

論 文 要 旨

Relationship between lip motion detected with a compact 3D camera and swallowing dynamics during bolus flow swallowing in Japanese elderly men

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Abstract

Background: Clinical application of a swallowing function evaluation system that is minimally invasive and enables an objective evaluation is necessary.

Objectives: We constructed a system that can synchronize and analyze lip motion with a three-dimensional (3D) camera and swallowing dynamics with videofluoroscopy (VF) and clarified the relationship between lip movement and swallowing dynamics.

Methods: A compact 3D camera was adapted to Microsoft XBox One Kinect Sensor®. We examined Kinect's accuracy and repeatability and analyzed the highest measurement accuracy and repeatability of the distance between anguli oris muscles. The constructed system simultaneously measured, synchronized, and analyzed lip motion by Kinect and swallowing dynamics by VF. Fourteen elderly men without dysphagia were included. Barium turbid solution (5, 10, 15, and 20 mL) was used for swallowing. Measurement parameters were the 3D distance between angulus oris displacement (TDDD), swallowing quantity (SQ), oral transit time (OTT), stage transit duration (STD), pharyngeal transit time (PTT), and total swallowing duration (TSD). Statistical analyses were performed.

Results: The measurement accuracy and reproducibility were optimum within a 10° horizontal imaging angle at a 120-cm measurement distance. SQ, TDDD, OTT, STD, PTT, and TSD showed significant differences, and correlation was found between TDDD and OTT. **Conclusion:** SQ affected TDDD, OTT, STD, PTT, and TSD; OTT could be predicted from TDDD.

Improvement in the system and analysis method was considered to enable prediction of swallowing dynamics from body surface movement of the head and neck, including realization of measurement conditions with higher precision and reproducibility, and from lip motion.