P-133

Body Composition Assessment in Flail Arm Syndrome Using Direct Segmental Multi-Frequency Bioelectrical Impedance Analysis

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Background

Flail Arm Syndrome (FAS) represents a subtype of motor neuron disease characterized by progressive proximal weakness and atrophy of the upper limbs. This study aims to evaluate body composition in a 19-year-old female patient diagnosed with FAS, utilizing Direct Segmental Multi-Frequency Bioelectrical Impedance Analysis (DSMF-BIA).

Case report

A 19-year-old female patient presented with bilateral upper limb weakness persisting for a year. Clinical examination revealed muscle atrophy in the proximal region of the shoulder girdle. Manual muscle strength test indicated fair minus performance on bilateral shoulder flexor and abductor, fair right elbow flexor, and normal left elbow flexor. Dysphagia, dyspnea, fasciculation, spasticity, and tongue atrophy were not observed. The Hoffman test, ankle clonus examination, and deep tendon reflex test were negative. Family history revealed no significant findings. Magnetic resonance imaging showed inconclusive evidence of abnormalities in both brachial plexuses. Electrodiagnostic study revealed normal nerve conduction parameters and no evidence of motor neuron disease on needle electromyography. To quantify muscle atrophy differences between upper and lower limbs, DSMF-BIA testing was employed. The model used InBody® 970 (Biospace, Los Angeles, USA). It emphasized more pronounced atrophy in the upper limbs.
(Table 1)

Conclusion

This case underscores the utility of DSMF-BIA as an adjunctive tool for quantitatively evaluating motor neuron diseases such as FAS. Given its clinical and pathological similarities to amyotrophic lateral sclerosis (ALS), accurate diagnosis of FAS is imperative. Distinguishing FAS from ALS is crucial, particularly due to the significantly better survival rates in FAS. This case suggests the potential of DSMF-BIA to aid in the diagnostic process, warranting further investigation through large-scale studies.

Table 1. Segmental lean mass analysis

Segmental Lean mass analysis				
		Patient		Reference value
Upper extremity	Right arm	1.12 kg	2.55 kg	3.4 kg (0.6)
	Left arm	1.43 kg		
Lower extremity	Right leg	5.56 kg	11.35 kg	11.9 kg (2.1)
	Left leg	5.79 kg		
Trunk		14.0 kg		18.0 kg (2.5)

Reference values are means (SD).