P 1-151

Bioelectrical impedance phase angle as an assistive device for assessment and monitoring CRPS type I

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Introduction

Complex regional pain syndrome (CRPS) is characterized by continuous and gradual worsening of intense pain. Along with pain, it is a disorder accompanied with paresthesia, reduced motor function and trophic disturbance. Aggravation of posttraumatic inflammation is considered as one of the most important factor of pathophysiology in CRPS. Budapest diagnostic criteria has been widely used for diagnosis of CRPS. However, there are no prognostic indicators in CRPS. Bioelectrical impedance analysis (BIA) is noninvasive, easy to use, and cost-effective device used for analysis of body composition. BIA Phase angle(PA) value reflects cellularity, integrity of cell membranes and function of the cells, clinically, and it also has been found to be a prognostic indicator in several conditions, such as HIV, liver cirrhosis, chronic obstructive pulmonary disease. Acute local inflammation occurring in early phase of CRPS leads to tissue damage and cell death of the affected tissue and this may be reflected as low PA values. This case represents the BIA PA as a prognostic indicator of CRPS type I patients.

CASE REPORT

A 48-year-old female patient who had undergone open reduction and internal fixation with left ankle fracture 3 months ago was referred to our clinic for recurrence of ankle pain. At the time of admission, allodynia, ankle joint ROM limitation, pain, discoloration was seen. Under suspicion of CRPS, the Budapest diagnostic criteria were applied: allodynia and hyperalgesia were found in Sensory category; skin color difference between two sides was found in Vasomotor category; edema and asymmetric sweating were found in Sudomotor/edema category; and reduced ankle ROM was found in Motor/trophic category. Electrophysiologic evaluation showed no evidence of neuropathy. Three phase bone scan test was performed. In osseous phase, asymmetric diffuse increased uptake at left lower leg, especially ankle and foot was found. CRPS type I was diagnosed. At the time of diagnosis, the patient was evaluated by BIA. The segmental PA in 50 kHz was 4.5 in the affected limb and 5.6 in the unaffected limb. PA ratio of affected to unaffected side was 0.80. Follow-up examination was performed after 2 weeks of steroid pulse treatment period. Pain, allodynia, skin color change, edema, and ankle ROM limitation was improved after treatment. Three phase bone scan test demonstrated. In the Osseous phase, diffusely increased uptake at left lower leg, especially ankle and foot, but decreased overall activity compared to previous tests. The follow up BIA showed the PA of the affected limb was 5.1, the PA of the unaffected limb was 5.3, and PA ratio improved to 0.96.

Conclusion

Because there is no Objective prognostic indicator of CRPS type I, only the clinical symptoms are used for current treatment efficacy assessment and follow-up. The PA ratio before and after treatment improved from 0.80 to 0.96. BIA PA can be helpful in assessing and monitoring progress of CRPS.