

## Effortful Swallowing Training Coupled with Electrical Stimulation Leads to an Increase in Hyoid Elevation During Swallowing

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**Abstract** We tested the effects of surface electrical stimulation on hyoid elevation during swallowing in healthy volunteers. Sixteen people were recruited and randomly divided into two groups. Electrical stimulation was applied to the skin above the infrahyoid muscle in the experimental group. The stimulation current was adjusted until muscle contraction occurred and the hyoid bone became depressed. Participants were asked to swallow forcefully so as to elevate the hyolaryngeal complex when the stimulation began. The same experiment was performed in the control group except the intensity of stimulation was adjusted to just above the sensory threshold. The two groups received ten 20-min treatments over 2 weeks. We recorded the myoelectrical activity of the submental muscles and the amount of hyoid bone movement at three time points (pretreatment, immediately post-treatment, and 2 weeks after treatment). In the experimental group, the amount of y-axis hyoid bone excursion was increased immediately post-treatment, but this effect faded within 2 weeks following the treatment. Myoelectrical activity was not affected by either treatment regimen. We concluded that effortful swallowing coupled with electrical stimulation increases the degree of hyoid elevation in healthy volunteers. It needs to be evaluated for its long-term effectiveness in increasing the elevation of hyolaryngeal complex.

**Keywords** Deglutition Dysphagia Effortful swallowing Treatment Electrical stimulation Deglutition disorders