Electrical muscle stimulation in the development of acquired weakness in the intensive care unit in adult patients with severe sepsis and septic shock at the Clinic Hospital of the Univerisity of Chile: results of a pilot randomized study

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Study protocol

SOFA score and septic focus were recorded, and muscle mass was assessed through ultrasonography (US) at patient's admission. Randomization was applied to assigned the subjects to the intervention group (conventional physical therapy and Electrical muscle stimulation) or to the control group (conventional physical therapy). The intervention was applied until the day when the subject woke up and was able to respond adequately to at least three of five orders of the score of 5 questions test (S5Q): "Look at me", "Open and close your eyes", "Nod your head", "Open your mouth and put out your tongue" and "Raise your eyebrows after I have counted to five". If the subject was able to respond less than three orders it was considered as not cooperative and the assessment was repeated the next day. If subjects fulfilled three or more orders, we proceeded to assess muscle strength measured through the medical research council scale (MRC), maximum inspiratory pressure (MIP), SOFA score and we repeated the measurement of muscle mass through US. Subsequently, the subjects were followed to record days of invasive mechanical ventilation (IMV), presence of weaning failure, days of ICU stay, 28-day mortality, and gait ability at hospital discharge.

Treatment protocol of the control group: conventional physical therapy was used, consisting of early passive mobilization and positioning since subjects' day of ICU admission (levels 0 and 1 of the adaptation of "Start to move" protocol by Gosselink et al.), as long as it met criteria of cardiorespiratory stability according to this protocol.

Treatment protocol of the intervention group: conventional physical therapy was used, but also electrical muscle stimulation (EMS) was applied, starting 48 hours after admission, in bilateral biceps brachii and quadriceps femoris (anterior rectus) muscles. The electrostimulator that we used is a portable model, Ultima Neo®, Pain Management Technologies, Ohio, United States. A set of self-adhesive electrodes was used for each patient. The size of the electrodes was 5x5 cm. for the biceps brachii and 5x9 cm. for the

quadriceps femoris muscles. The parameters used were a frequency of 35 Hz with a pulse width of 250 μs for the biceps and a frequency of 50 Hz with a pulse width of 400 μs for the cudriceps. In both, biphasic wave was used, 45 minutes of total work, 5 seconds of contraction and 10 seconds of relaxation and the intensity was adjusted to the point of a visible muscle contraction.