SCIENTIFIC AWARD SESSION 2-1

소아재활
발표일시 및 장소 : **10 월 26 일(금) 14:15-14:27 Room E(5F)**

OP- Scientific 2-1

The Mechanism of Hip Dislocation in Patients with Spastic Cerebral Palsy

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Introduction
The purpose of this study was to identify the changes of forces in the hip adductor between with or without the abduction bar (AB) and evaluate the effect of pelvic supporter compressing the proximal femur on the spasticity of the adduction muscles.

Methods
Prospective experimental study. Thirty-three patients with cerebral palsy (FMFCS IV and V) were included. Surface electromyography (S-EMG) were taken by attaching EMG on the bilateral adductor longus, adductor magnus, Gluteus medius, and tensor faciae latae muscles. Clinical photography and S-EMG were taken when spasticity developed with and without AB, as well as with both AB and pelvic supporter by theraband. Neck Shaft Angle and Migration Index were also obtained.

Results
The angle between bilateral femur was changed from 9.4 ±4.5 to -2.73±5.1 after applying AB (P-value < 0.001). RMS values were significantly increased with AB in the adductor longus, adductor magnus, and tensor fascia lata muscles ($p<0.05$). Adductor Sum and Net Adduction Index showed significant increases after the use of AB $p<0.05$). After applying pelvic supporter, the NET Adduction Index was significantly decreased ($p<0.05$).

Conclusion
Our Results showed significant changes in the adductor muscles' amplitude, Adduction Sum, and Net Adduction Index. These Results indicate that force may be inflicted to worsen hip dislocation. Therefore, abduction bars should either be removed or replaced by softer material. Hip compression bandages significantly decreased adductor spasticity. Hence, it has the potential to be considered as a non-invasive method for preventing hip dislocations.

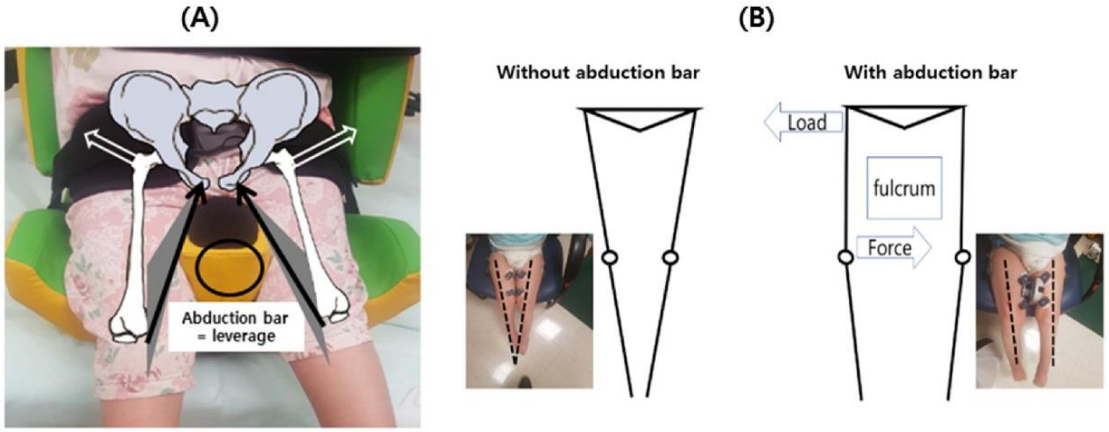
	Without abduction bar(μV)*	With abduction bar(μV)	With abduction bar and theraband (μV)
Adductor Longus m.	22.2 ± 20.78	32.5 ± 21.0**	29.6 ± 22.2
Adductor Magnus m.	17.4 ± 18.0	22.3 ± 26.3**	19.2 ± 16.1
Tensor Fascia Lata m.	18.9 ± 27.4	22.1 ± 18.8**	26.7 ± 31.2
Gluteus Medius m.	13.4 ± 13.9	13.8 ± 18.2	13.9 ± 21.5
Adductor Sum	75.7 ± 53.8	112.6 ± 68.2**	95.5 ± 57.6
Abductor Sum	64.6 ± 68.6	90.8 ± 64.6	90.8 ± 64.6
Net Adduction Index	291.9 ± 488.9	414.2 ± 548.8*	202.3 ± 287.0#

Values are presented as mean ± SD.

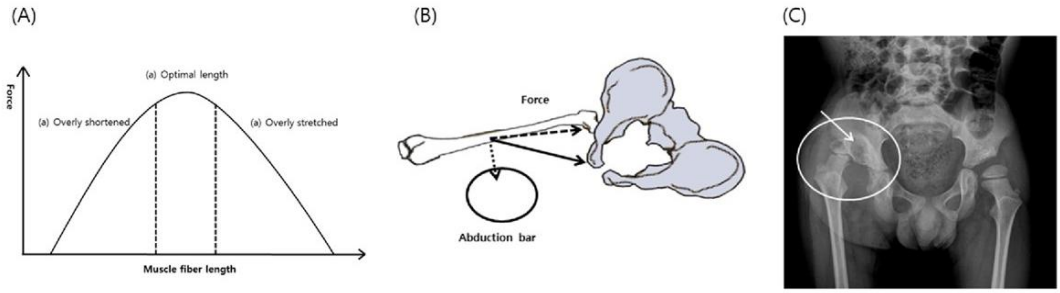
Comparison between without bduction bar and with abduction bar, *p<0.05, **<0.01

Comparison between with abduction bar and with abduction bar and theraband, #p <0.05

This table shows the Results of S-EMG at three positions when spasticity developed: (1) without either AB or bilateral hip compression bandage, (2) with AB only, and (3) with both AB and bilateral hip compression bandage. When comparing between with and without the use of AB, RMS values in the adductor longus, adductor magnus, and tensor fascia lata muscles were significantly increased in the former ($p<0.05$). Although the abductor sum was not statistically significant, the adductor sum showed a significant increase after the use of AB ($p<0.05$). The calculated net adduction index showed a significant increase after the use of AB ($p<0.05$).



These figures show the leverage fulcrum as a mechanism of aggravated hip dislocation in the presence of abduction bar (first class lever, (A)). In the presence of spasticity, tone of adductor muscles becomes greater than the tone of abductor muscles and, thus, scissoring occurs ((B), Left figure). After the use of abduction bar, decrease of angle between femur shafts indicates that an abduction bar helps resist the force inflicted inward on the thighs, implying its function as a leverage fulcrum during spasticity ((B), Right figure).



This figure (A) shows the length-tension relationship of muscles. At the optimal length, the muscular tone is greater than shortened or lengthened muscles. Abduction bar prevents shortening of hip adductor muscles and preserves the adductor muscle at optimal length. Figure (B) shows the vectors of adductor muscles. The vector of hip adductor muscles can be divided into two vertical planes – medial vector and upward vector. In the presence of abduction bar, the upward direction, which destructs the superior (supine position) or postero-superior acetabulum (sitting position), is increased by the length-tension relationship, thereby, resulting in aggravated acetabular destruction and hip dislocation. The white arrow (C) indicates the destructed acetabulum.