Stroke Patients in the ICU: Is There Any Benefit?

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Citation

P Marik. *Stroke Patients in the ICU: Is There Any Benefit?*. The Internet Journal of Anesthesiology. 1998 Volume 3 Number 1.

Abstract

Objective: To examine the impact of treatment in an Intensive Care Unit on the outcome of patients who have suffered a stroke.

Methods: We prospectively collected data on 40 patients who were admitted to ou r MICU after suffering a stroke. Patients with subarachnoid hemorrhages and sub dural hematomas were excluded.

Results: 11 (28%) patients died in the ICU (group 1), 6 (15%) died in hospital after ICU discharge (group 2) and 23 (57%) survived to hospital discharge (grou p 3). All the survivors were severely disabled requiring chronic care. There we re no differences in co-morbidities, pre-stroke functional status, or type and location of stroke between the three groups of patients. The Glasgow coma score (p=0.001) and the presence of a gag reflex (p=0.0006) were the best predictors of hospital survival. The most common indications for admission to the ICU wer e for airway protection and treatment of hypertension. Only 2 survivors receive d therapy that was considered life saving. After a mean follow-up of 8 months, 9 of the 23 survivors were alive, 8 had died and 6 were lost to follow-up. Of t he 9 long term survivors, 6 remained severely disabled and bedridden.

Conclusion: It is likely that, for the vast majority of patients suffering a st roke, admission to an ICU does not affect outcome. Only patients with reversibl e medical conditions who require acute physiological support, or patients who r equire a life saving intervention, and have a reasonable prognosis for meaningf ul survival should be admitted to an ICU following a stroke.

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INTRODUCTION

Stroke is the third most common cause of death in the United States, after heart disease and cancer. Approximately 175,000 patients die from this disease each year [1,2].

However, unlike acute myocardial infarction, no therapeutic intervention has been demonstrated to be of “any value in restoring the damaged cerebral tissue or its function” after a stroke has fully evolved 1. New treatment modalities are being evaluated which may limit ischemic neuronal damage in acute stroke [3,4]. However, it remains highly “speculative whether any of these therapeutic modalities will benefit stroke patients, or not” 3.

Despite the experience of the 1970’s which demonstrated that stroke intensive care units did not significantly reduce morbidity and mortality [5,6,7,8], most patient in the US who suffer a severe cerebrovascular accident are admitted to an ICU. In the US between 3-6% of admissions to intensive care units are for the management of patients who have

suffered a stroke [9,10,11]. This compares to less than 0.5% for most other western nations [10,12]. Admission to and aggressive management in an ICU may only serve to prolong the dying process of a patient who has suffered a catastrophic neurological event [13]. The aim of this study was to evaluate the outcome and impact of therapeutic interventions on patients admitted to our MICU after having suffered a severe cerebrovascular accident.

PATIENTS AND METHODS

This study was conducted at St. Vincent Hospital, a university-affiliated teaching hospital in Worcester, Massachusetts. The hospital has approximately 350 acute-care beds, with 11 medical ICU beds. Most patients are admitted to the MICU through the emergency room at the discretion of the primary care physician. After obtaining consent from the Institutional Review Board we prospectively followed all patients who were admitted to the MICU after having suffered a stroke. Patients with subarachnoid hemorrhages and subdural hematomas were excluded from this study. All patients received "standard" neurologic ICU management, however no set protocol was followed. All intubated patients were hyperventilated to some extent. Mannitol, in standard dosages, were prescribed by the neurology consultant in some cases. Long term follow-up information was obtained by reviewing the patients medical records and phone calls to the family and/or chronic care facility.

The following data were recorded for each patient: age; sex; history of myocardial infarction, CABG, stroke, hypertension, diabetes, cardiac failure, renal failure, malignancy and chronic obstructive pulmonary disease. The primary reason for admission to the ICU, the CT scan findings, and the neurological examination and APACHE II score 14 on admission to the ICU were recorded. In addition all major medical interventions in the ICU were documented. The Glasgow Coma scale was recorded on admission to the ICU, at discharge from the ICU and at hospital discharge [15]. The patients functional activity prior to admission to hospital, at discharge and on follow-up was assessed using the Karnofsky score (Table 1) [16]:

Table 1: Karnofsky score

- 100 Normal, no complaints, no evidence of disease
- 90 Able to carry on normal activity, minor signs or symptoms of disease
- 80 Normal activity with effort, some signs and symptoms of disease
- 70 Cares for self, unable to carry on normal activity or to do work
- 60 Requires occasional assistance from others, but able to care for most needs
- 50 Requires considerable assistance from others, frequent medical care
- 40 Disabled, requires special care and assistance
- 30 Severely disabled, hospitalization required, death not imminent
- 20 Very sick, hospitalization necessary, active supportive treatment necessary

DATA ANALYSIS

The patients were divided into three groups; patients who died in the ICU (Group 1), died in hospital (Group 2) , and were discharged from hospital (Group 3). Summary statistics were compiled to allow a description of the three groups of patients. Data are presented as means SD, ranges, or proportions, as appropriate. A 2 by 3 factorial chi-squared analysis was used for the analysis of categorical data and continuous variables were analyzed using the Bonferroni method.

RESULTS

Forty patients were studied. Eleven (28%) patients died in the ICU , 6 (15%) died in hospital after having been discharged from the ICU, and 23 (57%) were discharged from hospital. The patients clinical and demographic data are presented in tables 2 and 3. The major medical interventions the patients' received are listed in table 4. One patient in group 3 required mechanical ventilation for respiratory failure as a consequence of cardiac failure and pneumonia, and a further patient required a ventriculostomy for hydrocephalus developing after an intraventricular bleed. None of the other patients in this group developed any complications requiring urgent intervention or received therapy which could be considered life saving, and could not have been provided in a "stroke unit" or neurology ward. Therapy was withdrawn in 8 (73%) of the patients in group 1. Twelve of the patients who were discharged from hospital were transferred to a rehabilitation facility and 11 to a nursing home. The GCS and functional scale in these

patients at discharge were 13 2 and 42 8 respectively.

Figure 1

Table 2: Patients premorbid characteristics

	Died in ICU (n=11)	Died in Hospital (n=6)	Discharged from Hospital (n=23)
Age	72 +/- 12	77 +/- 7	71 +/- 10
Sex (M:F)	5:6	5:1	8:15
Previous stroke	2	3	3
Myocardial infarction	0	0	4
CABG	1	0	3
Diabetes mellitus	3	1	4
Hypertension	5	1	11
COPD	3	0	5
Cardiac Failure	3	2	6
Renal Failure	2	0	6
Malignancy	2	1	3
Functional Score	90 +/- 9	92 +/- 18	90 +/- 7

Figure 2

Table 3: Patients Clinical Characteristics

	Died in ICU (n=11)	Died in Hospital (n=6)	Discharged from Hospital (n=23)
APACHE II Score	26 +/- 5	23 +/- 6	15 +/- 5 ¥
GCS on admission ICU	5 +/- 2	7 +/- 2	10 +/- 5 ¥
GCS discharge ICU	-	6 +/- 3	12 +/- 3
Days in ICU	2.7 +/- 1.7	7.5 +/- 4.0	6.1 +/- 6.8
Days in hospital	-	13 +/- 4	27 +/- 24
Do Not Rescucitate DNR	10 (90%)	5 (83%)	7 (30%)
Type of stroke			
intracerebral bleed	5	0	11
thrombotic infarct	4	3	7
embolic infarct	2	3	5
Location of stroke			
carotid territory	7	5	19
extensive cortical	2	0	2
vertebro-basilar	2	1	2
Absent gag reflex	5	2	0 §

¥ p<0.001; § P=0.0006 for comparison between group 3 and groups 1 and 2

{image:3}

After a mean follow-up of 8 months, 8 of the 23 survivors had died, 9 were alive, and 6 were lost to follow-up. The mean functional scale of the “long” term survivors was 51 20, with 6 of the patients being severely disabled and bedridden.

COMMENT

Fifty seven percent (23/40) of the patients treated in our ICU after suffering a severe stroke were discharged alive from hospital. However, all of these patients were severely disabled and required special care in a chronic care facility. Almost half of the hospital survivors had died within a year, and most of the survivors remained severely disabled and bedridden. Only two of the hospital survivors received treatment in the ICU which was considered “life-saving”. Although this was not a randomized, controlled study, the results of our study supports the data from the early 70’s in which it was demonstrated that stroke intensive care units have very little impact on the outcome of patients following a stroke 5-8. One other recent study has reported the outcome of patients admitted to the ICU following a stroke17. This study reported an ICU mortality of 73% with a one year mortality of 92% [17]. In reviewing their data, Alexandrov and colleagues reported that patients with severe stroke were equally likely to be admitted to the ICU as to the acute stroke unit [18]. Although these authors do not report comparative outcomes, the ICU patients received more interventions, and fewer do-not-resuscitate orders were written for these patients. Grotta and colleagues evaluated the outcome of elective intubation in 20 patients who suffered a severe stoke [19]. These authors reported a 20% survival rate, however no data is presented that would indicate that these four survivors would have died without aggressive management in an ICU.

The data suggests that for the vast majority of patients suffering an acute cerebrovascular accident short term admission to an intensive care u nit will not improve outcome. This is not to imply that physicians should adopt a fatalistic approach when managing patients who have suffered a stroke 3,4. A number of well conducted clinical trials have demonstrated that the mortality and functional recovery of patients following a stroke is significantly improved when these patients are cared for in a specialized stroke unit as compared to a general medical ward [20,21].

The management of patients following a cerebrovascular accident largely involves good nursing care and a well-organized multidisciplinary rehabilitation program 20,21. Acute medical interventions have not been established to improve outcome, and in fact may be harmful in some circumstances [22,23,24]. Although intubation and hyperventilation are routine, though heroic measures in patients after severe stroke, their efficacy in reducing mortality and improving functional recovery has never been established. In fact, hyperventilation with induced hypocarbia, may reduce perfusion to the penumbral brain regions and increase infarct size. Furthermore, isovolemic hemodilution, corticosteroids, osmotic diuretics,

barbiturates, and acute thrombolysis have not been demonstrated to improve the outcome of patients who have suffered a cerebrovascular accident 23-32. Surgical intervention is only indicated in patients with large cerebellar infarcts or bleeds that compress the brain stem and in patients with an acute obstructive hydrocephalus 2,33. The emergent reduction of blood pressure in a hypertensive patient may be hazardous and increase the size of the stroke 22,34. Antihypertensive treatment is therefore not recommended for patients with stroke except in cases of extreme blood pressure elevation, and in these cases treatment with oral antihypertensives usually suffices 22,26,34.

The report from the Stroke Council of the American Heart Association recommends that "protecting the airway and providing ventilatory assistance are critical components of resuscitation in patients with stroke who have impaired consciousness"2. We disagree with this therapeutic strategy for a number of reasons. As demonstrated by our study and the study by Burtin and colleagues 17, patients with an absent gag reflex on admission to hospital will almost always die from their stroke and intubation and mechanical ventilation may only prolong the dying process and increase the risk of developing further complications. Furthermore, it is arguable that endotracheal intubation and mechanical ventilation will reduce the risk of atelectasis and pneumonia in patients with an impaired level of consciousness, when compared to good nursing and respiratory care without endotracheal intubation. There is however considerable evidence that endotracheal intubation and mechanical ventilation increases the incidence of pneumonia, acute bronchitis, sinusitis, atelectasis, and many other complications [35,36,37,38]. Therefore, there is no data to suggest that the 10 hospital survivors in our study, who were intubated for airway protection, benefited from this intervention.

In our study and the study of Burtin and colleagues 17, the severity of neurological impairment as reflected by the Glasgow coma score was the best predictor of outcome in stroke patients following admission to the ICU. The prognostic power of the APACHE II score was largely due to the effect of the Glasgow Coma score. Neither the location or type of stroke, nor the patients co-morbidities were significant prognostic factors.

The function of an Intensive Care Unit is to provide temporary physiological support for patients with potentially reversible organ failure. When poorly selected patients are admitted to the ICU, the inappropriate use of technology may not save lives, nor improve the quality of a life, but rather transform dying into a prolonged, miserable, and undignified process. If aggressive treatment in an ICU delays or prolongs dying and causes discomfort, the procedure should be considered harmful to the patient and should not be offered. We therefore believe that most patients suffering a cerebrovascular accident are best cared for in specialized stroke units. Endotracheal intubation should only be performed in patients with reversible respiratory failure. Furthermore, patients suffering a cerebrovascular accident should only be admitted to an ICU if they develop an acutely reversible medical complication and have a good prognosis for a functional recovery.

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