

Sensory Transcutaneous Electrical Stimulation Improves Post-Stroke Dysphagic Patients

Syrine Gallas · Jean Paul Marie · Anne Marie Leroi · Eric Verin

Received: 19 April 2009 / Accepted: 24 September 2009
© Springer Science+Business Media, LLC 2009

Abstract Oropharyngeal dysphagia is frequent in stroke patients and increases mortality, mainly because of pulmonary complications. We hypothesized that sensitive transcutaneous electrical stimulation applied submentally during swallowing could help rehabilitate post-stroke oropharyngeal dysphagia by improving cortical sensory motor circuits. Eleven patients were recruited for the study (5 females, 68 ± 11 years). They all suffered from recent oropharyngeal dysphagia (>eight weeks) induced by a hemispheric ($n = 7$) or brainstem ($n = 4$) stroke, with pharyngeal residue and/or laryngeal aspiration diagnosed by videofluoroscopy. Submental electrical stimulations were performed for 1 h every day for 5 days (electrical trains: 5 s every minute, 80 Hz, under motor threshold). During the electrical stimulations, the patients were asked to swallow one teaspoon of paste or liquid. Swallowing was evaluated before and after the week of stimulations

using a dysphagia handicap index questionnaire, videofluoroscopy, and cortical mapping of pharyngeal muscles. The results of the questionnaire showed that oropharyngeal dysphagia symptoms had improved ($p < 0.05$), while the videofluoroscopy measurements showed that laryngeal aspiration ($p < 0.05$) and pharyngeal residue ($p < 0.05$) had decreased and that swallowing reaction time ($p < 0.05$) had improved. In addition, oropharyngeal transit time, pharyngeal transit time, laryngeal closure duration, and cortical pharyngeal muscle mapping after the task had not changed. These results indicated that sensitive submental electrical stimulations during swallowing tasks could help to rehabilitate post-stroke swallowing dysphagia by improving swallowing coordination. Plasticity of the sensory swallowing cortex is suspected.

Keywords Electrical stimulation · Swallowing · Stroke · Human · Deglutition · Deglutition disorders

S. Gallas · A. M. Leroi · E. Verin (✉)
Service de physiologie digestive, urinaire, respiratoire et sportive, CHU de Rouen, 1 rue de Germont, 76031 Rouen Cedex, France
e-mail: eric.verin@chu-rouen.fr; everin@mac.com

J. P. Marie
Groupe de Recherche sur le Handicap Ventilatoire (GRHV)
UPRES EA 3830/IFRMP23, Université de Rouen, Rouen Cedex, France

S. Gallas · A. M. Leroi
Digestive Tract Research Group, EA3234/IFRMP23, Université de Rouen, Rouen Cedex, France

J. P. Marie
Service de chirurgie cervico faciale, CHU de Rouen, 1 rue de Germont, 76031 Rouen Cedex, France

Oropharyngeal dysphagia is a social health problem because of its high prevalence and its dramatic consequences, including dehydration, malnutrition, aspiration, choking, pneumonia, and death. While epidemiological data are scarce, the prevalence of dysphagia among individuals over 50 years of age is estimated to range from 16 to 22% [1]. In health-care institutions, it is estimated that 12–13% of patients in short-term care hospitals and up to 60% of nursing home occupants have feeding difficulties [2]. Similarly, there is a 20–40% prevalence of oropharyngeal dysphagia among special populations such as those with head injuries, cerebrovascular accidents, and Parkinson's disease [3]. Given the prevalence of oropharyngeal dysphagia among the elderly and given the aging of the population, busy clinicians are frequently faced with the