

Ischemic strokes requiring mechanical ventilation in the Intensive Care Unit

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ABSTRACT

Objective: To describe the clinical profile and the outcome of patients with clinical diagnosis of ischemic stroke requiring mechanical ventilation at King Fahd Hospital of the University.

Methods: A descriptive study of all cases of ischemic stroke patients requiring mechanical ventilation admitted to the Intensive Care Unit at King Fahd Hospital of the University, Saudi Arabia, between August 1996 - August 1998 with their clinical pattern and outcome.

Results: A total of 25 stroke patients with female to male ratio of 1.7:1 and mean age of 61.2±2.6 years. The vascular territories were middle cerebral artery 60% of the case, 20% basilar and 20% multiple territories. Hypertension (80%), diabetes mellitus (72%), hyperlipidemia (36%), hyperglycemia (32%) and obesity (16%) were the common risk factors. Glasgow Coma Scale on admission and 24 hours later were reported. The computerized tomography of the head shows ischemic strokes in the following distribution: Middle cerebral

artery 48%, basilar 20% and mixed territories 32%. Of the twenty-five patients in the Intensive Care Unit, 14 patients (56%) showed improvement, 2 patients (8%) unchanged, and 9 patients (36%) died. Age, absence of corneal reflexes, presence of multiple infarcts on computerized tomography of the head and systemic complication of heart failure, hyperosmolar and pneumonia are associated features indicating poor outcome.

Conclusion: The risk factors, predictors and poor outcome are similar with those reported in the literature. The outcome of stroke with mechanically ventilated patients, in the opinion of the author, calls for a need of specialized stroke team and the establishment of a Neuro-Intensive Care Unit, which will help in optimizing treatment strategies and appropriately allocate resources.

Keywords: Mechanical ventilation, stroke.

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Tracheal intubation and mechanical ventilation are indicated in patients with a large hemispheric stroke when progressive drowsiness reduces the ability to protect the airway.¹ In other patients, ineffective ventilation from brainstem compression, aspiration, or any other type of lung injury may necessitate ventilator support. Previous studies revealed that patients with stroke who are comatose on admission and those requiring mechanical ventilation have a poor prognosis despite intensive care treatment.^{1,2}

Various studies have documented the types of stroke syndromes and outcome requiring mechanical

ventilation and admission to the Intensive Care Unit (ICU).²⁻⁵ However, there is a paucity of reports describing the clinical profile of stroke syndromes admitted to the ICU in Saudi Arabia. This study reviews the clinical course of patients with ischemic hemispheric stroke who had mechanical ventilation in the ICU of a university hospital in the Eastern Province.

Methods. Adults seen and admitted to the Medical ICU at King Fahd Hospital of the University, Al Khobar, with suspected

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cerebrovascular disease, impaired consciousness, weakness in one or more extremities or focal or generalized seizures, and reviewed by the Intensivist and Neurologist from August 1996 to August 1998 were accepted for the study. For the purpose of this study, the diagnosis of stroke was accepted when there was sudden onset of focal or global impairment of cerebral function with symptoms lasting for more than 24 hours or leading to death related to ischemic vascular pathology and territory.⁶

Patients with open or close cranio-cerebral trauma, subdural hematoma or other identifiable etiology such as intracranial infections, tumors or metabolic dysfunction were excluded. Ischemic strokes were classified according to vascular territory including: middle cerebral artery (MCA), anterior cerebral artery (ACA) or posterior cerebral artery (PCA) and basilar artery (BA) or mixed according to clinical findings, computerized tomography (CT) and magnetic resonance imaging (MRI) when necessary.

Baseline investigations included complete blood count, erythrocyte sedimentation rate, renal function test, liver function test, thyroid function test, prothrombin time, partial thrombin time, fibrinogen level, arterial blood gas, electrocardiography, echocardiography, carotid Doppler study, EEG, cerebral angiography when necessary. Protein C, S levels, antithrombin III and homocysteine were not done.

Results. Ischemic stroke was confirmed clinically and neuroradiologically in twenty-five patients. The vascular territory involved included middle cerebral artery and basilar artery in 15 (60%) and 5 (20%) patients respectively. Five (20%) patients had ischemic infarcts in multiple territories. The most common risk factors encountered include hypertension (80%), diabetes mellitus (72%), hyperlipidemia (36%), hyperglycemia (32%) and obesity (16%). Glasgow Coma Score on admission was less than 10 in 14 patients (66%) and 11-12 in other 11 patients (44%). In the next 24 hours Glasgow Coma Score measured less than 10 in 10 patients (40%) and more than ten in fifteen patients (65%). Of the twenty-five patients seven patients (28%) developed seizures. Computed axial tomography (CT) of the head was abnormal in all but one patient (4%). The abnormality seen was ischemic changes in the middle cerebral artery territory in twelve (48%) patients, basilar artery territory in five (20%) patients and in mixed territory in the remaining patients. Of the twenty-five stroke patients in the ICU, 14 patients (56%) showed improvement, two patients (8%) unchanged, and nine patients (36%) deceased. The most important associated feature indicating poor outcome were age, absence of corneal reflexes, presence of multiple infarcts on CT of the head and presence of systemic

Table 1 - Clinical profile of patients with ischemic stroke requiring mechanical ventilation and admitted to ICU (N=25).

	Number of Patients (%)
Sex	
Male	9 (36)
Female	16 (64)
Age (in years)	
25-40	4 (16)
>41-64	12 (48)
>65	9 (36)
Breathing Pattern	
Normal	1 (4)
Hyperventilating	12 (48)
Central	1 (4)
Apenestic	6 (24)
Ataxic	1 (4)
Cheyenne Stoke	3 (12)
Gaspings	1 (4)
Vascular Territory	
MCA	15 (60)
ACA	-
Basilar	5 (20)
Mixed	5 (20)
CT Findings	
Normal	1 (4)
MCA	12 (48)
ACA	3 (12)
Basilar	5 (20)
Mixed	4 (16)
Duration of Stay	
<7 days	12 (48)
8-14	5 (20)
15-21	4 (16)
>22	4 (16)
Outcome	
Discharged Home	14 (56)
Rehabilitation Center	2 (8)
Death	9 (36)

abnormalities (heart failure 2, hyperosmolar state 2, and pneumonia 1).

Discussion. The diagnosis of ischemic strokes is based predominantly on the clinical and neuro-imaging evaluations or both. Of 1106 patients seen in the ICU during the period of the study, 25 had ischemic strokes (16 female, 9 male) with female to male ratio 1.8:1. This makes the annual ICU frequency rate of 2.3 of the adult population. The

mean age of onset in our patients was 63.8-61.2 years (female - male) is similar to that by Steiner et al, where 124 patients with stroke admitted to ICU with a mean age of 61.4 years.⁷ The clinical presentation in our patients, with predominant unilateral weakness, with less frequent brain stem or cerebral lesions, and the distribution of the vascular territory involved conforms to the pattern described by others.⁷⁻⁹ Wijidicks, et al (1997)¹ showed that in 24 mechanically ventilated patients with ischemic strokes in ICU, 13 (54%) the ischemic stroke affected the territory of the middle cerebral artery. Although some authorities (Brandt, et al 1996)⁵ suggested that the commonest reason for the admission to the intensive care unit was brain stem ischemia with basilar artery occlusion that was not the observation in this study or others.^{1,6} This may well be related to the high mortality rate of basilar artery occlusion, which had an 80-90% mortality (Ferber, et al 1990).¹⁰ The frequency of CT scan abnormalities in our patient is not unlike the frequency CT abnormalities in Wijidicks, et al in 1998^{4,1} (90%). However, the CT findings in the later study reports abnormalities in bi-hemispheric distribution wherein CT abnormalities in our patients were slightly different with 60% bi-hemispheric, and 20% in the basilar artery territory. None of the CT scans in both reports shows signs of water shed infarcts. This may reflect the severity and extent of brain injury. The outcome of patients of acute ischemic stroke in our study revealed the mortality rate of 36%. This is slightly better than the outcome reported by Bushnell, et al (1999)⁹ wherein 131 patients intubated with ischemic strokes, 80 patients died with an overall mortality rate of 61%. On the other hand, Steiner, et al in 1997⁷ showed 52% mortality rate in 124 consecutive stroke patients requiring mechanical ventilation. The difference in the outcome may reflect the difference in the population groups or simply may reflect the small number of patients in our study.

The poor outcome of stroke victims requiring mechanical ventilation admitted to the ICU mitigates,

in the opinion of the author, the creation of a specialized stroke team, to establish neurosciences ICUs, optimize treatment strategies and appropriately allocate resources.¹¹⁻¹⁴

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