INTRODUCTION
Patients with spastic cerebral palsy (CP) have difficulty with motor control and frequently use ineffective movement patterns. Both the integrated volitional control electrical stimulator (IVES) and the functional electrical stimulation (FES) have been used to facilitate the proper muscle group at the proper timing. This case report describes to evaluate the efficacy of IVES and FES treatment in an adult with spastic CP triplegia.

METHOD
Subject: We present an 19-year-old girl diagnosed with CP triplegia (Gross Motor Function Classification System level III), without cognitive impairment. She was able to ambulate indoors with a walker, and used an electric wheelchair for long distances. Her main complaints were stiffness and pain of right upper muscles, difficulty in prolonged standing and walking, and toileting.

Apparatus: We used the IVES system (MURO Solution, pacificsupply, Osaka, Japan) to elicit right wrist and finger extension during voluntary movements, and the NESS L300 Plus neuroprosthesis system (Bioness Inc., Valencia, CA, USA), which delivers electrical stimulations to the right common peroneal nerve.

Procedures: IVES therapy sessions were undertaken for 10-12 hr/day for 12 days, including during therapy sessions and daily activities. FES was used to stimulate the right dorsiflexors muscles and improve equinus foot at the swing phase for 30min-1 hr/day for 12 days.

Data Analysis: The assessment was conducted using Simple Test for Evaluating Hand Function (STEF), Stroke Impairment Assessment Set (SIAS) and Functional Independence Measure (FIM).

RESULTS
All scores showed a slight increase with the right side: the score of STEF was from 1 before the intervention to 3 after intervention, and the score of SIAS was from 32 before the intervention to 34 after intervention. Nevertheless it was improved without statistical significance, she was able to use as a functional assistive hand little by little, so the score of STEF with the left side was from 80 before the intervention to 86 after intervention. Furthermore, she was gradually able to keep her right foot on the footrest for her electric wheelchair and the sitting posture was improved than before.

DISCUSSION
Neuromuscular electrical stimulation (NES) has been used successfully to increase muscle strength and size, and temporarily reduce spasticity. Although a short time intervention, the patient was interested in a new functional gain and motivated to change her conventional ineffective movement patterns. Further therapy are needed for her to gain a functional assistive hand and improve equinus foot.

CONCLUSION
This report suggests that NES may be effective for adult spastic CP. Further studies are needed in order to validate our intervention.

CLINICAL APPLICATIONS
This therapy has many potential clinical applications in patients with spastic CP.

REFERENCES
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