소아재활

게시일시 및 장소 : 10 월 19 일(토) 08:30-12:30 Room G(3F)

질의응답 일시 및 장소 : 10 월 19 일(토) 11:00-11:30 Room G(3F)

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Assessment of hip adductor stiffness using ARFI sonoelastography in cerebral palsy : Pilot study

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Introduction

Hip displacement is one of the most common deformities in children with cerebral palsy (CP). Spasticity-related adductor muscle contracture plays a key role in the development of hip displacement. Recent sonoelastography using Acoustic Radiation Force Impulse (ARFI) imaging can measure intrinsic viscoelastic changes using shear wave velocities (SWPVs), which can be a quantitative marker of muscle stiffness. Therefore, this study was designed to investigate the correlation among hip adductor spasticity, SWPVs measured by sonoelastography, and hip migration index in children with spastic CP.

Methods

Twenty legs of 10 children (mean age 4.6 ± 0.97 years) diagnosed with spastic CP were investigated in this study (Table 1). ARFI sonoelastography was conducted to measure the stiffness of the hip adductor muscle. Scans of the short axis of the adductor longus muscles were performed with minimal compression applied with the transducer weight, bilaterally. Three trials of ARFI imaging were performed and the mean values were used for analysis. Hip adductor spasticity was assessed with the Modified Ashworth Scale (MAS) in knee flexed and extended posture. The hip migration index (MI) was measured in pelvic simple radiography to assess the severity of hip displacement.

Results

Hip adductor MAS shows positive strong correlation with MI ($r=0.615$, 0.627, $P<0.05$), and hip abduction ROM shows negative moderate correlation with MI ($r=-0.503$, $P<0.05$). However, SWPVs of hip adductor longus measured by ARFI sonoelastography shows no significant correlation with hip adductor MAS, ROM, or MI (Table 2).

Conclusion

This study found that severity of hip displacement was correlated with hip adductor spasticity and ROM, not with the intrinsic viscoelastic changes. Further studies in larger groups of children are needed to delineate the correlation of muscle stiffness measured by ARFI elastography and other clinical assessments.

Table 1. Characteristics of the participants

Characteristic	Number /Value*
Number of participants	10
Number of legs	20
Age at assessment, years	4.60 ± 0.97 (3 - 6)
Sex, male/female	8 / 2
GMFCS level, II; III; IV; V	3; 3; 1; 3

GMFCS: Gross motor functional classifidcation system
* Values are mean ± standard deviation (range)

Table 2. Correlation coefficients between hip adductor spasticity, SWPV, and migration index

	SWPV	MI
SWPV of Adductor Longus		
Correlation	1	0.178
p-value	-	0.454
Hip adductor MAS		
with knee flexion		
Correlation	0.229	**0.627***
p-value	0.200	0.003
with knee extension		
Correlation	0.235	**0.615***
p-value	0.318	0.004
Hip abduction ROM		
Correlation	0.402	**-0.503***
p-value	0.079	0.024

ROM, range of motion; SWPV, shear wave propagation velocities
* Correlation is significant at the 0.05 level by Spearman's rank correlation coefficient