



OPEN ACCESS

Inability to close mouth and dysphagia caused by pseudobulbar palsy: trial treatment by vibration-induced mastication-like movement

Masanori Nagaoka,^{1,2} Hiromasa Suzuki,³ Kazuhiro Kanayama,³ Yuko Ozone³

¹Neurology, Juntendo University, Tokyo, Japan

²Internal Medicine, Nikko Noguchi Hospital, Nikko, Japan

³Rehabilitation, Nikko Noguchi Hospital, Nikko, Japan

Correspondence to

Professor Masanori Nagaoka; nagaokam@juntendo.ac.jp

Accepted 17 December 2019

DESCRIPTION

An 84-year-old man suddenly developed dysphagia following repeated transient ischaemic attacks. He could not close his mouth, swallow food, or speak. Dislocation of the jaw, atrophy of the tongue, or gag reflex was not seen, but the snout reflex and jaw jerk were exaggerated, and the patient was able to walk. Radiological findings showed occlusion of the right internal carotid artery, leukoaraiosis and atrophy of anterior operculum. The patient's condition was diagnosed as Foix-Chavany-Marie syndrome, a type of pseudobulbar palsy.¹ His mouth was kept half-open due to inability to close mouth. We used a bandage to prevent jaw dislocation and stretch the jaw closing muscles.² Under nutritional control with gastric fistula, swallowing training was started, but dysphagia did not improve. However, vibration stimulation of the mouth with an electric toothbrush induced mastication-like movement in a reflex manner (video 1). After 2 weeks of reflex

movement training, the patient was able to close his mouth voluntarily. However, adding swallowing training to the reflex movement training using an electric toothbrush failed to improve dysphagia. The mastication-like movement was analysed with surface electromyogram (EMG) by placing electrodes on the masseter, suprahyoid (digastricus) and orbicularis oris muscles (figure 1A,B). Voluntary masticatory movements were similar to the vibration-induced movements, but did not lead to swallowing movement.³ Although dysphagia of pseudobulbar palsy is difficult to treat, range of movement exercise of the mandibular joint and stimulation of the trigger point have been reported to be useful for opening the mouth and facilitating swallowing in patients with pseudobulbar palsy.⁴ Because of relatively abundant muscle spindles in the masseter and temporal muscles, the vibratory stimuli from an electric toothbrush probably trigger the jaw closing reflex and facilitate voluntary mastication.⁵ Stimulation with an electric toothbrush may be a plausible method for treating dysphagia caused by pseudobulbar palsy.

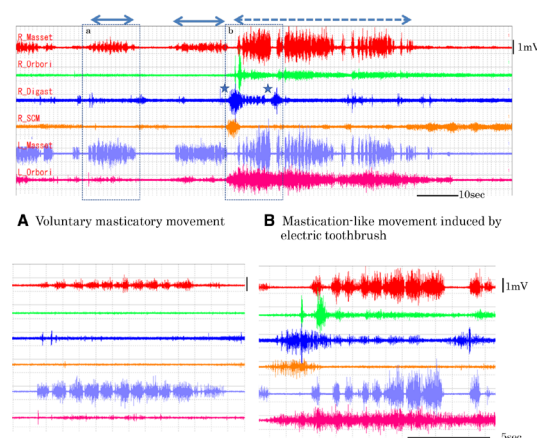


Figure 1 Surface EMG recorded after 2 weeks of reflex movement training when the patient became able to close mouth voluntarily and make an explosive voice. Electrodes were placed on bilateral masseter and orbicularis oris muscles, and right digastricus and sternocleidomastoid muscles. (A) During voluntary mastication, grouped discharge at approximately 1 Hz for a duration of 700–800 ms was seen in the masseters. (B) By an electric toothbrush, grouped discharges at approximately 1.2 c/s for a duration of 600–1000 ms appeared in the masseter and digastric muscles. When he held the toothbrush between his teeth, reciprocal activation and inhibition was seen between the digastricus (jaw opening muscle) and masseter (jaw closing muscle) (asterisks).

Acknowledgements We appreciate Dr Yasuo Kumagai and Dr Akihiro Numao for their management of this patient in the acute hospital.

Contributors MN wrote the manuscript, HS made the design of this study, KK and YO assessed the effect of vibration induced mastication-like movement on the swallowing function.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Next of kin consent obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

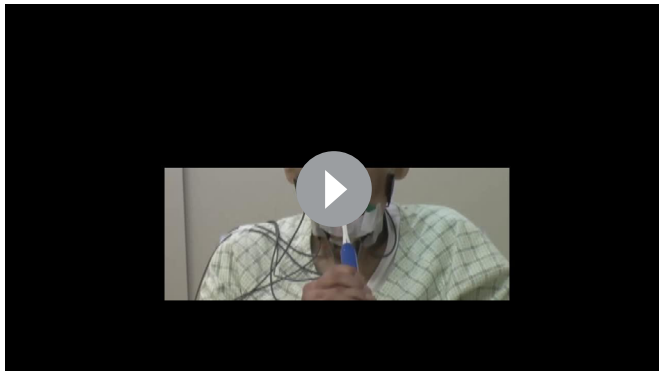


© BMJ Publishing Group Limited 2019. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

To cite: Nagaoka M, Suzuki H, Kanayama K, et al. *BMJ Case Rep* 2019;12:e232061. doi:10.1136/bcr-2019-232061

Learning points

- ▶ Inability to close mouth and dysphagia caused by pseudobulbar palsy were treated by vibration using an electric toothbrush.
- ▶ Mastication-like movement was induced by an electric toothbrush in a reflex manner, and voluntary mastication was possible after 2-week training.
- ▶ The acquired voluntary mastication did not lead to swallowing, but vibration using toothbrush should be tried to overcome the nuisance condition of failure of closing mouth.



Video 1 On admission, he was not able to close his mouth and say any word. By applying an electric toothbrush, mastication-like movement was evoked. After two weeks of training with an electric

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

REFERENCES

- 1 Bruyn GW, Gathier JC. The operculum syndrome. In: Vinken PJ, Bruyn GW, eds. *Handbook of clinical Neurology*, vol. Amsterdam: Elsevier Science BV, 1969: 776–83.
- 2 Kisner C, Colby LA. *Therapeutic exercise: foundations and techniques*. 394. 5th edn. Philadelphia, PA: F.A. Davis Corporation, 2007.
- 3 Nakamura Y, Katakura N. Generation of masticatory rhythm in the brainstem. *Neurosci Res* 1995;23:1–19.
- 4 Kojima C, Fujishima I, Ohkuma R, et al. Jaw opening and swallow triggering method for bilateral-brain-damaged patients: K-point stimulation. *Dysphagia* 2002;17:273–7.
- 5 Miles TS, Flavel SC, Nordstrom MA. Stretch reflexes in the human masticatory muscles: a brief review and a new functional role. *Hum Mov Sci* 2004;23:337–49.

Copyright 2019 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <https://www.bmj.com/company/products-services/rights-and-licensing/permissions/>
BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Become a Fellow of BMJ Case Reports today and you can:

- ▶ Submit as many cases as you like
- ▶ Enjoy fast sympathetic peer review and rapid publication of accepted articles
- ▶ Access all the published articles
- ▶ Re-use any of the published material for personal use and teaching without further permission

Customer Service

If you have any further queries about your subscription, please contact our customer services team on +44 (0) 207111 1105 or via email at support@bmj.com.

Visit casereports.bmj.com for more articles like this and to become a Fellow