that there could be a relationship between dysplasia and flexible flat foot, since they both have ligamentous laxity as a common cause. The literature does not contain any information about a relationship between these two pathologies, and neither could we find any in textbooks nor journal publications. However, it is common to adopt approaches like ruling out residual hip dysplasia among patients with flexible flat foot who had not undergone screening, without a basis for it in the literature.

Based on this initial approach to the quantification of the relationship, when evaluating the prevalence of flexible flat foot among patients with a history of hip dysplasia or dislocation requiring surgical management, we found an incidence 5 times higher among patients who had suffered prior hip pathologies. This analysis points to a relationship between both pathologies, albeit without establishing any causality.

Bearing in mind that hip dysplasia is more frequent among females,¹⁰ we conducted an analysis by subgroups, considering gender as a variable that could confuse the results. The statistically significant presence of flexible flat foot in the group with a history of dysplasia and without it, after discriminating by gender, confirmed the initial finding that there is a difference, not only clinical, as perceived in our institution, but also statistical among individuals who have presented a hip development pathology, such as dysplasia and dislocation, in terms of the prevalence of flexible flat foot compared to those who have not suffered such pathologies, both among male and female individuals.

Conclusion

This work suggests that there could be a relationship between flexible flat foot and developmental hip dysplasia or dislocation, since the prevalence of flexible flat foot was higher among the group with hip dysplasia. Ideally, a prospective work with a long follow-up period could support

the link between the two pathologies, as well as adopting medical approaches to avoid consequences derived from these two pathologies.

Ethical responsibilities

Protection of people and animals. The authors declare that this investigation did not require experiments on humans or animals.

Confidentiality of data. The authors declare that they have followed the protocols of their workplace on the publication of patient data.

Right to privacy and informed consent. The authors declare having obtained written informed consent from patients and/or subjects referred to in the work. This document is held by the corresponding author.

Level of evidence

Level of evidence III. Retrospective and comparative study.

Conflict of interests

The authors have no conflict of interests to declare.

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