

Incidence of Dysphagia in Acute Stroke Patients: An Early Screening and Management

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ABSTRACT

Introduction: In acute stroke dysphagia is a common complication associated with a risk of pneumonia and mortality. The primary aim of our study was to assess the incidence of dysphagia in acute stroke patients and analyze the benefits of early screening and management.

Materials and methods: A prospective cohort study was conducted in our center. A total of 100 acute stroke patients were seen. All patients were then assessed by Mann assessment of swallowing ability (MASA) for the presence of dysphagia and aspiration. Patients with dysphagia were then further evaluated by fiber-optic-endoscopic evaluation of swallowing (FEES), stroke severity was assessed by National Institutes of Health Stroke Scale (NIHSS) score and location of stroke was done on the basis of CT scan of the brain.

Results: Dysphagia was seen in 53 patients of acute stroke. FEES and swallowing therapy were done in 39 of dysphagia patients. The 3 parameters considered in FEES were penetration aspiration scale, secretion rating scale and residue rating scale. In patients with mild dysphagia compensatory strategies were given whereas in patients with moderate to severe dysphagia both compensatory and rehabilitative were given. Improvement was seen in our patients after swallowing therapy.

Conclusion: The incidence of dysphagia in acute stroke patients was 53%. MASA scale helped in early detection of dysphagia. FEES and appropriate swallowing therapy played a significant role in improving the outcome of our patients.

Keywords: Dysphagia, FEES, Swallowing therapy.

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INTRODUCTION

In acute stroke, dysphagia is a common complication associated with a risk of pneumonia and mortality. It is also associated with dehydration, malnutrition, and prolonged hospital stay. In recent years, there have been advances in stroke management resulting in reduced morbidity and mortality. We analyzed the incidence of dysphagia in stroke patients, and the effect of early screening and timely management in alleviating complications associated with it.

MATERIALS AND METHODS

A prospective cohort study was conducted in our tertiary care center with approval from the Local Ethics Committee. Patients with acute stroke admitted in the medicine ward between May 2019 to November 2019 were evaluated. A total of 100 patients were seen. Patients with ischemic stroke or intracerebral hemorrhage admitted within 72 hours after the onset of symptoms, with a National Institutes of Health Stroke Scale (NIHSS) score ≥ 3 were included in the study. The comatose patients, recurrent stroke cases, and patients with other neurological problems such as brain tumor, Alzheimer's disease, Parkinson's disease, and multiple sclerosis were excluded from the study.

All patients were then assessed by Mann Assessment of Swallowing Ability (MASA) for the presence of dysphagia and aspiration. Patients were divided into two groups on the basis of MASA score, a score of 177 points or less was considered as having dysphagia^{1,2} and those having 178 or more were considered as normal swallowing. A score of less than 148 was considered to be high risk for aspiration, and a nasogastric tube was inserted in these patients. Patients with dysphagia were then further evaluated by:

- Fiber-optic endoscopic evaluation of swallowing (FEES):³ We performed this procedure along with our speech and

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language pathologist in which various maneuvers could be elicited on patients to assess which method would be more helpful in improving their symptom. During FEES, we closely monitored SPO₂ (oxygen saturation) of our patients. The three scales considered were penetration aspiration scale, secretion rating scale, and residue rating scale. According to the severity of score, patients were given compensatory and rehabilitative swallowing therapy.

- Stroke severity was assessed by NIHSS score.
- Location of stroke was done on the basis of computed tomography (CT) scan of the brain.

The primary aim of our study was to assess the incidence of dysphagia in acute stroke patients and analyze the benefits of early screening and management.

Statistical Analysis

Data were expressed as number (%) and compared using Wilcoxon signed-rank test. The two groups (patients with dysphagia vs

patients with normal swallowing ability) were compared using percentage. The various parameters examined in dysphagia group of patients were baseline NIHSS score, infarct location (anterior vs posterior cerebral circulation), severity of dysphagia and aspiration using MASA, percentage of patients who underwent FEES and swallowing therapy, and improvement seen in patients after therapy was seen on the basis of score.

RESULTS

A total of 100 consecutive patients with acute stroke were included in our study. Dysphagia was seen in 53 patients. According to CT scan of the brain, 84.9% (45) of the patients had anterior cerebral circulation stroke, 9.4% (5) had posterior cerebral circulation stroke, and 5.7% (3) had stroke in both territories. The severity of dysphagia and aspiration was assessed by means of MASA score. NIHSS was used to assess the severity of stroke in patients with dysphagia. FEES and swallowing therapy were done in 39 patients with dysphagia (FEES: $Y = 39/53 = 73.58\%$; swallowing therapy $y = 39/53 = 73.58\%$). In patients with mild dysphagia, compensatory strategies, such as postural adjustments and altering bolus characteristics (consistency, viscosity, volume of bolus, temperature, taste), were given, whereas in patients with moderate to severe dysphagia both compensatory and rehabilitative approaches, such as Masako

maneuver, supraglottic swallow and super supraglottic swallow (breath hold), Mendelsohn maneuver, and Shaker's maneuver and increased sensory input were given.

In patients with dysphagia, who underwent FEES and swallowing therapy, the following improvements were seen on the basis of various scores. The parameters considered were Penetration-Aspiration Scale, Secretion Rating Scale, and Residue Rating Scale.

- In penetration-aspiration scale (Table 1):⁴ our patients with dysphagia before swallowing therapy were in scale 3–7 which meant moderate to severe symptom but after the therapy 57.1% of our patients improved and was in scale 2 (Fig. 1). Data were expressed as number (%). Using Wilcoxon signed-rank test, significant reduction was seen with a $p < 0.001$ (Table 2).
- Secretion-rating scale (SRS):⁵ before swallowing therapy 33.3% of our patients were in scale 4 which meant laryngeal penetration but after therapy 34.3% of our patients improved to scale 1 and 22.9% of our patients did not have any pooling of secretion (Fig. 2). Data were expressed as number (%). Using Wilcoxon signed-rank test significant reduction was seen with a $p < 0.001$ (Table 3).
- Residue-rating scale (RRS):⁶ before swallowing therapy our patients had coating of pharyngeal mucosa to severe residues but after therapy 51.4% of our patients improved and did

Table 1: Penetration-aspiration scale (PAS)

1. Material does not enter the airway.
2. Material enters the airway, remains above the vocal folds, and is ejected from the airway.
3. Material enters the airway, remains above the vocal folds, and is not ejected from the airway.
4. Material enters the airway, contacts the vocal folds, and is ejected from the airway.
5. Material enters the airway, contacts the vocal folds, and is not ejected from the airway.
6. Material enters the airway, passes below the vocal folds, and is ejected into the larynx or out of the airway.
7. Material enters the airway, passes below the vocal folds, and is not ejected from trachea despite efforts.
8. Material enters the airway, passes below the vocal folds, and no effort is made to eject.

Table 2: According to penetration-aspiration scale (PAS) severity of symptoms before therapy and improvement seen after swallowing therapy

PAS	Before therapy	After therapy
1	0 (0.0%)	0 (0.0%)
2	0 (0.0%)	20 (57.1%)
3	14 (35.9%)	9 (25.7%)
4	10 (25.6%)	0 (0.0%)
5	9 (23.1%)	5 (14.3%)
6	5 (12.8%)	0 (0.0%)
7	1 (2.6%)	1 (2.9%)
8	0 (0.0%)	0 (0.0%)
Total	39 (100.0%)	35 (100.0%)

Wilcoxon signed-rank test
 $Z = 5.3$, S , $p < 0.001$

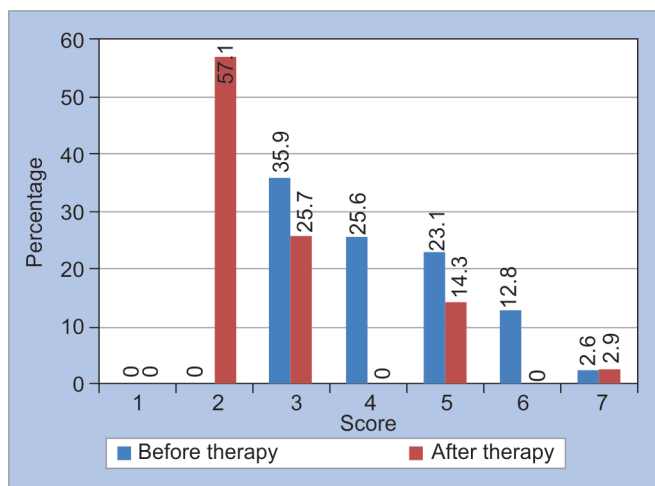


Fig. 1: Improvement in symptoms seen in penetration-aspiration scale after swallowing therapy

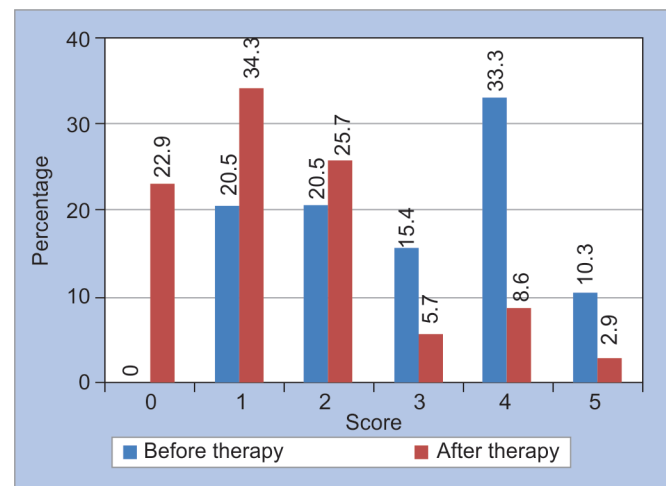
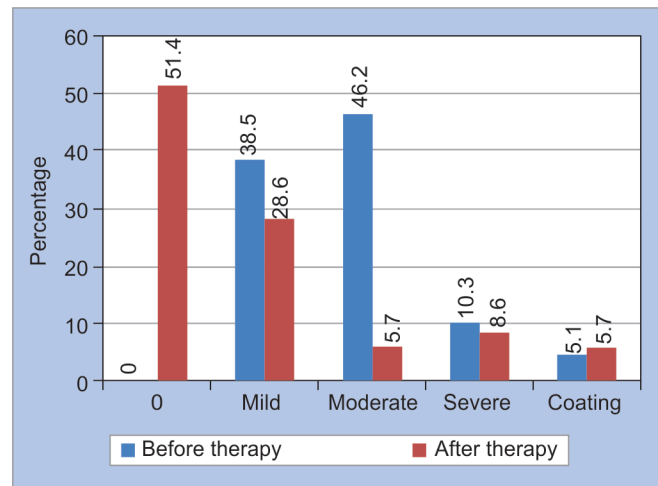


Fig. 2: Improvement in symptoms seen in secretion-rating scale after swallowing therapy

Table 3: According to secretion-rating scale (SRS) severity of symptoms before therapy and improvement seen after swallowing therapy

SRS	Before therapy	After therapy
0	0 (0.0%)	8 (22.9%)
1	8 (20.5%)	12 (34.3%)
2	8 (20.5%)	9 (25.7%)
3	6 (15.4%)	2 (5.7%)
4	13 (33.3%)	3 (8.6%)
5	4 (10.3%)	1 (2.9%)
Total	39 (100.0%)	35 (100.0%)

Wilcoxon signed-rank test
 $Z = 5.3$, S , $p < 0.001$

**Fig. 3:** Improvement in symptoms seen in residue-rating scale after swallowing therapy

neither have residues nor coating of mucosa (Fig. 3). Data were expressed as number (%). Using Wilcoxon signed-rank test significant reduction was seen with a $p < 0.001$ (Table 4).

DISCUSSION

- The frequency of dysphagia after stroke varies from 20 to 80%.⁷⁻⁹ In our study, the incidence of dysphagia was 53%, which corresponds to the incidence found in literature.
- Theoretically, posterior circulation or brainstem strokes should be mainly associated with dysphagia since the swallowing centers of nucleus tractus solitarius, nucleus ambiguus, and the reticular formation is located in dorsolateral medulla oblongata, but studies have shown anterior circulation strokes affecting the frontal and insular cortex have the highest frequency of dysphagia. This is so because these regions control the planning and execution of swallowing or pharyngeal peristalsis resulting in prolonged dysphagia.⁸ Brainstem lesions impaired oropharyngeal sensation, laryngeal elevation, and timing of pharyngeal swallow resulting in dysphagia.^{8,9} In our study 84.9% of dysphagia patients had anterior circulation stroke and 9.4% had posterior cerebral circulation stroke.
- According to Okubo et al.,¹⁰ 87.5% patients with dysphagia had NIHSS scores ≥ 12 and 12.5% had scores of 10 and 11, whereas in our study majority of our patients with dysphagia had mild stroke 84.9%.

Table 4: According to residue-rating scale (RRS) severity of symptoms before therapy and improvement seen after swallowing therapy

RRS	Before therapy	After therapy
0	0 (0.0%)	18 (51.4%)
Mild	15 (38.5%)	10 (28.6%)
Moderate	18 (46.2%)	2 (5.7%)
Severe	4 (10.3%)	3 (8.6%)
Coating	2 (5.1%)	2 (5.7%)
Total	39 (100.0%)	35 (100.0%)

Wilcoxon signed-rank test
 $Z = 3.8$, S , $p < 0.001$

- Studies have shown a higher risk of pneumonia and aspiration in stroke patients with dysphagia with an incidence ranging from 22 to 47% which further increased hospital stay and expenditure.^{11,12} In our study, none of our patients had pneumonia.
- To assess the severity of dysphagia and aspiration, MASA score was taken, 67.9% of our patients had mild dysphagia and 32.1% had moderate dysphagia, whereas 56.6% had mild aspiration and 43.4% had moderate aspiration. Patients with MASA score less than 178 were advised FEES. The three parameters considered were penetration-aspiration scale, secretion-rating scale, and residue-rating scale. Thirty-nine percent of our patients underwent FEES and swallowing therapy was given according to the findings seen in FEES.
- Swallowing therapy in our patients helped in preventing complications and improving their symptoms.

CONCLUSION

The incidence of dysphagia in acute stroke patients was 53%. Anterior cerebral circulation stroke was seen in 84.9% of the patients with dysphagia. Bedside screening using MASA scale helped in early detection of dysphagia. FEES and appropriate swallowing therapy played a significant role in improving the outcome of our patients. Hence early detection of dysphagia in patients with acute stroke reduces complications associated with stroke, thus reducing length of hospital stay and overall healthcare expenditures.

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