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Prevalence of Aspiration Pneumonia in Stroke Patients – A Descriptive Cross Sectional Study

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Abstract

Background: Aspiration pneumonia is a significant post-stroke complication leading to increased morbidity and mortality. Understanding its prevalence and associated risk factors is crucial for improving patient management and outcomes.[1]

Methods: A descriptive cross-sectional study was conducted at the Postgraduate Department of General Medicine, Government Medical College, Srinagar, over two years. 200 stroke patients were enrolled to assess aspiration pneumonia prevalence, demographic influences, radiological findings, and associated mortality rates. Statistical analysis was performed using SPSS Version 20.0, with Chi-square test and Student's t-test applied.[2]

Results: The mean age of enrolled patients was 62.99 ± 9.47 years, with 81.5% males and 18.5% females. Hypertension (40.5%) was the most common comorbidity. 42.5% of patients developed aspiration pneumonia, with its prevalence slightly higher in hemorrhagic strokes (43.15%) than ischemic strokes (41.91%), though the difference was statistically insignificant (p = 0.486). Mortality among aspiration pneumonia patients was 51.8%, reinforcing its severe impact.

Conclusion: Aspiration pneumonia remains a major concern in stroke patients, particularly in the elderly and those with compromised neurological function. Routine screening and preventive strategies, including early dysphagia management and positioning techniques, are crucial to reducing mortality and morbidity.

Keywords: Stroke, Aspiration pneumonia, Dysphagia, Mortality, Risk factors

Introduction

Stroke is a leading cause of disability and mortality worldwide, with complications such as aspiration pneumonia contributing significantly to poor outcomes. Stroke-induced neurological impairments affect swallowing mechanisms, increasing the risk of pulmonary aspiration. Despite its clinical significance,

there is limited data on aspiration pneumonia prevalence among stroke patients in this region, warranting further investigation.

This study aims to evaluate aspiration pneumonia prevalence, associated risk factors, and mortality rates in stroke patients. Identifying high-risk groups will enable targeted preventive strategies, improving overall patient outcomes.

Materials and Methods Study Design and Setting

A descriptive cross-sectional study was conducted in the Postgraduate Department of General Medicine, Government Medical College, Srinagar, over two years, following institutional ethical approval.

Inclusion Criteria

1. Stroke patients aged 40-80 years
2. Diagnosed cases of ischemic or hemorrhagic stroke
3. Patients with any level of consciousness (GCS score ≤15)

Exclusion Criteria

1. History of lung disease, pulmonary edema, or chronic heart failure
2. Patients with neurological disorders causing swallowing dysfunction (e.g., MND, Myasthenia gravis).
3. Stroke mimicking conditions like hypoglycemia, encephalopathy

Data Collection

- Patients were assessed using structured proforma, including:
- Demographic details (Age, Gender, Occupation)
- Neurological status (Glasgow Coma Scale, Stroke type)
- Radiological findings (CT Brain, Chest X-ray, HRCT)
- Presence of aspiration pneumonia, confirmed via clinical symptoms and imaging

Statistical Analysis

- Data was compiled in Microsoft Excel and analyzed using SPSS Version 20.0 (SPSS Inc., Chicago, USA).
- Chi-square test & Fisher's exact test were used for categorical variables.
- Student's independent t-test & Mann-Whitney U-test were applied for continuous variables
- A p-value < 0.05 was considered statistically significant

Results

Demographic Findings

- Mean age: 62.99 ± 9.47 years
- Gender distribution: Male – 81.5%, Female – 18.5%
- Most common comorbidity: Hypertension + Type 2 Diabetes (40.5%)

Aspiration Pneumonia Prevalence

- 42.5% of stroke patients developed aspiration pneumonia
- Higher prevalence in hemorrhagic strokes (43.15%) compared to ischemic strokes (41.91%) (p = 0.486)
- Significant association between older age and aspiration pneumonia risk (p = 0.012)

Radiological Findings

- Chest X-ray: Right-sided lung infiltrates were common (27.5% of cases)
- HRCT Chest: Ground glass opacities and consolidations detected in 42.5% of cases

Mortality Analysis

- All deaths (22% of total patients) occurred in aspiration pneumonia cases
- Mortality rate among aspiration pneumonia patients: 51.8%

Discussion

Aspiration pneumonia remains a significant complication among stroke patients, particularly in the elderly, males, and those with neurological impairment. The disruption of swallowing mechanisms following a stroke increases the risk of aspiration, leading to respiratory infections and worsening clinical outcomes. Identifying the prevalence and associated risk factors is crucial to improving patient care and reducing mortality rates.

Advanced age appears to be a strong predictor of aspiration pneumonia development. Elderly individuals often experience weakened protective reflexes, diminished muscle strength, and reduced immunity, making them more susceptible to pulmonary infections. Stroke further exacerbates these vulnerabilities by impairing coordination between swallowing and airway protection. Studies have consistently shown that older adults, particularly those above sixty years, are at higher risk of developing dysphagia and subsequent aspiration. This aligns with previous findings indicating that stroke survivors in this age group have significantly increased rates of aspiration-related complications, reinforcing the importance of early screening and preventive measures.

In this study, aspiration pneumonia was observed slightly more frequently in hemorrhagic stroke patients compared to those with ischemic stroke, though the difference was not statistically significant. Hemorrhagic strokes tend to cause larger lesions with more profound neurological deficits, potentially affecting the brainstem regions responsible for swallowing control. As a result, these patients may experience more severe dysphagia, increasing their likelihood of aspiration. However, the lack of statistical significance suggests that aspiration pneumonia is a concern in both stroke types, emphasizing the need for equal vigilance in monitoring all stroke patients for signs of dysphagia and respiratory complications.

Gender differences in aspiration pneumonia prevalence were also noted, with males being more commonly affected. This may be linked to a higher baseline stroke risk, with males frequently exhibiting hypertension, diabetes, and smoking history, all of which contribute to stroke severity and post-stroke complications. While stroke incidence tends to be higher in males, lifestyle factors may also play a role in their increased susceptibility to aspiration events. Dietary habits, alcohol consumption, and delayed healthcare-seeking behavior are potential contributors to this trend, highlighting the need for targeted interventions based on patient demographics.

Radiological findings provide valuable insight into the progression of aspiration pneumonia. In this study, predominant lower-lobe infiltrates were observed, consistent with the gravity- dependent aspiration pattern typically seen in stroke-induced dysphagia. Chest X-rays frequently revealed right-sided lung involvement, a well-documented phenomenon due to the anatomical structure of the right bronchus, which makes it more prone to aspiration-related infections. High-resolution computed tomography further confirmed significant pulmonary involvement, with evidence of multifocal consolidations and ground-glass opacities in dependent lung regions. This reinforces the importance of early imaging in detecting aspiration-related changes before they develop into severe respiratory complications.

The impact of aspiration pneumonia on mortality was evident, with over fifty percent of affected patients succumbing to the condition. This finding aligns with previous studies highlighting aspiration pneumonia as one of the leading causes of death among stroke patients. In addition to increasing mortality rates, aspiration

pneumonia significantly prolongs hospital stays and contributes to increased healthcare costs and dependency on assisted care.

The severity of its impact underscores the necessity of structured interventions aimed at reducing aspiration risks. Routine swallow assessments, modified diets, and respiratory monitoring play a pivotal role in preventing aspiration events, particularly in high-risk patients.

Future research should focus on refining preventive protocols and optimizing stroke patient management. Larger multi-center studies could provide deeper insights into the effectiveness of dysphagia screening methods and rehabilitation strategies. Techniques such as fiberoptic endoscopic evaluation and video fluoroscopy could enhance early detection, improving timely intervention rates. Special attention should be given to stroke survivors with comorbid conditions, as their risk of aspiration pneumonia is often compounded by underlying metabolic disturbances and cardiovascular impairments. Investigating the efficacy of

Advanced rehabilitation techniques, including neuromuscular retraining, could help enhance swallow function and airway protection, ultimately reducing aspiration risks.

Implementing structured preventive measures in routine clinical practice can significantly improve stroke outcomes. Early intervention through targeted swallow assessments, dietary modifications, and head positioning strategies can help minimize aspiration risks. Collaborative efforts between neurologists, pulmonologists, and rehabilitation teams are essential to ensure comprehensive post-stroke care. By prioritizing preventive strategies and individualized patient management, healthcare providers can effectively reduce aspiration pneumonia-related morbidity and mortality, improving overall recovery and long-term prognosis for stroke survivors.

Conclusion

Aspiration pneumonia significantly impacts stroke recovery and survival rates. Routine swallow screenings, early rehabilitation, and respiratory support should be integral components of post-stroke care.

- Preventive strategies (Head positioning, swallow therapy, modified diets) can reduce aspiration events.
- Multidisciplinary collaboration between neurologists, pulmonologists, and rehabilitation teams can optimize stroke outcomes.
- Future studies should evaluate long-term preventive measures for aspiration pneumonia in stroke patients.

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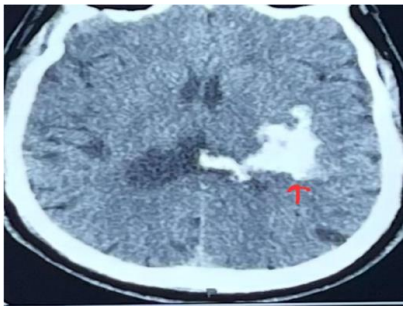
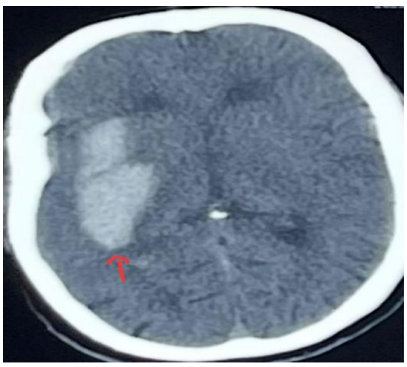
NCCT Head Imaging In Stroke Patients

Figure A:



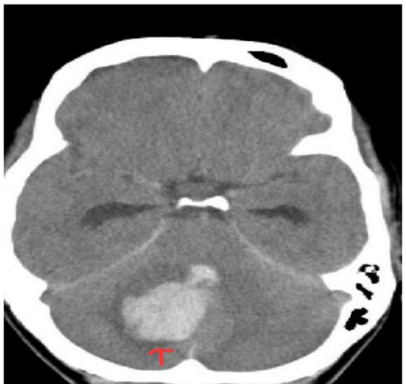
NCCT Head shows Hyper density in left capsuloganglionic area s/o Intra cerebral Hemorrhage (Left Capsuloganglionic bleed with Intra ventricular extension

Figure B:



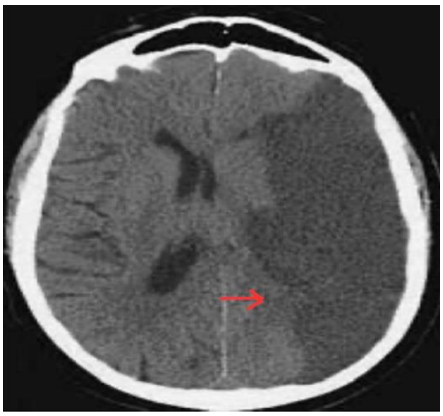
NCCT Head shows Hyper density in Right Capsuloganglionic region s/o Intra cerebral Hemorrhage (Right Capsuloganglionic Bleed)

Figure C:



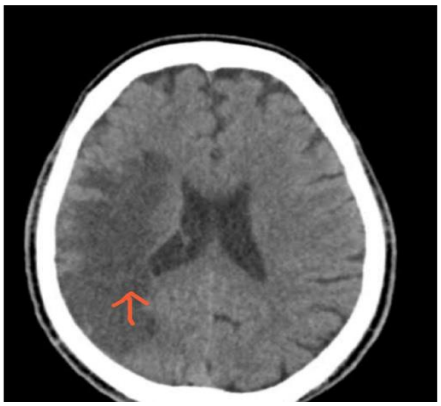
NCCT Head shows hyper density in left cerebellar region s/o Left cerebellar bleed with intraventricular extension.

Figure D:



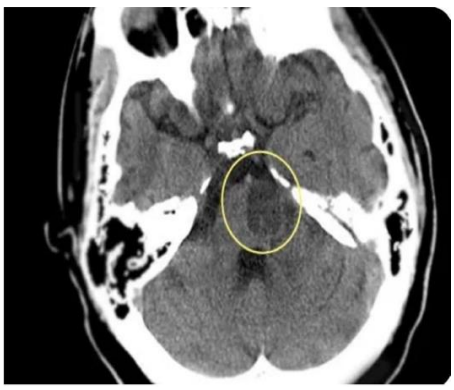
NCCT head shows large hypodense area in left frontal parietal area with midline shift with effacement of left lateral ventricle s/o Left MCA territory infarct.

Figure E:



NCCT head shows hypodense area in Right middle cerebral artery territory s/o Acute Ischemic stroke (Right MCA territory infarct).

Figure F:



NCCT head shows hypodense area in pontine area s/o Acute Ischemic stroke (Acute pontine infarct).

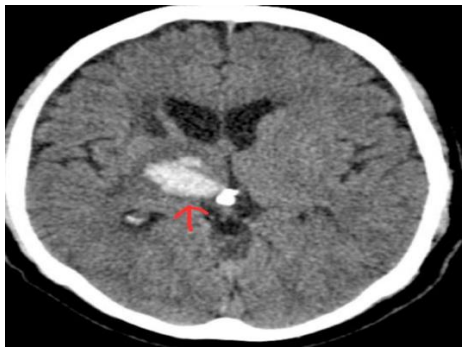
Figure G:

NCCT head shows hypodense area in Right Thalamic region s/o Acute Ischemic stroke (Right Thalamic infarct).

Figure H:

NCCT head shows hyper density in pontine area s/o Intra cerebral Hemorrhage (Acute pontine Hemorrhage).

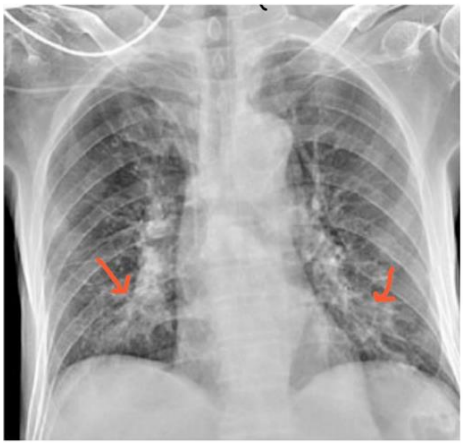
Figure I:



NCCT head shows hyper dense area in Right thalamic region s/o Intra cerebral Hemorrhage (Right Thalamic Bleed)

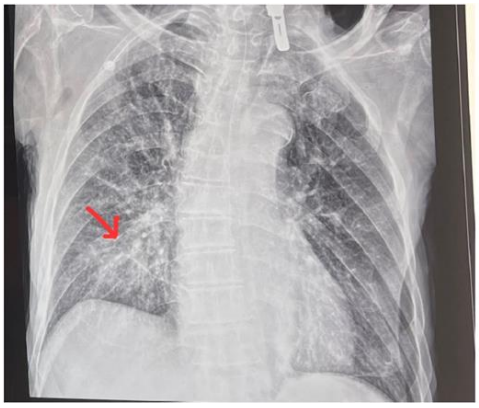
Aspiration Pneumonia Findings on Chest X-Ray

Figure A:



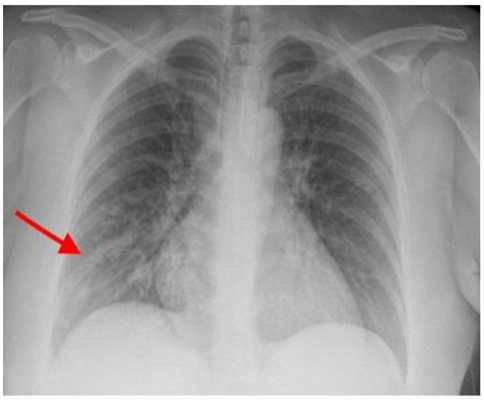
Chest radiograph (A) shows patchy opacities in both lower lungs.

Figure B:



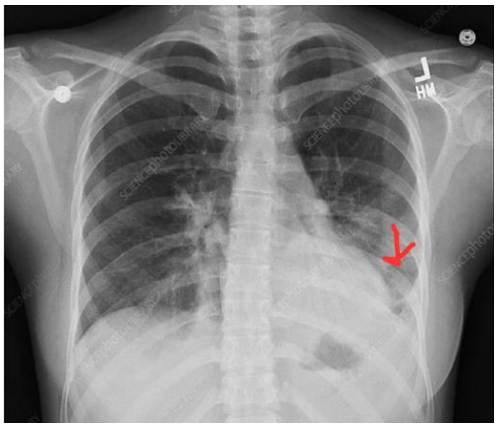
This Chest radiograph shows Right sided infiltrates.

Figure C:



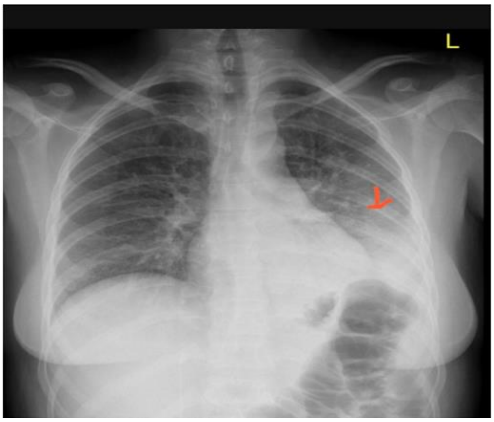
Chest Radio graph showing patchy infiltrate in right lower lung base.

Figure D:



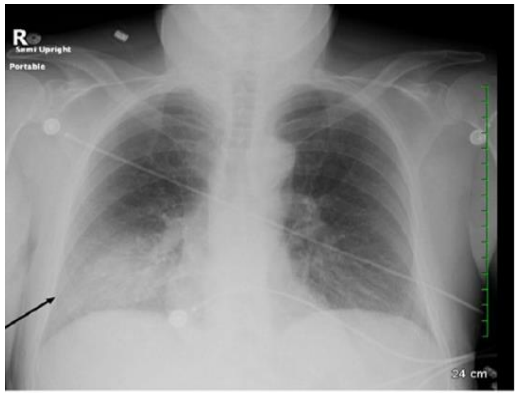
Chest Radio graph showing Left lower lobe infiltrates.

Figure E:



Chest Radio graph showing left lower lobe consolidation patch.

Figure F:

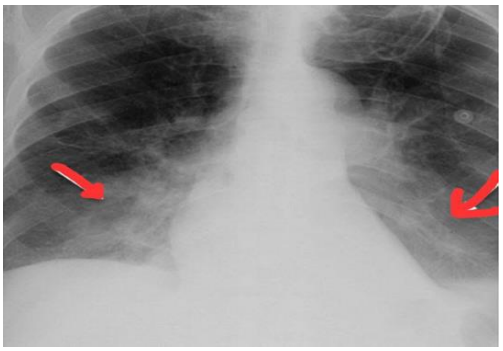


Chest Radio graph showing Right lower lobe infiltrate consistent with pneumonia.

Figure G:

Chest Radio graph showing Right sided infiltrates.

Figure H:



Chest Radio graph showing infiltrates in the Bilateral dependent lung bases.

Findings of Aspiration Pneumonia on HRCT Chest

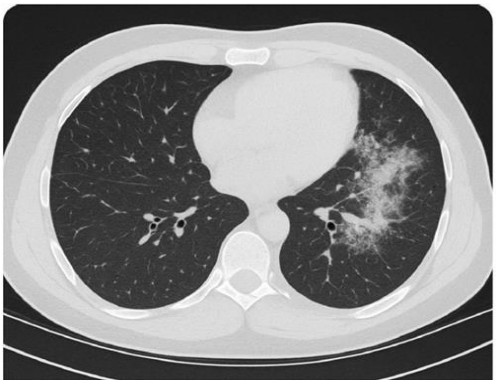
Figure A:

HRCT scan showing patchy consolidation and ground-glass opacities in the posterior segments of the right upper lobe and superior segment of the lower lobe, consistent with aspiration pneumonia.

Figure B:

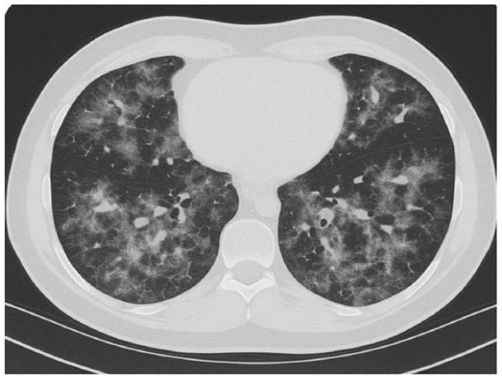
HRCT scan demonstrating bilateral patchy ground-glass opacities and consolidation predominantly in the dependent regions of both lungs, indicative of aspiration pneumonia.

Figure C:



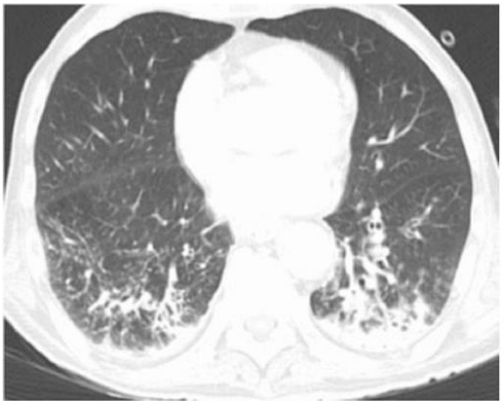
HRCT scan demonstrating bilateral areas of consolidation that are multifocal and patchy in appearance, indicative of aspiration pneumonia.

Figure D:



HRCT scan showing bilateral lung opacities that are patchy, poorly defined, and scattered, consistent with aspiration pneumonia.

Figure E:



HRCT chest show consolidations, ground glass opacities, centrilobular densities, and broncho vascular bundle thickening in dependent lungs s/o Aspiration Pneumonia.