Incidence of Secondary Vascular Complications After Stroke

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ORIGINAL PAPER
SUMMARY
Stroke is a clinical syndrome characterized by the sudden occurrence of a permanent focal neurological deficit. The most common causes of death are transtentorial herniation, pneumonia, pulmonary embolism and heart disease. According to literature data, pulmonary embolism (PE) is responsible for 5% of deaths after stroke. AIM: The aim of this article is to determine the incidence of patients who had secondary vascular complications in the form of PE and deep venous thrombosis (DVT) after stroke and indicate the need for creating and promoting the algorithm for these complications in patients after stroke. MATERIAL AND METHODS: The study included 86 patients hospitalized at the Clinic of Physical Medicine and Rehabilitation in the period from October 2008 to October 2009 who have had rehabilitation as a continuation of the treatment immediately after the stroke. RESULTS: Hemorrhagic type was present in 13% of patients, and ischemic in 87%. As a secondary complication after stroke, five patients had pulmonary embolism. Neurological deficit in these patients was in the form of hemiplegia and were with ischemic type. Time from stroke until the appearance of symptoms of pulmonary embolism was in average 25.4 days. Suggested thrombi prophylaxis therapy (which they received before rehabilitation) in patients who have developed PE was Aspirin Protect, while no patient had recommended low molecular heparin. Physical therapy was performed for all patients, and mechanical methods of prophylaxis were used. CONCLUSION: Different attitudes about prophylaxis effects for these patients should be regulated by a unique algorithm that would reduce the possibility of discrepancy in therapeutic sense. That is why for patients with acute stroke and limited mobility it is recommended to use heparin or low molecular heparin (LMH) in preventive doses, if there are no contraindications for anticoagulants, with physical therapy and mechanical methods of prophylaxis.

Keywords: stroke, pulmonary embolism, prevention

1. INTRODUCTION

Stroke is a clinical syndrome characterized by the sudden emergence of a permanent focal neurological deficit, with vascular genesis–hemorrhage or ischemia of the brain blood vessels, and the symptoms which match the location and size of brain damage and the time passed since the beginning of stroke.

Epidemiological data show that diseases of the blood vessels are the enemy number one of modern man. Cerebrovascular diseases including stroke, among which the most prominent is stroke, are the third most important cause of illness and mortality, and the leading cause of disability in the world. Incidence of stroke was 200/100 000 inhabitants in 1960, and today it has reached even 500/100 000. Mortality in case of hemorrhagic stroke during the first month was 80% (mainly during the first three days), and from ischemic stroke 15%. The most common causes of death are transtentorial herniation, pneumonia, pulmonary embolism, heart disease.

Variable risk factors for the occurrence of stroke are hypertension, heart disease (ischemia, valves, and arrhythmias), tobacco smoking, diabetes, hyperlipidemia, eritrocitosis, increased fibrinogen, overweight and stress, and their regulation may affect the manifestation of stroke. Permanent factors such as age, sex, race, hereditary risk factors should not be ignored, although on them we cannot influence.

Treatment and rehabilitation require significant funds, and given that in two thirds of patients stroke causes disability that often causes permanent disability or sickness, so the consequences of stroke and influence on the financial burden of a state.

It is estimated that as many as 46% of cases of stroke occurs in the productive age in the general population between the 45 and 59 years of age. The time required for rehabilitation after stroke depends on its severity. Two-thirds of patients after stroke survive and recover to a greater or less autonomy, and the third was permanently disabled for independent living and is dependent on someone else's help. If the patient does not recover enough to be capable of working, implementation of preventive measures increasing the risk of repeated stroke, which can be fatal.

Rehabilitation procedures begin on the first or second day of acute treatment performed immediately after the diagnosis and acute medical intervention. Rehabilitation has several objectives. Preventive activities are aimed at the prevention of ulcers, respiratory infections, urinary infections, thrombophlebitis, control with implementation of intermittent bladder catheterization and electro-stimulation, early mobilization of patients during the first 24 to 48 hours of the onset of the disease, and condition for this is cardiopulmonary stability.

Prevention of secondary complications, such as thrombophlebitis and pulmonary embolism are of great importance for the final outcome of this disease. According to literature data pulmonary embolism (PE) is responsible for 5% of deaths after stroke. That's why for patients with acute stroke and limited mobility, it is recommended to use heparin and LMH in preventive doses, if there are no contraindications for anticoagulants (Grade 1A) (1, 2).

Data from 70 clinical studies on 16 000 patients reported that extensive use of prophylaxis can prevent 50% of PE and 66% of deep vein thrombosis (DVT) (3, 4).

Studies have also shown that the use of aspirin cannot be considered as prophylaxis of pulmonary embolism and DVT (5).

2. GOAL

To determine the incidence of patients who had vascular complications in the form of PE or DVT after stroke, and indicate the need to create and promote the prevention of these complications algorithm for patients after stroke.

3. MATERIAL AND METHODS

The subjects of this study were hospitalized patients at the Clinic of Physical medicine and Rehabilitation between October 2008 and October 2009 with rehabilitation conducted as a continuation of the treatment immediately after the stroke and who had a pulmonary embolism as a secondary compli-

Gender	Stroke
M	47 (55%)
F	39 (45%)
Total	86 (100%)

Table 1. Number and gender of patients with stroke treated in period 2008-2009 at the Clinic of Physical Medicine and Rehabilitation, n=86

Type of stroke	M	F	Total
hemorrhagic	8 (10%)	3 (3%)	11 (13%)
ischemic	39 (45%)	36 (42%)	75 (87%)

TABLE 2. Type of stroke among patients treated in period 2008-2009 at the Clinic of Physical Medicine and Rehabilitation, n=86

cation. Necessary data were collected from available medical records, and then processed and displayed in tables.

4. RESULTS

In the period from October 2008 until October 2009 at the Clinic of Physical Medicine and Rehabilitation were hospitalized 86 patients as a continuation of treatment after stroke. There were 47 (55%) men and 39 (45%) women.

Gender	PE	DVT
M	3 (3.4%)	10 (12.1%)
F	2 (2.4%)	6 (6.8%)
Total	5 (5.8%)	16 (18.9%)

TABLE 3. Secondary vascular complications in form of thrombophlebitis and pulmonary embolism in patients with stroke treated in period 2008-2009 at the Clinic of Physical Medicine and Rehabilitation, n=86

Hemorrhagic stroke was recorded in 13% of patients and ischemic in 87% of patients. Out of these, hemorrhagic stroke had 8 (10%) males and 3 (3%) women, while ischemic stroke was recorded in 39 (45%) of males and 36 (42%) women. The average life span was 50.3 years of age.

Neurology deficit	N	%
Hemiplegia	5	100
Hemiparesis	0	0

TABLE 4. Type of neurology complications in patients with pulmonary embolism after stroke (ischemic) treated in period 2008-2009 at the Clinic of Physical Medicine and Rehabilitation n=5

Secondary vascular complications in the study were present in 21 (24.7%) patients and in the form of thrombophlebitis in 16 (18.9%) patients, and pulmonary embolism were diagnosed in 5 (5.8%) patients of which one died.

All patients in whom pulmonary embolism was diagnosed had a neurological deficit in form of hemiplegia.

Thrombo-prophylaxis	N	%
Aspirin protect	5	100
Low molecular heparin	0	0
Physical therapy	5	100
Mechanical prophylaxis methods	0	0

TABLE 6. Recommended prophylaxis in patients with pulmonary embolism after stroke (ischemic) treated in period 2008-2009 at the Clinic of Physical Medicine and Rehabilitation, n=5

Time from stroke to the appearance of symptoms of pulmonary embolism was accounted for an average of 25.4 days. With 2 patients symptoms PE occurred on 18 days after stroke diagnose and in one patient after 45 days.

Suggested prophylactic therapy (which patients received before admission) in patients who have developed pulmonary embolism was Aspirin protect, and neither one patient had administered low molecular heparin. Physical therapy was performed in all cases, and mechanical methods of prophylaxis are used.

5. DISCUSSION

It is estimated that as many as 46% of cases of stroke occurs in the productive age in the general population between the 45 and 59 years of age (6, 7). According to our research, the average age of patients with stroke was 50.3 years.

Stroke as a disease, unfortunately, takes more and more important place on the lists of morbidity and mortality. Modern treatment allows reduced level of disability for these patients, but to secondary complications should be given greater attention, and thereby treatment costs will be significantly reduced.

Days	Patient 1.	Patient 2.	Patient 3.	Patient 4.	Patient 5.
10-20			+		+
21-30	+	+			
>30				+	

TABLE 5. Time from stroke (ischemic) until occurrence of pulmonary embolism symptoms in patients with PE after stroke treated in period 2008-2009 at the Clinic of Physical Medicine and Rehabilitation, n=5

In our study occurred complications in patients with ischemic stroke and neurological deficit of hemiplegic type were also treated with aspirin protect which did not lead to sufficient prophylaxis in accordance with the literature data of other authors (5). Studies that have examined the occurrence of DVT and PE in patients after stroke speaks about the benefit of applications of low molecular heparin for prevention of DVT and PE (8).

Modern trends of treatment in surgery, especially loco motor until few years ago represented a difficulty due to the appearance of DVT and pulmonary embolism, especially after surgery on the hip. Rehabilitation programs were significantly slowed due to frequent appearance of DVT and something less pulmonary embolism. With the introduction of prophylaxis protocols, referred secondary complications almost disappeared (9, 10).

Similar problems occur in patients with stroke. Rehabilitation programs must often be stopped because of the appearance of DVT and pulmonary embolism. Different attitudes about prophylaxis effects for these patients should be regulated by a unique algorithm that would reduce the possibility of discrepancy in therapeutic sense.

6. CONCLUSION

Secondary complications in the form of DVT and PE after stroke are a major burden, both for the patients–if they continue treatment in home conditions and for health workers that provide care. If the patients are in rehabilitation facilities in the continuation of treatment, then all programs of rehabilitation must be stopped, which has influence on the outcome of treatment–the duration of treatment and increase the treatment.

All studied patients had hemiplegia, which further highlights the need for more sophisticated medical prophylaxis. Physical therapy and mechanical methods of prophylaxis remain as an essential part of supportive preventive medication programs.

There is no definite algorithm for the prevention of complications in the term of DVT/PE. The current approach to the problem is individual and inadequate, and this applies especially to the initial use of low molecular heparin due to fear of possible subsequent brain

hemorrhage and avoidance of mechanical methods of prophylaxis.

Consequently the effectiveness of treatment and its continuity is not fully realized. This reflects on duration of treatment and total rehabilitation process. These are the key reasons for the imperative to create a unique algorithm, which would include the use of low molecular heparin with mechanical support, and prophylaxis for certain categories of patients with stroke along with already known adjuvant hormonal therapy.

Data on fatal consequences in this study cannot be considered as valid as there is no insight on complications which occurred within primary neurology treatment

DVT/PE after stroke is a clinical and public health problem that can be reduced through prevention. Given the actuality of problems it is necessary to conduct scientific research on a wider basis which would set guidelines that will indicate the way of prevention and on what basis we can reduce the mortality and cost of treatment for patients after stroke.

REFERENCES

1. Turpie AGG. et al. Semin Thromb Hemost, 1997; 23(2): 155.
2. Albers GW. et al. Chest, 2004; 126: 483S-512S.
3. Geerts WH. et al. Chest, 2004; 126: 338S-400S.
4. Leizorovicz A. et al. Circulation, 2004; 110(24 Suppl 1): IV13-9.
5. Maksimović Ž. Osnove vaskularne hirurgije i angiologije, CIBD. Medicinski fakultet, Beograd, 2004.
6. Geerts W H, Graham FP. et al. Prevention of venous thromborm-bolism: the seventh ACCP Conference on antithrombotic and thrombolytic therapy. Chest, 2004; 126: 338-400.
7. Dimitrijević J. Urgentna neurologija. Pliva, Sarajevo, 2005.
8. www.thelancet.com Vol369 april21. 2007
9. Geerts WH. et al. Chest, 2004; 126(3 Suppl): 338S-400S.
10. Nicolaides AN. et al. Int Angiol, 2006; 25: 101-61.

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