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Mortality and Functional Disability of Post-stroke Delirium

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ABSTRACT

Introduction: Small number of studies have evaluated the mortality and the degree of functional disability of post-stroke delirium, and our aim was to determine that. **Patients and Methods:** Comprehensive neuropsychological assessments were performed within the first week of stroke onset, at hospital discharge, and followed-up for 3, 6 and 12 months after stroke. We used diagnostic tools such as Glasgow Coma Scale, Delirium Rating Scale, National Institutes of Health Stroke Scale and Mini-Mental State. **Results:** Delirious patients had a significantly higher mortality (p = 0.0005). As opposed to the type of stroke mortality was higher after ischemic (p = 0.0005). The patients without delirium had significantly better cumulative survival during the first year after stroke (p = 0.0005). Delirious patients aged ≥65 years had a significantly lower cumulative survival during the first year after stroke (p = 0.0005). In relation to the type of stroke delirious patients with ischemic had a significantly lower cumulative survival during the first year after stroke (p = 0.0005). Delirious patients had a greater degree of functional impairment at discharge (p = 0.01), three (p = 0.01), six months (p = 0.01) and one year (p = 0.01) after stroke. **Conclusion:** Delirious patients have a significantly higher mortality, lower cumulative survival and a greater degree of functional disability in the first year after stroke.

Keywords: mortality, functional disability, delirium, stroke.

1. INTRODUCTION

Delirium is usually transient, or it is a reversible disorder. In fewer cases, it is broken with the development of coma, convulsions and potentially fatal outcomes. Patients can recover completely, stay with certain sequelae, or after a recovery, dementia that has already existed before.

Previous studies of delirium after stroke indicate that delirium has a negative impact on functional disability. There is very little information about the outcome of delirium after stroke, especially considering the long-term consequences. So far, there is an adequate report on this for twelve months of patient monitoring (1).

Post-stroke delirium is associated with increased length of hospital stay, increased mortality, increased risk of institutionalization, increased need for geriatric rehabilitation, increased functional dependency on another person for up to six months, and an increased mortality rate (1, 2, 3).

2. AIM

Aim of article was to evaluate mortality and the degree of functional disability of post-stroke delirium.

3. PATIENTS AND METHODS

This prospective study was conducted at the Department of Neurology, University Clinical Center in Tuzla for the period of September 2014 to August 2015. During the study period we used test group of 100 patients with delirium in the acute phase of stroke. The control group consisted of the same number of patients without delirium in the acute phase of stroke. Both groups were matched by gender, age, location, type and severity of stroke. The study group included patients who meet the following criteria: diagnosis of cerebral infarct (ischemic or hemorrhagic) confirmed by computed tomography and/or magnetic resonance imaging of the brain; Neuropsychiatric assessment of delirium being performed within seven days after stroke onset; Glasgow Coma Scale (GCS) score > 8; given written consent for participation in the study by the patient or the patient's immediate family member (4). Patients that had GCS score <8 on the day of neuropsychological examination were excluded from the study, and so were patients with epileptic seizures onset of stroke, aphasia, with confirmed early stage dementia (heteroanamnestic data obtained from

Type of stroke		Mortality						
		With delirium		Without delirium		Total		p*
		N	%	N	%	N	%	
	Survivor	60	37.0	78	48.1	138	85.2	
IS								0.0005
	Died	21	13.0	3	1.9	24	14.8	
	Total	81	50.0	81	50.0	162	100.0	
	Survivor	13	34.2	17	44.7	30	78.9	
HS								0.2
	Died	6	15.8	2	5.3	8	21.1	
	Total	19	50.0	19	50.0	38	100.0	

Table 1. Mortality of patients with and without delirium in relation to the type of stroke

relatives, earlier medical findings and based on dementia Score results), patients with confirmed alcohol abuse, patients with previously verified mood disorders, patients who had previously taken medication that could cause delirium (5). Comprehensive neurological, neuropsychiatric and neuropsychological assessments were performed in five periods:

- First test–in the acute phase of stroke (first week of stroke onset).
- Second test–at discharge or after one month of discharge from hospital.
- Third Test–three months after stroke.
- Fourth test–six months after stroke.
- Fifth Test–twelve months after stroke.

The presence of delirium was assessed according the Delirium Rating Scale R-98 and the Diagnostic and Statistical Manual of Mental Disorders–Fourth Edition criteria for delirium within 24 hours after hospitalization by one of the authors of this research. The final neuropsychological assessment was performed during the third or fourth day of hospital stay by two of the coauthors of this study and neither did the first assessment. Authors of this study, all neuropsychiatrists delirium experts who used DRS R-98 scale and the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition criteria independently. In order to diagnose delirium patients had to meet the criteria according to both assessments. For all patients we also used diagnostic tools:

- Glasgow Coma Scale (at first and second testing) (4);
- Delirium Rating Scale (in all tests) (5);
- National Institutes of Health Stroke Scale-NIHSS (in all tests) (6;
- Mini Mental Test (at the third, fourth and fifth testing) (7).

Identification of delirium symptoms was performed using the Scale for the assessment of delirium-R-98 (DRS-R-98) and the criteria for delirium according to the Fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (5, 8). Delirium was diagnosed in those patients who had more than 16 points on the DRS-R-98 and who meet the criteria for delirium according to DSM-IV. Patients with a score of 16-32 were selected to the milder form and those over 32 as a more severe form of delirium.

Computed tomography and magnetic resonance imaging of the brain were interpreted by the radiologist who was not familiar with the research objectives and hypotheses, and based on whose results were found: type of stroke, localization of lesions, size of the lesion and silent infarcts.

Magnetic resonance imaging of the brain was performed

in patients with clinical signs of brain stem lesions, with negative findings on computed tomography of the brain, or when necessary to supplement the findings. Strokes by type are divided into: hemorrhagic and ischemic stroke.

The degree of neurological deficit was evaluated on the admission by Stroke Scale score of the National Institutes of Health USA (National Institute of Health Stroke Scale-NIHSS) (6). Testing was done for each variable to a normal distribution using the Kolmogorov-Smirnov test, and histogram display. To estimate the statistical significance of differences obtained results we used: Chi-square test. All statistical tests were done with the level of statistical probability of 95% (p <0.05).

4. RESULTS

Delirious patients had a significantly higher mortality (p = 0.0005). In relation to the type of stroke mortality was significantly higher in patients with delirium after ischemic stroke (p = 0.0005) (Table 1).

The patients without delirium had significantly better cumulative survival during the first year after stroke (p = 0.0005) (Table 2).

Delirious patients aged ≥65 years had a significantly lower cumulative survival during the first year after stroke (p = 0.0005) (Table 3).

In relation to the type of stroke delirious patients with ischemic had a significantly lower cumulative survival during

Days death	With delirium %	Without delirium %	p*
≥30 days	89.0	98.0	
≥90 days	82.0	97.0	
≥180 days	79.0	97.0	
≥365 days	73.0	95.0	**0.0005**

Table 2. The cumulative survival of patients during the first year after stroke. *Kaplan Meier-Log Rank test

Days death	With delirium ≥ 65 years %	Without delirium ≥ 65 years %	p*
≥30 days	86.5	96.9	
≥90 days	77.0	95.3	
≥180 days	74.3	95.3	
≥365 days	67.6	93.8	**0.0005**

Tabela 3. The cumulative survival of patients during the first year after stroke for age. *Kaplan Meier-Log Rank test

Days death	With delirium-IS %	Without delirium-IS %	p*
≥30 days	90.1	98.8	
≥90 days	80.2	97.5	
≥180 days	79.0	97.5	
≥365 days	74.1	96.3	**0.0005**

Table 4. The cumulative survival rate for one year after strok compared to ischemic stroke. *Kaplan Meier-Log Rank test; Ischemic stroke (IS);

the first year after stroke (p = 0.0005) (Table 4).

Delirious patients had a greater degree of functional impairment at discharge (p = 0.01), three (p = 0.01), six months (p = 0.01) and one year (p = 0.01) after stroke.

5. DISCUSSION

Delirium is an independent indicator of the increase in mortality at discharge and 12 months after the occurrence (9, 10). Gustafson, Hennon, Sheng and colleagues in their studies announced similar results previously mentioned (1, 2, 3).

Adamis et al. have reported that of 164 patients during hospitalization 14 patients (8.5%) died, of which 6 patients with delirium (11). There was no statistically significant difference in mortality between patients with delirium and without delirium.

Belleli and colleagues analyzed over the three years 1278 consecutively admitted patients aged ≥65 years to rehabilitate (12). Announced that patients with preexisting dementia and the resultant delirium during hospitalization had twice the increased risk of mortality than patients with and without dementia and patients with and without delirium.

The study Dostovic of 59 patients who had delirium in the acute phase of stroke 11 (18.6%) died during hospitalization, and survived the 48 (81.4%) (13). The mortality of patients with delirium in the acute phase of stroke was significantly higher than in patients without delirium.

The study Eeles et al. is established and that delirium was associated with an increased risk of death up to five years after its formation, and such patients had an increased need for permanent institutionalization in institutions for geriatric rehabilitation, a higher degree of functional dependence, more comorbid conditions and a higher incidence of preexisting cognitive dysfunction (14).

Witlox, et al. in their meta-analysis show the connection between delirium elderly people with poor outcome (15). The primary analysis of the adjusted hazard ratio showed that delirium is associated with increased risk of death compared to those without delirium.

This study found that the mortality of patients with delirium after stroke significantly higher than in patients without delirium. Delirium significantly affect the survival of patients during the first year after a stroke. Delirious patients compared to those without delirium have a significantly lower cumulative survival. Delirium after stroke significantly deteriorating functional disability patients.

In a recent study Chong et al. indicating that the placement of patients to delirium in units delirium, where the principles of integrated prevention and modern treatment

and care of such patients, contributed to the better outcome of these patients (16). These units should have, in addition to organized standard of care and treatment, and the use of organized evening light therapy for consolidation of circadian rhythms and improve sleep. Medical staff in Units for delirium would be specially trained for treatment and care of these patients and there would be a 24-hour supervision.

6. CONCLUSION

Delirious patients have a significantly higher mortality, lower cumulative survival and a greater degree of functional disability in the first year after stroke.

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