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INFECTIONS IN POST STROKE SETTING: A STUDY FROM THE NEUROLOGY SECTION OF AGA KHAN UNIVERSITY HOSPITAL, KARACHI

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OBJECTIVE: Stroke is one of the commonest neurological disorders, contributing to the major burden of inpatient and outpatient neurology services. Infections after the stroke are the major factor, contributing to prolonged hospital stay and poor outcome in term of increasing morbidity and mortality.

The aim of this study is to define the different types of infections in post stroke patients and their impact on the outcome of patients with stroke. **METHOD:** This is a descriptive, cross sectional study, that was carried out in the section of Neurology, Department of Medicine at Aga Khan University Hospital, Karachi over the span of one year.

The strokes were classified as either ischemic or hemorrhagic.

Different types of infections i.e. chest infections, urinary tract infections, phlebitis, cellulitis and others were noted and the risk factors associated with their occurrence were identified.

Data was entered and analyzed on SPSS 23. **RESULTS:** 104 patients with the diagnosis of acute stroke, who developed infections at least 48 hours after their presentation, were identified. There were sixty (58%) male and forty-four (42%) females.

Sixty-four (61.5%) of patients had a diagnosis of ischemic stroke, while thirty-six (34.6%) had hemorrhagic strokes, while data was missing in 4(3.8%) cases about the type of stroke.

The commonest infection was Aspiration pneumonia, accounting for seventy-two

(69%) of patients, followed by Urinary tract infections, that was found in fifty-six (54%) of the patients. Significant association of aspiration pneumonia with the level of consciousness was found. **CONCLUSION:** Stroke is one of the commonest neurological disorders. Ischemic strokes accounts for almost 2/3rd. of the stroke. The commonest infection was Aspiration pneumonia, accounting for seventy-two (69%) of patients, followed by Urinary tract infections, that was found in fifty-six (54%) of the patients. Significant association of aspiration pneumonia with the level of consciousness was found.

INTRODUCTION:

Stroke is a focal neurological deficit, which is attributed to an acute focal injury of the central nervous system (CNS) secondary to a vascular cause and includes cerebral infarction, intracerebral hemorrhage (ICH), and subarachnoid hemorrhage (SAH).[1]

Most strokes (87%) are ischemic strokes. [2] An ischemic stroke happens when blood flow through the artery that supplies oxygen-rich blood to the brain becomes blocked.

There have been significant recent advances in the health care facilities. Although there is gradual decline in the mortality associated with stroke in many industrialized countries because of early intervention and modification of risk factors, but worldwide, it still remains the third leading cause of death [3] and major cause of disability in adults.[3] Since the patients with acute ischemic

ischemic stroke are usually seriously ill hence, they are at risk of developing serious medical complications after the acute stroke.[3]

Within the first week following the stroke, most of the mortality is usually due to the direct effects of brain damage, such as brain swelling with transtentorial herniation.[4] but once the patients survive this acute phase, subsequent mortality is attributable in autopsy,[4] and population-based studies,[5] to medical complications, the commonest of which is infection.

The reported incidence of certain medical complications can vary from 40% to 96% of patients and the highest frequency is reported in prospective studies. [6]

The commonly encountered medical problems in acute stroke survivors in most of the studies include urinary tract infections, venous thrombi, pneumonias, joint and soft-tissue pain, sepsis and falls. [7] In stroke patients, the commonest

infections affect the urinary or respiratory tracts especially chest infections are the commonest infection during the first few days after the stroke. [8'9] Pneumonia accounts for approximately 7% to 22% of infections in the stroke patients.[6, 10, 11, 12] and dysphagia and aspiration are the usual contributing factors in the development of chest infections. [13, 14].

The risk of complications is also increased if the hospital stay is prolonged or the level of consciousness is decreased, especially Glasgow coma scale less than 4 (Eye) or less than 6 (Motor) [15, 16].

As there is no available data regarding the post-stroke complications, especially the infections in stroke patients from our hospital, that is a major factor to prolong the hospital stay and increase the morbidity and mortality. The study is designed to identify and collect data on these modifiable and reversible factors to reduce the post-stroke mortality and morbidity.

MATERIAL AND METHOD:

It is a descriptive study, conducted to analyze the clinical data of 104 adult patients admitted with the diagnosis of stroke patients to the Section of Neurology, Department of Medicine, Aga Khan University Hospital, Karachi over the span of last 1 year. The AKUH is a 542 bedded tertiary care teaching and referral hospital. It has an established neurology team of residents, specialist and consultants providing round the clock service. Patients are admitted either through emergency or out patients departments. Major source of admission is emergency department.

The data was retrieved through electronic data bank system. The study was approved by institutional ethical committee. The records are maintained according to ICD-9 coding system in electronic data base system of the hospital. We analyzed the data of the patients admitted with the diagnosis of stroke and then identified the patients for occurrence of various types of post stroke complications especially infections over the span of the study period. A structured form was used to collect the required information including demographic data as age, gender and nationality. Strokes were grouped either ischemic or hemorrhagic. We tried to identify different types of infections, their impact on neurological recovery, and identification of organisms by various cultures and response to therapy. All adult patients with stroke admitted in stroke unit, special care unit and intensive care unit were included in the study and followed for the development of infections

(at least 48 hours after the admission and till the patient was in the hospital because of it). Patients were selected if they were fulfilling the inclusion criteria. They were examined at the time of admission to the hospital for any existing infection (if patients already had any signs of infection at the time of presentation or within 48 hrs. (As it does not fulfill the criteria of nosocomial infection) they were excluded. Then, they were followed during their hospital stay and the patients who developed infections subsequently, at least after 48 hours were enrolled in the final study. The clinical signs suggestive of infection were fever spikes, cough, increasing tracheal secretions or secondary alteration in sensorium etc. Appropriate laboratory tests like total leukocyte counts, Urine D/R, chest X-ray, cultures etc. were carried out as needed to confirm the presence of infection and identify the type of infection. Later on, their response to antibiotic therapy and other supported measures was assessed till end point (either death or discharge). The Statistical Package for social science SPSS 23 was used for data analysis. The Descriptive analysis was done for demographic, clinical features. Results are expressed as number (percentage). Differences of proportion were assessed by using the Pearson Chi-square or Fisher's exact test whenever appropriate. All p-value were two sided. P- Value < 0.05 was considered as statistically significant.

RESULTS;

This study included 104 patients (out of 150 patients admitted under special care units), both male and female, who were admitted with the diagnosis of stroke and acquired infections during hospital stay. We included only the patients who acquired infections at least 48 hours after the onset of the stroke symptoms.

Various types of infections (numbers) is shown in graph 1. response to antibiotic therapy is summarized in figure 2.

Table 1 is explaining the results of blood cultures. Table 2 highlights the different organisms from tracheal aspirate while table 3 is showing the results of urine cultures.

There were sixty (58%) male and forty-four (42 %) females. Sixty-four (61.5%) of patients had a diagnosis of ischemic stroke, while thirty-six (34.6%) had hemorrhagic strokes, while data was unidentified in four cases (3.8%) about the type of stroke. Fifty-eight (56%) of the pts. developed single infection while forty-six (44%) of the patients were infected with multiple infections at the same time.

Blood cultures were not very helpful to guide

guide about the initiation of antibiotic therapy as 84% of the patients had sterile blood cultures and it was positive only in 16% of the patients, with the major organism being the staph species. Tracheal aspirate was the most sensitive among various types of cultures in detecting the organisms, it gave positive results in 35% of the patients and with the commonest organism being the Klebsiella pneumonia and Acinetobacter Lwoffli. Urine cultures was able to detect the organisms in upto 28% of the cases.

The commonest infection was Aspiration pneumonia, affecting 69(66%) of patients, followed by Urinary tract infections, that was found in fifty-six (54%) of the patients. There was also significant association of Aspiration pneumonia with the level of consciousness. It affected 10 out of 25 alert patients, accounting for about 40% of cases, while 28 out of 41 in drowsy patients, approximately 68.29% and the risk was increased 34 out of 38 patients in comatose state, comprising about 90 % of the population, with a p-value of <0.001.

While there was no significant association of urinary tract infection (UTI) with level of consciousness, with a p- value of 0.138. 16% of patients showed positive blood cultures, Urine cultures were positive in 28%, while tracheal aspirate showed 35% positivity. Klebsiella pneumonia was the commonest organism recovered from the tracheal aspirate, while E. coli was recovered most commonly from urine.

Most of these patients presented with fever spikes, high TLC counts, abnormal Urine analysis, abnormal chest X- rays or secondary alteration in conscious status.

The Foley's catheterization was associated with increased risk of UTI, being present in 38 out of 57(66%) of pts. with catheter, while only 19 patients out of 55 (34.5%) without catheter developed this problem, with a significant p-value of < 0.001.

Nine patients (8.7%) expired as a result of secondary infections. Seventy (68%) patients improved while fifteen (14.4%) patients deteriorated despite therapy, while outcome was not known in ten (9.6%) of the patients, either because of premature hospital discharge or lack of data.

DISCUSSION:

In our study, that was conducted in the neurology department of the Aga Khan university Hospital, Karachi, we tried to find out the occurrence of various kinds of infections in the post stroke setting.

As per our results, there was slight male predominance, with 58% of the patients being males. In stroke subtypes, the ischemic strokes accounted for approximately two-third of the cases. Hemorrhagic strokes affected about one-third of the recruited patient, which is almost consistent with the available literature.[2,19] Regarding ischemic stroke subtypes, anterior circulation strokes accounted for approximately 66%, while intracerebral hemorrhages were most commonly seen in basal ganglia, followed by thalamus, cerebellum and lobar locations, which is the usual case as reported in other studies.[20]

56% of the patients had single infection whereas 64% were infected with multiple infections at the same time. In our study, Aspiration pneumonia was the commonest infection, as also reported in other studies [15, 18]. It was found in 69 (66%) patients, which is higher in contrast to some studies [10, 15, 16, 23] reported in literature. Microbial pathogens were mostly mixed anaerobes-aerobes and gram-negative bacilli, which is reported in literature as well [16, 19]. There was also significant association of Aspiration pneumonia with the level of consciousness, as also reported by other workers [16, 19]. It occurred in 42% of conscious patients while incidence gradually increased to 64% and 90% respectively in drowsy and comatose patients. UTI occurred in 54 (52)% of patients; this incidence was same as compared to other studies done abroad [3, 18] E.coli was the commonest organism. We were unable to find data about microbial pathogens in post-stroke UTI from previous literature. The Foley's catheterization was associated with increased risk of UTI, being present in 66% of patients with catheter, while only 23% of patients without catheter developed this problem. The association of these potential risk factors of infections has previously been mentioned in literature as well, but we couldn't find exact figures in prior studies, but it is mentioned that risk of UTI is decreased if bladder instrumentation is minimized [18].

There was about nine percent mortality in our study as a result of secondary infections, which is lower as compared to other study [10], but higher in comparison to other studies [21, 22] but this controversy could be explained as in these studies, they included all the medical complications occurring after the stroke.

CONCLUSION:

Our findings are mainly consistent with the current literature regarding the post stroke complications. Infections are the major responsible factors that increase the morbidity and mortality in the post

setting .Aspiration pneumonia and urinary tract infections are the commonest infections. Negative cultures should not preclude our clinical judgment about the decision to treat as many patients had sterile cultures despite clinical and other laboratory parameters in favor of acquiring the infections.

TABLE: 1 RESULTS OF BLOOD CULTURE:

Organisms	No. of patients	% of patients
Staph. Saprophyticus	6	5.7%
Staph. Species	6	5.75
Staph. Epidermidis	4	3.8%
Corynebacterium	1	1%
Staph. Aureus	1	1%
Sterile cultures	86	82.7%
Total number of the patients	104	100%

TABLE 2; RESULTS OF URINE CULTURES.

Organisms	No. of patients	% of patients
E. Coli	15	14.4%
Candida Albicans	4	3.8%
Enterococcus	2	1.9%
Klebsiella	2	1.9%
Staph. Aureus	2	1.9%
Staph. Epidermidis	2	1.9%
Pseudomonas	1	1%
E. coli, Klebsiella	1	1%
E. coli, staph. Epi.	1	1%
Polymicrobial	2	1.9%
Sterile pyuria	72	69.2%
Total number of the patients	104	100%

TABLE: 3 RESULTS OF TRACHEAL ASPIRATE CULTURES.

Organisms	No. of patients	% of patients
Acinetobacteriwoffli(AL)	4	3.8%
AL, Moraxella	2	1.9%
AL, E. Coli	1	1%
AL, Staph. Aureus	2	1.9%
AL, Candida	2	1.9%
AL, Streptococcus	2	1.9%
KlebsiellaPneumonea(KL)	5	4.7%
KL, Pseudomonas	2	1.9%
Pseudomonas	3	2.85%
E. Coli	2	1.9%
Candida	2	1.9%
Staph Aureus(SA)	1	1%
SA, E. Coli	3	2.85%
SA, KL	1	1%
H. Influenzae	2	1.9%
Polymicrobial	5	4.7%
Sterile cultures	65	62%
Total number of the patients	104	100%

FIGURE 2:RESPONSE OF THE PATIENTS TO ANTIBIOTICS THERAPY

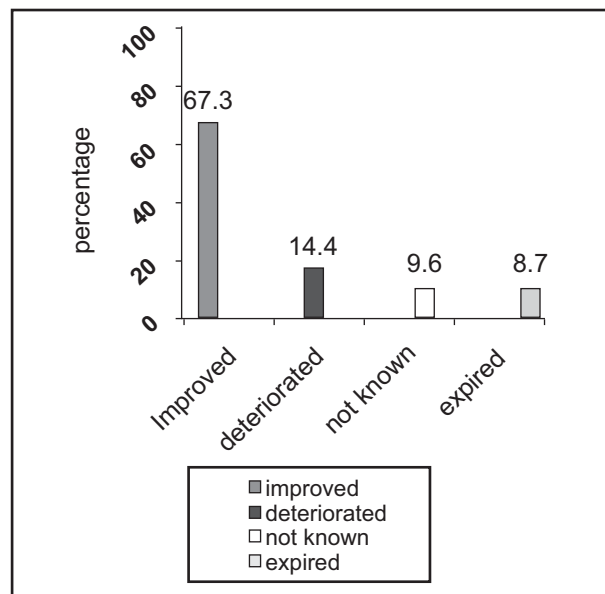
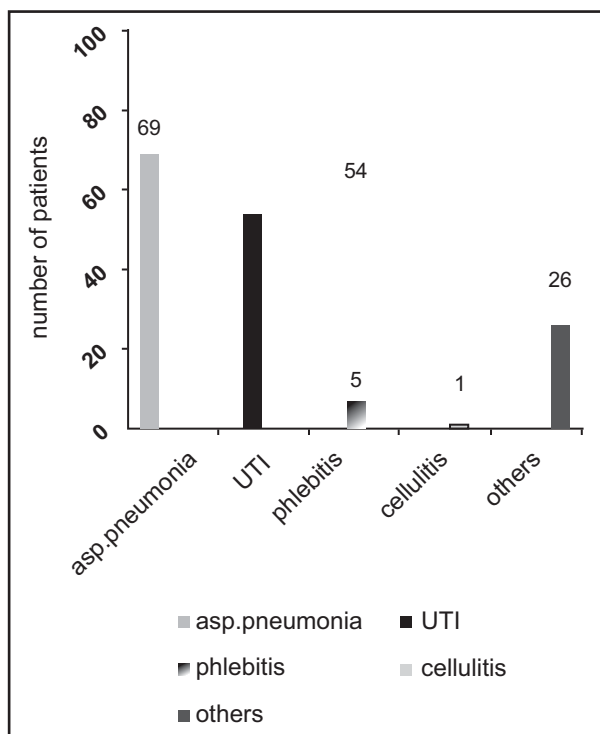


FIGURE 1; VARIOUS TYPES OF INFECTIONS BY NUMBER



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Author's contribution:

Rizwana Shahid; concept, study design, data collection, data analysis, manuscript writing, manuscript review

Azra Zafar; data collection, data analysis, manuscript writing, manuscript review

Mohammad Wasay; data analysis, manuscript writing, manuscript review