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Microbiological profile of patients who developed pneumonia following acute stroke

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Abstract
Infections are frequent in patients with stroke and are often related to the clinical severity of the stroke and the subsequent immobilization. Post-stroke immunosuppression is likely to result from the sympathico-adrenal activation seen predominantly aft er severe stroke, and this may further contribute to the susceptibility of stroke patients to infections. By far the most frequent infections are urinary tract infections and pneumonia. The number of infections may be reduced by early mobilization and specific preventive measures. All selected patients were studied for post stroke pulmonary complications mainly pneumonia, mechanical ventilation, respiratory depression, its incidence, age, gender distribution and its association with the site of lesion, type of lesion, Severity of the stroke if measured by NIHSS scoring system. Study of microbiological profile among patients who developed pneumonia, growth was seen only in 19 patients among which klebsiella pneumonia seen in 7, acinetobacter in 4, CONS in 2, staphylococcus aureus in 2, candida sps in 3, enterobacter in 1 patients of our study.

Keywords: Microbiological profile, pneumonia, acute stroke

Introduction
Blood supply to the brain is normally divided into anterior and posterior segments, relating to the different arteries that supply the brain. The two main pairs of arteries are the Internal carotid arteries (supply the anterior brain) and vertebral arteries (supplying the brainstem and posterior brain) [1].

The anterior and posterior cerebral circulations are interconnected via bilateral posterior communicating arteries. They are part of the Circle of Willis, which provides backup circulation to the brain. In case one of the supply arteries is occluded, the Circle of Willis provides interconnections between the anterior and the posterior cerebral circulation along the floor of the cerebral vault, providing blood to tissues that would otherwise become ischemic.

A stroke without an obvious explanation is termed cryptogenic (of unknown origin); this constitutes 30-40% of all ischemic strokes [2, 3].

There are various classification systems for acute ischemic stroke. The Oxford Community Stroke Project classification (OCSP, also known as the Bamford or Oxford classification) relies primarily on the initial symptoms; based on the extent of the symptoms, the stroke episode is classified as total anterior circulation infarct (TACI), partial anterior circulation infarct (PACI), lacunar infarct (LACI) or posterior circulation infarct (POCI). These four entities predict the extent of the stroke, the area of the brain that is affected, the underlying cause, and the prognosis. The TOAST (Trial of Org 10172 in Acute Stroke Treatment) classification is based on clinical symptoms as well as results of further investigations; on this basis, a stroke is classified as being due to (1) thrombosis or embolism due to atherosclerosis of a large artery, (2) an embolism originating in the heart, (3) complete blockage of a small blood vessel, (4) other determined cause, (5) undetermined cause (two possible causes, no cause identified, or incomplete investigation) [4, 5].

Infections are frequent in patients with stroke and are often related to the clinical severity of the stroke and the subsequent immobilization. Post-stroke immunosuppression is likely to result from the sympathico-adrenal activation seen predominantly after severe stroke, and this may further contribute to the susceptibility of stroke patients to infections. By far the most frequent infections are urinary tract infections and pneumonia. The number of infections may be reduced by early mobilization and specific preventive measures [6].

Patients often present with a slight increase in body temperature (37.5-37.9°C), subtle neurological deterioration, mental confusion, and/or increasing C-reactive protein and white blood cell counts. Pre-disposing conditions such as dysphagia- increasing the risk of aspiration or urinary tract infection call for special attention [7].

Specific recommendations depend on local resistance patterns and consequently local antibiotics protocols should be followed. Culture and determination of resistance patterns are mandatory.

Prophylactic antibiotics do not improve outcome after stroke. This approach has been tested in the context of post-stroke immunosuppression and the high risk of infections after stroke. In clear-cut cases it is justified to start antibiotics based on clinical findings before having all test results as in our clinical experience this reduces the total morbidity due to the infection in patients after stroke [8].

Methodology

Sample size: 100 patients

Methods of collecting the data

All selected patients were studied for post stroke pulmonary complications mainly pneumonia, mechanical ventilation, respiratory depression, its incidence, age, gender distribution and its association with the site of lesion (i.e Anterior vs Posterior), type of lesion (infarct vs bleed), Severity of the stroke if measured by NIHSS scoring system. Short term outcome in the form of death, with complications, without complications, and discharged against medical advice was studied till discharge that is for a minimum of 2weeks. Outcome in patients on mechanical ventilator, with pneumonia, dysphagia were also studied.

Inclusion criteria

All patients admitted within 72 hours of the onset of acute stroke to our ICU/Emergency ward in our institute.

Exclusion criteria

- Admission more than 72 hours after stroke onset.
- Recent history of cerebrovascular disease (within 3 months)
- Traumatic brain stroke
- Pre existing pneumonia.
- Pre existing dysphagia of varied etiology

Study design: A hospital based, prospective study

Results

Table 1: Association between age and gender with pneumonia

Sl. No.	Features	Pneumonia		p value#
		No n (%)	Yes n (%)	
1	Age category			
	23 – 50	17 (73.9)	6 (26.1)	0.14
	51 – 70	25 (55.6)	20 (44.4)	0.17
	71 – 95	18 (56.3)	14 (43.8)	0.95
2	Gender			
	Male	44 (57.9)	32 (42.1)	
	Female	16 (66.7)	8 (33.3)	0.44

Table 2: NHSS score among those who developed pneumonia and others

Sl. No.	Features	Pneumonia		p value#
		No Mean (SD)	Yes Mean (SD)	
1	NHSS	7.7 (2.8)	10.5 (3)	0.001*

Note: # p value based on student's t test, * statistically significant ($p<0.05$)

This table shows association between NIHSS score and development of pneumonia, higher the score of NIHSS increases the chances of pneumonia and this finding is statistically significant. Organism growth was seen in 19 patients among which Klebsiella in 7, Acinetobacter in 4, CONS in 2, staphylococcus in 2, Enterococcus in 1, candida in 3 samples.

Table 3: Organism detected

Sl. No.	Features	Frequency and %
1	Acinetobacter species	4
2	Klebsiella pneumonia	7
3	Coagulase negative Staphylococcus	2
4	Staphylococcus aureus	2
5	Enterobacteriaceae	1
6	Candida albicans	3

Discussion

Study of microbiological profile among patients who developed pneumonia, growth was seen only in 19 patients among which klebsiella pneumonia seen in 7, acinetobacter in 4, CONS in 2, staphylococcus aureus in 2, candida sps in 3, enterobacter in 1 patients of our study.

Among our study population 100 patients, short term outcome was studied upto 2weeks or till discharge, which showed that 39% of Patients did not develop any complications. Where as 47% patients have developed various complications and 12% were dead and 2% patients got discharged against medical advice.

As a part of our study we have studied the association of site, type of stroke and risk factors with short term outcome that showed

- 68% of patients with posterior circulation stroke required mechanical ventilator in our study.
- 85% of patients with respiratory depression required mechanical ventilation.

When association of dysphagia with clinical outcome was studied, it was found out that

- Among patients who developed pneumonia, 95% patients has dysphagia.
- In patients who required mechanical ventilation 93% had dysphagia.
- In patients who were dead, 83% patients had dysphagia.
- So dysphagia was found to be a major risk factor for cause of complications and it also affects the outcome.

As a part of the study diabetics and hypertensives association with the type and site of stroke has been compared and found that

- In patients with infarcts -31% patients had diabetes and 68.3% patients had hypertension.
- In patients with bleed – 29% were diabetics and 64% patients were diabetics.

This findings shows predominance of stroke in hypertensive compared to diabetics which this does not show any statistical significance of the study [9, 10].

Based on the stroke site, it was found that posterior circulation strokes have more prevalence in hypertensives when compared to diabetics. And this finding is statistically significant.

Complications which were observed were studied for the association with outcome and the following observations were made:

- Among patients who were on mechanical ventilator, 33% patients had death.
- In patients who had pneumonia, 22% patients have expired.
- In patients who had respiratory depression, mortality was 71%.

Conclusion

Microbiological profile was studied and among patients who developed pneumonia, growth was seen only in 19 patients among which klebsiella pneumonia seen in 7, acinetobacter in 4, CONS in 2, staphylococcus aureus in 2, candida sps in 3, Enterobacter in 1 patients of our study.

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