Factors Predicting Recovery of Oral Intake in Stroke Survivors with Dysphagia in a Convalescent Rehabilitation Ward

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Background: Percutaneous endoscopic gastrostomy may be performed in dysphagic stroke patients. However, some patients regain complete oral intake without gastrostomy. This study aimed to investigate the predictive factors of intake, thereby determining gastrostomy indications. *Method:* Stroke survivors admitted to our convalescent rehabilitation ward who underwent gastrostomy or nasogastric tube placement from 2009 to 2015 were divided into 2 groups based on intake status at discharge. Demographic data and Functional Independence Measure (FIM), Dysphagia Severity Scale (DSS), National Institutes of Health Stroke Scale, and Glasgow Coma Scale (GCS) scores on admission were compared between groups. We evaluated the factors predicting intake using a stepwise logistic regression analysis. *Results:* Thirty-four patients recovered intake, whereas 38 achieved incomplete intake. Mean age was lower, mean body mass index (BMI) was higher, and mean time from stroke onset to admission was shorter in the complete intake group. The complete intake group had less impairment in terms of GCS, FIM, and DSS scores. In the stepwise logistic regression analysis, BMI, FIM-cognitive score, and DSS score were significant independent factors predicting intake. The formula of BMI × .26 + FIM cognitive score × .19 + DSS score × 1.60 predicted recovery of complete intake with a sensitivity of 88.2% and a specificity of 84.2%. *Conclusions:* Stroke survivors with dysphagia with a high BMI and FIM-cognitive and DSS scores tended to recover oral intake. **Key Words:** Dysphagia—stroke—percutaneous endoscopic gastrostomy—nasogastric tube feeding—complete oral intake.

Introduction

Dysphagia is a common complication after stroke, affecting 27%-64% of patients.[1-3] It has been reported that half of those with dysphagia will recover by 2 weeks after stroke onset.[1-3] However, the other half might retain a swallowing disability along with other related complications, such as malnutrition, aspiration pneumonia, delayed functional recovery, and/or subsequent increased mortality.[4-6] Internal tube feeding, mainly through percutaneous endoscopic gastrostomy (PEG) or nasogastric tube (NGT) placement, is widely applied in patients who show delayed recovery until they regain complete oral intake (COI).[7,8]

Previous studies have clarified certain advantages and disadvantages of PEG and NGT feeding. Some studies have reported that PEG, compared with NGT feeding, resulted in less weight loss and greater improvement in nutritional state in the late rehabilitation phase in stroke survivors with prolonged dysphagia.[9-13] Norton et al conducted a randomized prospective comparison of PEG and NGT feeding after acute dysphagic stroke and reported that the mortality rate at 6 weeks after stroke onset was

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significantly lower in the PEG group.[13] Conversely, the FOOD trial,[14] which focused on early indications for PEG, particularly within 2 weeks after stroke onset, reported higher complication and mortality rates with PEG than with NGT feeding. Accordingly, these researchers suggested that PEG should be avoided and that NGT feeding should be chosen during the first several weeks after stroke onset. Dziewas et al demonstrated that a correctly placed NGT did not cause worsening of stroke-related dysphagia and concluded that there were no principal obstacles to begin limited and supervised oral feeding.[15] On the other hand, Gomes et al concluded that PEG might be a better choice than NGT feeding when enteral nutrition is necessary for a certain length of time because prolonged NGT placement can lead to complications, such as damage to the nose and larynx and chronic sinusitis.[16] In another study, Rowat summarized that PEG should be chosen for any patient who shows long-term swallowing difficulty, whereas NGT placement is the preferred method for short-term feeding.[17] In other words, PEG should be performed when recovery of COI is not promised. However, the factors predicting recovery of COI remain to be clarified in order to determine the appropriate indications of PEG.

Numerous studies have investigated the predictive factors for either PEG or internal feeding tube removal in stroke survivors with dysphagia.[18-29] Some of these studies have shown a correlation between stroke severity and dysphagia within a few days after stroke onset.[18-21] However, during this period, the patient's stroke symptoms and remaining functions can still fluctuate; thus, the data might be unreproducible. Other studies have examined the patients' status of COI or incomplete oral intake (ICOI) at discharge from acute care hospitals.[18,19,21-25] However, patients classified as having ICOI might recover COI after rehabilitation. Some studies have used videofluoroscopic swallowing study (VFSS) in the acute phase to evaluate dysphagia.[19,22,27-29] However, more than a few patients might be excluded because VFSS imposes certain limitations on endurance and cognitive function. Taken together, these previous studies might not reflect the stability of the patients' stroke symptoms or remaining functions, the patients' final swallowing condition after rehabilitation, or the patients who were excluded from VFSS.

Therefore, in the present retrospective study, we examined patient data that were collected more than 2 weeks after stroke onset when stroke symptoms and remaining functions were considered to be stable. In addition, the patients' final swallowing condition was evaluated after completion of rehabilitation. We also applied the Dysphagia Severity Scale (DSS) instead of VFSS, which can evaluate the severity of swallowing dysfunction in all patients.[30-34] The aims of this study were to investigate the factors predicting recovery of COI and to develop a simple model to aid clinicians in determining the appropriate indications for PEG.

Materials and Methods

Study Design

This was a retrospective case-control study in which patients were divided into 2 groups based on their status of COI or ICOI at discharge from our convalescent rehabilitation ward. COI was defined as not requiring artificial nutrition via an enteric tube or parenteral route in addition to oral feedings. Patients who did not meet this definition were classified as having ICOI.

Participants and Setting

Our convalescent rehabilitation ward was designated by the Japanese Ministry of Health and Labor in October 2001 for the purpose of developing a patient's activities of daily living through intensive rehabilitative training by a multidisciplinary medical team.[35] In this program, discharge means completion of the rehabilitation phase.

Stroke survivors who were admitted to our ward from January 2009 to December 2015 were screened to determine their eligibility to participate in this study. Inclusion criteria were diagnosis of stroke with dysphagia and an initially placed PEG or NGT feeding at an acute care hospital. All of the patients were admitted to our ward between 2 and 8 weeks after diagnosis of stroke, which was confirmed by computed tomography or magnetic resonance imaging at an acute care hospital. We excluded patients who were diagnosed with subarachnoid hemorrhage, or epidural or subdural hematoma, because these types of stroke are likely to have a complex course of recovery over a longer period. Patients who had comorbidities that could affect swallowing function, such as neuromuscular disease, or pharyngeal or esophageal cancer, were also excluded.

All of the patients underwent rehabilitation by therapists and received care by trained nurses in our ward. Oral intake was started when the patient showed no aspiration on either VFSS or fiber optic endoscopic evaluation. The amount of nutrition and water was calculated by using the Harris–Benedict formula,[36] and body weight was monitored and maintained throughout hospitalization. The current study was approved by the Ethics Committee of Yawata Medical Center.

Variables and Outcome Measures

All the patients' demographic and clinical characteristics were recorded and evaluated by the trained multidisciplinary medical team in our ward. Age; sex; supratentorial or infratentorial lesion; initial or recurrent stroke; right, left, or bilateral brain injury; hemorrhage or infarction; time from onset to admission; and body mass index (BMI)[37] were compared between groups. DSS score[30-34] was evaluated on admission; the interclass reliability and validity of the DSS have been established in previous studies.[30-34] Scores of less than 7 signify the presence of