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Original Article

Role of Swallowing Therapy in Preventing Aspiration Pneumonia in Patients with Stroke having Dysphagia

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ABSTRACT

Objective: To compare the effectivity of swallowing therapy in prevention of aspiration pneumonia in patients with acute stroke with dysphagia admitted to the Intensive Care Unit.

Study Design: Prospective comparative study.

Place and Duration of Study: Department of Rehabilitation Medicine, Fauji Foundation Hospital, Rawalpindi Pakistan, from Jun-Dec 2023

Methodology: A total of 120 patients were recruited, patients were randomly divided into two groups. Group-S (n=60) receivied swallowing therapy and Group-N (n=60) received standard nursing care for oral feed according to institutional protocol. Primary variables studied were median scores of the Functional Oral Intake Scale (FOIS) (Scored 1-7) and Swallow Function Score System (SFSS) (Scored 0-6) evaluated every day and complied after 10 days along with incidence of aspiration pneumonia and necessity to shift to NG feed in case of complete oral feed failure.

Results: Median functional oral intake scale was 4.00 (0.00) in Group-N versus 6.00 (0.00) in Group-S (p<0.001). Median swallow function score system was 4.00 (1.00) in Group-N versus 5.00 (0.00) in Group-S (p<0.001). The incidence of aspiration pneumonia was seen in 20(33.3%) patients in Group-N versus 05(8.3%) patients in Group-S (p=0.001). Patients shifted to nasogastric feed following oral intake failure were 20(33.3%) patients in Group-N versus 02(3.3%) patients in Group-S.

Conclusion: The swallowing therapy results in early and effective initiation of oral feed with decreased need for nasogastric feeding resulting in reduced duration of hospital stay in selected patients having stroke with dysphagia.

Keywords: Aspiration, dysphagia, Pneumonia, Swallowing, stroke, Therapy.

How to Cite This Article: *Nauman B, Tassadaq N. Role of Swallowing Therapy in Preventing Aspiration Pneumonia in Patients with Stroke having Dysphagia. Pak Armed Forces Med J 2025; 75(1): 163-167. DOI: https://doi.org/10.51253/pafmj.v75i1.12508*

INTRODUCTION

Acute stroke is one of the commonest indications for admission in the intensive care unit.[1] According to Global Burden of Disease (GBD) it is the second leading cause of death and third leading cause of disability worldwide.[2] The burden for disease is more in the developing world and it is estimated that low income and poor resource countries would witness the highest burden of stroke in the next decade due to poor treatment of risk factors ultimately leading to a cerebrovascular accident.[3] With the increasing incidence being observed even in the younger age groups, the disease presents a considerable burden and standardization of treatment strategies for effective patient care.

Acute stroke presents with a diverse set of signs and symptoms. Decreased neurological status, fits, aspiration, weakness of the upper and/or lower limbs, visual disturbances and speech disorders are the most common.[4] Dysphagia post-stroke presents a considerable dilemma in patients with stroke resulting in poor feeding, weight loss, increased hospital stay and poor patient compliance.[5] The need for nasogastric tube is often warranted even in patients who can tolerate oral feeding which is not in line with present guidelines preferring oral feed to nasogastric if possible and tolerated. Literature supports the increased incidence of aspiration pneumonia in patients with dysphagia after an episode of acute stroke.[6] This is a catastrophic complication which increases mortality in patients who are already debilitated and neurologically compromised. Studies also state that nasogastric (NG) feeding is also associated with considerable incidence of aspiration pneumonia.[7]

Studies support the employment of swallowing therapy in the early post-stroke rehabilitation plan and a multidisciplinary team trained in the process can help stroke patients with dysphagia in early oral feeding and decreasing the incidence of aspiration pneumonia. The practice has been in vogue internationally but needs to be implemented in our healthcare setups supported by evidence based local studies for which this study is designed. This study

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Received: 25 Jul 2023; revision received: 20 Sep 2024; accepted: 23 Sep 2024

aimed to explore the effectivity of swallowing therapy in preventing aspiration pneumonia in patients with acute stroke with dysphagia admitted to the ICU (intensive care unit) when compared with standard nursing care without swallowing therapy.

METHODOLOGY

This prospective comparative study was carried out at the Department of Re-habilitation Medicine, Fauji Foundation Hospital (FFH) Pakistan, from Jun-Dec 2023 after approval from the ethical review board (vide letter no. 711/ERC/FFH/RWP Dated 24/07/2023). Sample size was calculated keeping the proportion of aspiration pneumonia in patients having dysphagia post-stroke at 33.3% without employing swallowing training and 6.3% with swallowing training employed.[8] Minimum sample size came out to be 31 patients according to WHO calculator. We included 60 patients in each group making a total of 120 patients in the final study protocol using non-probability consecutive sampling.

Inclusion Criteria: Patients with acute stroke (<72 hours) admitted to the ICU for observation diagnosed with dysphagia using the standard modified water swallowing test score (score <3 taken as positive for risk of aspiration pneumonia),[9] were included in the study.

Exclusion Criteria: Patients with a low GCS score (<8), drowsy patients not oriented in time, place and person, patients on nasogastric feed before admission, Patients on ventilatory support, Patient with profound hemodynamic compromise (on ionotropic support) were excluded.

They recruited patients were divided into Group-S (n=60) receiving swallowing therapy and Group-N (n=60) receiving standard nursing care for oral feed according to institutional protocol. Patients in Group-S received swallowing therapy by a multi-disciplinary team which included an intensivist, rehabilitation specialist, psychiatrist, nutritionist and trained nurse with experience and certification for swallowing therapy. Patients were initially assessed for risk of aspiration due to dysphagia by using the modified water swallowing test score in which patients were placed in the supine position and asked to swallow water using a syringe of 3, 5, 7 and 10 ml aliquots of water if the previous volume was tolerated. Cough, inability to swallow and grunting signified poor swallowing and risk of aspiration. The Patients having a score of less than 3 were included in one of the two study groups. Since the study protocol couldn't allow blinding of the patients or the consultant and staff involved, data analysis and final assessment was done by independent investigators with data filled on non-descript forms who were unaware of the study protocol.

Standard conventional swallowing therapy in patients included techniques for food intake along with modification in the consistency and boluses of food given to the patients. It included oromotor sensory stimulation, the Mendelsohn maneuver, supra- glottic swallow, range of motion exercise/ oromotor strengthening, chin down/chin tuck, head turn to the weak side and tilt to the sound side, effortful swallow, and cough training.[10] Head was inclined at 60 degrees in all cases in both groups before starting oral feeds. First follow up scoring after starting the therapy was done daily and complied after 10 days and Functional Oral Intake Scale (FOIS) (Scored 1-7) and Swallow Function Score System (SFSS) (Scored 0-6) was compared between both groups.[11] The higher the score, the better tolerability to oral feeds. Both these scores are standard scoring systems comparing the improvement in fluid and food intake in patients with dysphagia. Patients in the standard nursing care group were given oral fluids and food under supervised guidance as per institutional protocol. Failure to oral intake on more than three consecutive feeding cycles was considered failure and patients were shifted to NG feed and data endorsed and noted. Aspiration pneumonia and its incidence during feeding cycles in both groups was diagnosed through signs and symptoms of cough, wheeze, drooling, tachypnea, tachycardia and confirmed by chest radiograph.

Primary variables studied were median scores of the FOIS and SFSS scores evaluated every day and complied after 10 days along with incidence of aspiration pneumonia and necessity to shift to NG feed in case of complete oral feed failure.

Demographic data were statistically described in terms of Mean±SD, frequencies, and percentages when appropriate. Independent samples t-test was used to compare statistically significant means. Median scores was compared using the Mann Whitney U test. Chi-square test was used to compare frequency variables. A *p*-value of ≤0.05 was considered statistically significant. All statistical calculations were performed using Statistical Package for Social Sciences (SPSS) 26.0.

RESULTS

A total of 120 patients were analyzed in the final study protocol divided into Group-N (n=60) and Group-S (n=60). Mean age of patients in Group-N was 68.63±1.81 years versus 68.62±1.64 years in Group-S (p=0.958). Mean weight was 68.97±4.48 kg in Group-N versus 68.27±4.34 kg in Group-S (p=0.387). Gender distribution revealed 24(40%) males and 36(60%) females in Group-N versus 22(36.7%) males and 38(63.3%) females in Group-S (p=0.707). When studied for the type of stroke in both groups, 47(78.3%) patients in Group-N had an ischemic stroke versus 45(75%) in Group-S and 13(21.7%) had a hemorrhagic stroke in Group-N versus 15(25%) in Group-S (p=0.666). Location of lesion in the brain showed 34(56.7%) patients in Group-N having the lesion in the right hemisphere with 33(55%) patients having it in the right hemisphere in Group-S. 21(35%) patients in Group-N had it in the left hemisphere versus 21(35%) in Group--S. Brainstem lesion was seen in 05(8.3%) patients in Group-N versus 06(10%) patients in Group-S (p=0.948) (Table-I). Major problems seen on admission in the ICU showed 20(33.3%) patients having a major neurological deficit in Group-N versus 22(36.7%) in Group-S. History of fits was given by 10(16.7%) patients in Group-N versus 10(16.7%) patients in Group-S. Dysarthria was seen in 10(16.7%) patients in Group-N versus 07(11.7%) patients in Group-S. Reduced tongue movement was seen in 14(23.3%) patients in Group-N versus 14(23.3%) patients in Group-S. Impaired laryngeal elevation on examination was seen in 06(10%) patients in Group-N versus 07(11.7%) patients in Group-S (Table-I).

Table-I: Demographic Characteristics of the Study Groups (N=120)

Variable	GROUP-N (n=60)	GROUP-S (n=60)	*p*-value
Mean Age (Years)	68.63±1.81	68.62±1.64	0.958
Mean Weight (KG)	68.97±4.48	68.27±4.34	0.387
Gender			
Male	24.0(40%)	22.0(36.7%)	0.707
Female	36.0(60%)	38.0(63.3%)	
Type of Stroke			
Ischaemic	47.0(78.3%)	45.0 (75%)	0.666
Hemorrhage	13.0(21.7%)	15.0 (25%)	
Location of Lesion			
Right Hemisphere	34.0(56.7%)	33.0 (55%)	0.948
Left Hemisphere	21.0(35%)	21.0 (35%)	
Brain Stem	05.0(8.3%)	06.0 (10%)	
Problems at Presentation			
Major Neurological Deficit	20.0(33.3%)	22.0(36.7%)	
History of Fits	10.0(16.7%)	10.0(16.7%)	
Dysarthria	10.0(16.7%)	07.0(11.7%)	
Reduced Tongue Movement	14.0(23.3%)	14.0(23.3%)	
Impaired Laryngeal Elevation	06.0(10%)	07.0(11.7%)	

When observing the primary variables, mean stay in the ICU was 14.40±1.25 days in Group-N versus 14.47±1.26 days in Group-S (p=0.772). Median functional oral intake scale was 4.00 (0.00) in Group-N versus 6.00 (0.00) in Group-S (p<0.001). Median swallow function score system was 4.00 (1.00) in Group-N versus 5.00 (0.00) in Group-S (p<0.001). The incidence of aspiration pneumonia was seen in 20(33.3%) patients in Group-N versus 05(8.3%) patients in Group-S (p=0.001). Patients shifted to nasogastric feed following oral intake failure were 20(33.3%) patients in Group-N versus 02(3.3%) patients in Group-S (p<0.001) (Table-II).

Table-II: Comparison of Primary Variables Between Both Groups (n=120)

Variable	GROUP-N (n=60)	GROUP-S (n=60)	*p* - value
Mean Stay in the ICU (Days)	14.40±1.25	14.47±1.26	0.772
Median Functional Oral Intake Scale	4.00(0.00)	6.00(0.00)	<0.001
Median Swallow Function Score System	4.00(1.00)	5.00(0.00)	<0.001
Incidence of Aspiration Pneumonia	20.0(33.3%)	05.0(8.3%)	0.001
Shifted to Nasogastric Feed After Oral Intake Failure	20.0(33.3%)	02.0(3.3%)	<0.001

DISCUSSION

The swallowing therapy was found to be effective and successful in decreasing the incidence of aspiration pneumonia as well as improving the swallowing scores in our patients under study. We carried out this study in our demographic setup to look for alternative methods for effective oral feeding in post-stroke patients and decreasing the reliance on NG feed whenever possible. Early feeding has been proposed to promote gut motility, healing of gut flora, and increasing immunity in already debilitated and immunocompromised individuals with co-morbidities and extremes of ages. We want to use simple, effective, and reproducible methods to promote oral feeding and train staff for the same for better patient outcome.

The mean age for stroke seen in our study groups was in the late sixties and early seventies. This is in line with the mean age seen for stroke in susceptible individuals according to international and national literature.[12-14] There was a female predilection in both groups which is also in line with studies which show that females are more prone to have stroke in the later age groups than males. This is also attributed to hormonal changes post-menopause making them more susceptible to cerebrovascular accidents.[15] Ischemic stroke was the most common type seen in

both age groups when compared with hemorrhagic stroke which supports the international literature as well.[16] When the site of lesion was identified in our study group, the right hemisphere was where most of the lesions were identified. Major problems on admission showed that low GCS, history of drowsiness and fits were the most common presenting complaints seen.[17]

Mean stay in the ICU was similar and comparable in both groups with nearly all patients requiring around 2 weeks of care in the ICU to be able to be stepped down to the HDU (high dependency unit) or neuro ward according to the condition warranted. Primary variables including the Functional Oral Intake Score (FOIS) and Swallow Function Score System (SFSS) favored swallowing therapy as an excellent adjunct to the overall care and plan to start early oral feeds in the study group. The FOIS is an excellent validated score to check for the quality of oral intake both for solids and fluids strengthened by the SFSS score.[18] It goes to show that when properly applied with trained staff, early oral feed can be initiated successfully in patients with a favorable GCS and those not on hemodynamic supports which would result in early discharge and decreasing the hospital burden of keeping patients admitted just for the need for NG feeding.[10]

Since the oral intake scoring systems showed marked improvement once swallowing therapy was initiated, consequently the incidence of aspiration pneumonia was decreased significantly in the swallowing therapy group. The incidence decreased from around 33% in the conventional oral feeding group to around 8 percent in the swallowing therapy group. The need to NG feed was also statistically decreased significantly. The incidence is statistically as well as clinically significant and in line with literature on the same,[5,19] Our study is the first of its kind in our demographic area to promote and recommend swallowing therapy in selected stroke patients with dysphagia resulting in decreased need for NG feed and less incidence of aspiration pneumonia.

RECOMMEDATIONS

The study recommends early initiation of swallowing therapy in selected post-stroke patients with dysphagia resulting in decreased incidence of aspiration pneumonia.

CONCLUSION

The swallowing therapy results in early and effective initiation of oral feed with decreased need for nasogastric feeding in selected patients having post-stroke with dysphagia.

Conflict of Interest: None.

Funding Source: None.

Authors Contribution

Following authors have made substantial contributions to the manuscript as under:

BN & NT: Conception, study design, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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