Risk Factors and Outcome of Dysphagia After an Acute Ischaemic Stroke

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Summary

Dysphagia occurs frequently after a stroke. It is a major problem as patients are at risk of malnutrition and aspiration pneumonia. We aimed to identify the risk factors for and outcome of dysphagia over the first one month after an acute ischaemic stroke. Patients with acute first-ever ischaemic stroke admitted to the medical ward of Hospital Universiti Kebangsaan Malaysia (HUKM) between July 2004 and December 2004 were prospectively examined. Observation was done using pre-defined criteria. Demographic data, risk factors, and type of stroke were recorded on admission. The assessment of dysphagia was made using standardized clinical methods. All patients were followed up for three months. One hundred and thirty four patients were recruited in the study. Fifty-five patients (41%) had dysphagia at presentation. This number was reduced to 29 (21.6%) patients at one month. Logistic regression analysis revealed that age of more than 75 years [OR 5.20 (95% CI 1.89 – 14.30)], diabetes mellitus [OR 2.91 (95% CI 1.07 – 7.91)] and MCA infarct [OR 2.48 (95% CI 1.01-6.14)] independently predicts the occurrence of dysphagia after an acute stroke. Dysphagia at presentation was found to be an independent predictor of mortality at one-month [OR 5.28 (95% CI 1.51-18.45)] post ischaemic infarct. Dysphagia occurred commonly in ischaemic stroke. Advance age, diabetes mellitus and large infarcts were independently associated with the presence of dysphagia. Early stroke mortality can be independently predicted by the presence of dysphagia.

Key Words: Stroke, Risk factors, Dysphagia, Death

Introduction

A vast number of neurologic impairments occur after an acute stroke, and this includes major tasks such as eating. This elementary exercise may be affected by visual, cognitive, perceptual and communication impairments; upper limb dysfunction; postural control; and dysphagia[1]. The exact prevalence of dysphagia varies in different studies depending on the selection criteria, methodology, and the timing of assessment after a stroke. A number of simple clinical assessments of swallowing function have been validated as predictors of aspiration. These have the advantages of being easy to perform in the emergency department, and are less invasive and cheaper[2]. An example is the water swallow test of 50–150 ml, which has been demonstrated to predict risk of aspiration with high sensitivity[3,4,5]. Mann et al[6] reported a clinical detection of 51% and 50% in comparison to 64% and 76% with video fluoroscopy, at presentation and at six months respectively. The sensitivity of this test can be increased by careful assessment of bulbar function with abnormalities of pharyngeal sensation (but not the gag reflex) and reduced cough reflex being particularly useful in detecting silent aspiration[1]. The natural history of dysphagia following an acute stroke is insufficiently understood. The juncture at which dysphagia becomes irrevocable is not clearly delineated. The majority is detected to revive rather swiftly, largely within a week. Involvement in some

areas of the brain is thought to be pivotal to development of dysphagia. They include the MCA territory, internal capsule, superior segment of the corona radiata, thalamus, and subinsular region. An investigation by Hamdy *et al* [7] established that swallowing has a bilateral cortical representation but with consistent interhemispheric asymmetry, which signify that in some patients the right hemisphere is 'dominant' for swallowing, whereas in other patients the left one is. Dysphagia can be a serious menace to a patient suffering from a stroke because of the possibility of aspiration pneumonia, malnutrition, dehydration, weight loss, and airway obstruction. The objectives of this study were to look at risk factors and outcome of dysphagia after an acute ischaemic stroke and to determine whether it predicts mortality.

Materials and Methods

We prospectively studied patients who were admitted consecutively with acute first-ever ischaemic stroke to the medical wards of Hospital Universiti Kebangsaan Malaysia, Kuala Lumpur. The recruitment period was from July 2004 to December 2004. Acute brain infarct is diagnosed clinically and confirmed by computed axial tomography of the brain. Dysphagia is diagnosed clinically on day 3 to 7 post-stroke to confirm dysphagia by using a standardised bedside "swallowing assessment". The assessment involved observing patients swallowing 5 ml aliquots (with a teaspoon) of plain water which can be done up to ten times. The presence of involuntary cough, change of voice and/or nasal regurgitation was defined as dysphagia[3]. A standardised data form was used to record the variables. Risk factors assessed/recorded are age, diabetes mellitus, hypertension, hypercholesterolaemia, smoking, and type of stroke. Nasogastric tubes were inserted to all patients with dysphagia until recovery. Patients were followed up prospectively at one month from the onset of stroke, with bedside swallowing test repeated on the next clinic visit. Persistence or recovery of dysphagia, as well as deaths in both groups was recorded. The goal was to recruit at least 40 patients with dysphagia to achieve calculated power of sample calculation (80%). The number of sample calculated using Pocock's formula[8]. The confidence interval was taken as 95% with 5% precision.

Inclusion criteria
All patients with acute ischaemic stroke (diagnosed clinically and confirmed by computed axial tomography of the brain).

Exclusion criteria
1. Patients with acute haemorrhagic stroke;
2. Patients with impaired level of consciousness or tracheal intubation;
3. Patients with previous history of stroke;
4. Patients with history of previous swallowing impairment or a medical condition that could affect swallowing function.

Statistical analysis
The independent variables included in this analysis were selected from the bivariate analysis with a 0.05 level as a screening criterion for selection of candidate variables. Multiple logistic regression techniques were used to identify independent predictors of dysphagia. Further, independent predictors were identified for death at the end of the study. All analyses were performed using SPSS 12.0 data analysis system.

Ethical consideration
This study was approved by the Research and Ethics committee of the Faculty of Medicine, UKM.

Results

A total of 134 patients were recruited into the study and followed up for the period of one month after a stroke. There were equal numbers of males and females. The mean age of the patients was 64.4 ± 10.9 years (range 35-87 years). Patients with dysphagia group tend to be older (67.5 ± 11.1 years vs. 62.3 ± 10.3 years) although this was not statistically significant (p = 0.60). The ethnic composition of the patients was as follows: 64 (47.8%) Chinese, 57 (42.5%) Malay, and 13 (9.7%) Indian. Demographic data and risk factors are shown in Table I. Out of the total 134 patients identified, 55 (41.0%) had dysphagia at initial clinical evaluation. All patients were assessed within 3 to 7 days of stroke presentation. Twenty-six patients with dysphagia regained the ability to swallow leaving 29 (21.6%) with persistent dysphagia at one month. Age more than 75, middle cerebral artery (MCA) territory infarcts and diabetes mellitus were found to be significant predictors of dysphagia (Table II). There were no interactions between the predictors. Seventeen patients (12.7%) died at the end of the study, 14 of which had dysphagia. In this study, dysphagia at presentation was found to be an independent predictor of death at one month [OR 5.28 (95% CI 1.51-18.45)] post ischaemic infarct (Table III).

Table I: Baseline characteristic of the study population

	Number	Percent (%)
Male	67	50
Malay	57	47.8
Chinese	64	42.5
Indian	13	9.7
Diabetes Mellitus	72	53.7
Hypertension	104	77.6
Smoking	40	29.9
Hyperlipidaemia	89	66.4
MCA infarct	53	39.6
ACA infarct	8	6.0
PCA infarct	10	7.5
Lacunar infarct	60	44.7

MCA: Middle cerebral artery
ACA: Anterior cerebral artery
PCA: Posterior cerebral artery

Table II: Multivariate analysis for predictors of dysphagia

	Odds Ratio	95% Confidence Interval	p value
Age > 75	5.20	1.89-14.30	0.001
Diabetes Mellitus	2.91	1.07- 7.91	0.04
Hypertension	1.24	0.39- 3.96	0.72
MCA infarct	2.48	1.01- 6.14	0.049

Table III: Multivariate analysis for predictors of one month mortality

	Odds Ratio	95% Confidence Interval	p value
Age > 75	2.03	0.65- 6.40	0.22
Dysphagia	5.28	1.51-18.45	0.01
Diabetes Mellitus	1.33	0.43- 4.10	0.62
Hypertension	0.71	0.19- 2.64	0.60
MCA infarct	0.85	0.28- 2.58	0.84

Discussion

There was equal number of male and female subjects in this study, which is similar to previous findings. There were no significant differences in the incidence of dysphagia or death between male and female patients.

The incidence of dysphagia in patients with first-ever ischaemic stroke at initial clinical evaluation in our study was found to be 41%. Past studies have reported a frequency in the range of 25 to 65%[6]. The variation can be expounded in these studies by the timing of swallowing assessment after stroke, the method of assessing swallowing function, the type of stroke, and the definition of dysphagia. Bedside clinical examination was also demonstrated in previous articles to underestimate the frequency of dysphagia when compared with video fluoroscopic examination. Notwithstanding, this method of examination has a number of constrain in its widespread usage, including both its unfeasibility in the acute period of stroke and its lack of general accessibility.

The incidence of dysphagia in this study at one month was 21.6%. The speech and language therapists' study produced figures of 31% and 33% at median days 1 and 7, dwindling to 3% at 1 and 6 months[9]. Another study related decrease in the number of patients with dysphagia from 51% at presentation to 27% at day 7, to 17% at one month and 11% at six months[10]. More often than not, swallowing dysfunction improves in due time. Previous data has also shown that if the swallowing has not improved by 10-14 days, it will take a mean of 69 days to improve[11].

Looking at the risk factors, age older than 75 years, diabetes mellitus and MCA infarct were predictors of dysphagia. The prevalence of swallowing difficulty increases with normal aging partly because of the increasing prevalence of structural changes in the swallowing apparatus[12]. There is a clear decline with age in both swallowing function and the average volume per swallow. With acute illness leading to general weakness the elderly lose the ability to compensate[13]. MCA infarcts are large infarcts and have more severe deficits. Therefore, the association with dysphagia is greater compared to smaller strokes like lacunar infarcts. The explanation on how diabetes mellitus is an independent predictor to dysphagia is unknown. These results should be taken with caution, as dysphagia tends to improve with time. A longer observation of post-stroke patients is needed to determine the predictors of persistent dysphagia. Nonetheless, predictors of early dysphagia are also important especially to support the deficit period to avoid complications such as malnutrition and aspiration pneumonia. Dysphagia was also found to be an independent predictor of death at one month [OR 5.28 (95% CI 1.51-18.45)] post-ischaemic infarct. This is a significant finding as complications of dysphagia, which leads to higher mortality, can be prevented if managed properly. Therefore, the use of nasogastric or percutaneous endoscopic gastrostomy (PEG) tube should be instituted promptly after the diagnosis of dysphagia has been determined. This study has reinforced the fact that assessment of dysphagia and subsequent nutritional support are important elements of stroke care[14].

Conclusion

Dysphagia after an acute stroke is common in the early stage and should be actively assessed. Advance age, diabetes mellitus and involvement of MCA territory infarcts are the independent risk factors for developing dysphagia. Assessed clinically, dysphagia was a significant predictor of death at one month.

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