



Prognosis of Stroke Patients who need Mechanical Ventilator

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Abstract

Stroke is ranked as the second leading cause of death worldwide with an annual mortality rate of 5.5 million. The burden of stroke does not only lie in the high mortality but the high morbidity also results in up to 50% of survivors being chronically disabled. Prospective cross-sectional study with 52 stroke patients. The mean age of patients was (67.3±5.3years old) and the male more than female. A significant association was found between the sex and death. (80.7%) of the patients with Ischemic type of stroke. Bad prognosis of stroke patients who need mechanical ventilator was found in this study.

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Stroke, Mechanical ventilation.

Introduction

According to the definition proposed by the World Health Organization in 1970, “stroke is rapidly developing clinical signs of focal (or global) disturbance of cerebral function, with symptoms lasting 24 h or longer, or leading to death, with no apparent cause other than of vascular origin” (Warlow, 1998). Recently, a new definition of stroke has been proposed by the American Stroke Association which is tissue-based and states that “stroke is an episode of acute neurological dysfunction presumed to be caused by ischemia or hemorrhage, persisting ≥ 24 hours or until death” (Sacco *et al.*, 2013). The clinical manifestations of stroke include a wide range of signs and symptoms such as paralysis, weakness, numbness, severe headache, slurred speech, mental status change, vision problems, falling and dizziness. A stroke may be described as a silent stroke if it occurs without clinical features. In a silent stroke either a silent area of the brain is involved or symptoms are not noticed (Sampane-Donkor, 2014).

Types of Stroke: Stroke is divided into thrombotic and embolic

Ischemic stroke

Ischemic stroke, that includes TIA, is the most common type of stroke is a blockage that cuts off blood supply to affected parts of the brain. Ischemic strokes are often referred to as cerebrovascular accidents (CVA) and could be a thrombotic or embolic event. The effects of the blockage are related to the location of the blockage in the brain rather than the source; however the source becomes vitally important in identifying the cause for individual management and secondary stroke prevention (Kwiatkowski, 2013).

A thrombotic ischemic stroke occurs when a diseased or damaged artery supplying blood to the brain forms a clot and pieces of that clot can break away and block a large or small vessel within the brain. An embolic stroke is

caused by a blood clot that has formed elsewhere in the body (emboli) becomes dislodged and travels to a cerebral artery (MFMER, 2013). When an embolic stroke occurs, there are almost immediate neurological and physical deficits. Emboli may be bacterial in nature, form as a result of cardiac arrhythmias (atrial fibrillation), vascular repair process, or are dislodged vascular plaques. A transient ischemic attack (TIA) produces stroke symptoms that resolve when the arterial blockage is dislodged or dissolved spontaneously without medical intervention. Considers TIA's to be high risk since 9.5% of those with a TIA will subsequently have a more severe ischemic stroke within 90 days. The opportunity for secondary prevention makes a TIA an extremely important medical event.

Hemorrhagic stroke

Intracerebral hemorrhagic stroke differs from an ischemic stroke in that it is caused by a ruptured blood vessel as opposed to a blood clot. The ruptured vessel interrupts blood flow and delivery of essential nutrients and oxygen to the affected area of the brain. A ruptured blood vessel may release blood very rapidly which may lead to a sudden build up in cerebral pressure resulting in unconsciousness or death. Approximately 10-15% of all strokes are hemorrhagic and have an estimated 40%-50% mortality rate (Woo *et al.*, 2004). Goldstein *et al.* (2001) determined that "hypertension is a major risk factor for both cerebral infarction and intracerebral hemorrhage.

Other causes of intracerebral hemorrhages include infections, trauma, abnormalities in the blood vessels and blood clotting deficiencies. Intracerebral hemorrhages are less common than ischemic strokes and only account for approximately 12% of stroke events. Another kind of hemorrhagic stroke is subarachnoid hemorrhage. This is similar to intracerebral hemorrhages in that such strokes are caused from a ruptured blood vessel; however these occur outside of the brain tissue itself and result in the subarachnoid space surrounding the brain to fill up with blood causing rapid loss of consciousness and a poor prognosis for full recovery. The most common cause is the rupture of a cerebral aneurysm.

Aneurysms may develop from birth or early childhood and grow very slowly over the years as a result of thinning and progressive damage of the artery walls. In summary ischemic strokes are the most common type of stroke in both men and women and has been linked to many underlying influences known as risk factors.

Mortality appears higher with those who develop hemorrhagic strokes.

Epidemiology

Stroke was the second most frequent cause of death worldwide in 2012, accounting for 6.7 million deaths. Approximately 17 million people had a stroke in 2010 and 33 million people have previously had a stroke and were still alive making total population of 50 million with stroke in the world. Stroke is the number one preventable cause of permanent disability. Projections show that by 2030, stroke prevalence will increase by more than 20% over 2012 (Javed, 2015). Between 1990 and 2010 the number of strokes decrease by approximately 10% in the developed world and increased by 10% in the developing world. Overall, two thirds of strokes occurred in those over 65 years old (Feigin *et al.*, 2010) South Asians are at particularly high risk for stroke, accounting for 40% of global stroke deaths (Indian Heart Association Why South Asians Facts Web, 2015).

It is ranked after heart disease and before cancer. In the United States stroke is a leading cause of disability, and recently declined from the third leading to the fourth leading cause of death (Towfighi *et al.*, 2011) Geographic disparities in stroke incidence have been observed, including the existence of a "stroke belt" in the southeastern United States, but causes of these disparities have not been explained. The incidence of stroke increases exponentially from 30 years of age, and etiology varies by age (Ellekjær *et al.*, 1997). Advanced age is one of the most significant stroke risk factors. 95% of strokes occur in people age 45 and older, and two-thirds of strokes occur in those over the age of 65. A person's risk of dying if he or she does have a stroke also increases with age. However, stroke can occur at any age, including in childhood. Family members may have a genetic tendency for stroke or share a lifestyle that contributes to stroke. Higher levels of Von Willebrand factor are more common amongst people who have had ischemic stroke for the first time (Bongers *et al.*, 2006). The results of this study found that the only significant genetic factor was the person's blood type. Having had a stroke in the past greatly increases one's risk of future strokes.

Mechanical ventilation

Mechanical ventilation is a life-saving technological intervention for patients whose respiratory function is

compromised due to an acute or chronic disease. Tracheal intubation and mechanical ventilation are indicated in patients with a large hemispheric stroke when progressive drowsiness reduces the ability to protect the airway. 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 (Qutub, 2001).

Patients and Methods

Study design and setting: A prospective cross-sectional study carried out for 2 years duration in the neurosciences hospital from the period of the first of October 2012 to the end of Sep. 2014.

Sample size: 52 stroke patients who admitted to the ICU requiring mechanical ventilation and within the age ≥ 55 years old were included in this study. Data was collected by using a specially designed questionnaire and all patients assessed for GCS and MRI was done to detect the type of stroke.

Statistical analysis: All patients' data entered using computerized statistical software; Statistical Package for Social Sciences (SPSS) version 21 was used. Descriptive statistics presented as (mean ± standard deviation) and frequencies as percentages. Kolmogorov Smirnov analysis verified the normality of the data set. Multiple contingency tables conducted and appropriate statistical tests performed, level of significance (p value) set at ≤ 0.05.

Results and Discussion

The patients group consist of 41 men (78.8%) and women 11 (21.2%), and the mean age was (67.3±5.3) years and the mean GCS score on admission was 10.2 for ischemic and 9.8 for hemorrhagic stroke patients, 43 patients (more than 82%) were died, 46 (88.4) were admitted to the NICU within 24 hours after the onset of the symptoms. 42 (80.7 %) of the patients presented with ischemic stroke and the rest with spontaneous hemorrhage.

Table 2 show that 90.2% of the male was died and only 9.8% become well, while in female 54.5% of them was died and the rest become well. 26 patients was in age group (60-69) was died.

It has been found that there is a significant association between the gender difference and the survival outcome in which male had poor prognosis than that of female. While no significant differences was found regarding to the age, type of stroke and the survival outcome (table 2).

In the current study (67.3±5.3) years was the mean age of stroke patients which is concordant with many studies done in developing countries (El Sayed *et al.*, 1999; Cheung *et al.*, 2007; Dalal *et al.*, 2005) also with Al-Asadi *et al.*, studies which is done in Basrah in Iraq in 2014 (2014). More than half of the patients was within the age group 60—69 and the male was more predominant than female which is similar to that found by a previous study done in Iraq by Sulaiman, in 2002 (2002), Moreover it is similar to the Minelli study in Brazil in 2007 (2007) and with Mihalka in 2001 in West Ukraine (2001).

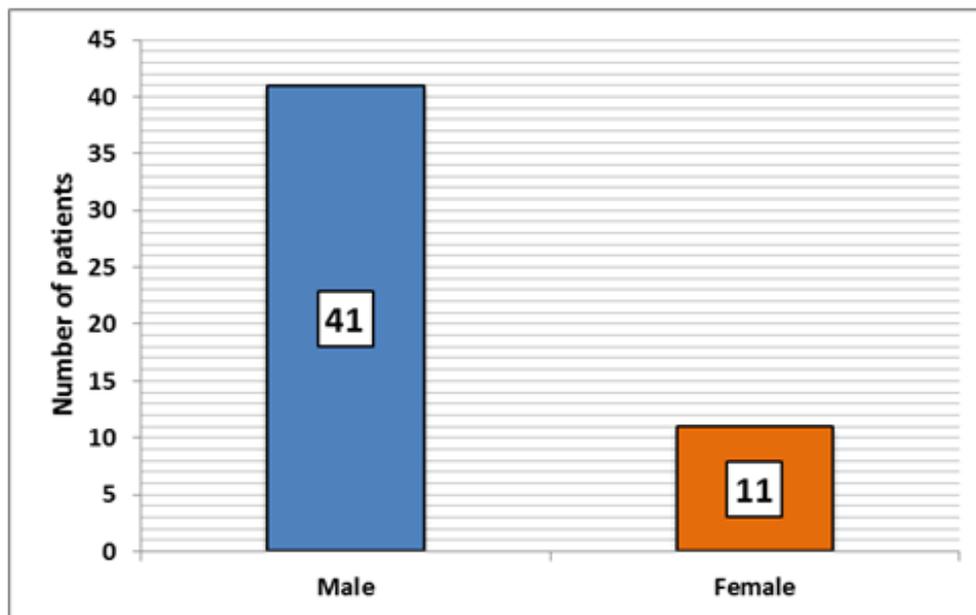
Table 1. Demographic characteristics of the patients

	No.	%
Age (years)		
50—59	13	25
60—69	29	55.8
≥ 70	10	19.2
Total	52	100.0
Type of stroke		
Ischemic	42	80.7
Hemorrhagic	10	19.3
Time of admission to the NICU		
≤ 24 hrs.	46	88.4
≥ 24 hrs.	6	11.6

Table 2. Survival outcome of patients

variable	Died		Well		Total		χ^2	P-value
	No.	%	No.	%	No.	%		
Gender								
Male	37	90.2	4	9.8	41	100.0	5.43	0.01
Female	6	54.5	5	45.5	11	100.0		
Age								
50—59	9	69.2	4	30.8	13	100.0	2.68	0.2
60—69	26	90.0	3	10.0	29	100.0		
≥ 70	8	80.0	2	20.0	10	100.0		
Type of stroke								
Ischemic	34	81.0	8	19.0	42	100.0	0.04	0.8
Hemorrhagic	9	90.0	1	10.0	10	100.0		

Fig 1. Gender distribution of cases



More than 4/5th (80.7%) of the stroke patients in the present study were ischemic type and the rest was hemorrhagic consistent with that registered by Hamad *et al.*, in Qatar in 2001 (2001) were 80% of the stroke patients was ischemic type. Also it is similar to that registered in a study done in Saudia Arabia by El-Sayed (El Sayed *et al.*, 1999) in 1999. This may be explained by that most Arabic Gulf people are adopting Western lifestyle and dietary habits, including increased fat intake, cigarette smoking and decreased physical activity.

Regarding to the time of admission to the NICU in the current study it was registered that 88.4% of the stroke

patients admitted to these unit within 24 hours. This is concordant with Steiner, Thorsten, *et al.* (1997) in which he mentioned that most of the patients were admitted to the NICU within 24 hours after onset of symptoms.

Limitation of the study: this study was a single center study with small sample size so we can't generalize the result.

Conclusion

The present study show that the stroke was more common in male than female, also it is increase with age (60 years and more) and the Ischemic stroke is most

common type than hemorrhagic. Bad prognosis was registered with the stroke patients who need mechanical ventilation.

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