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Endovascular treatment of acute ischemic stroke – Own experience

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ABSTRACT

Objective: Presentation of the own experience in the treatment of ischemic stroke using endovascular methods of simultaneous evaluation of their effectiveness and safety.

Materials and methods: The retrospective study involved a group of 18 patients hospitalized in 2005–2012 who were treated with intraarterial thrombolysis and mechanical thrombectomy. Overall there were 24 procedures performed. The investigated group consisted of seven (38.89%) women and 11 (61.11%) men. The average age of the patients was 60 years (SD ± 17, median – 60 years).

Results: In 62.50% of cases ($n = 15$) the effect of revascularization has been achieved and another 12.50% of cases ($n = 3$) recanalization was achieved only partially. Only in 25% of procedures ($n = 6$) failed to achieve recanalization of the artery (TICI ≤ 1). The highest percentage of recanalized arteries were obtained by following the procedure of thrombolysis targeted – 69.24% (TICI ≥ 2b). In the case of mechanical thrombectomy total patency (TICI ≥ 2b) was 54.55%. The average duration of treatment (operation) is 157 min. After 30 days successful result of the neurological status was achieved in 57.14% of patients ($n = 8$). Full return to independent functioning as defined within 3 months after the surgery (mRS ≤ 2) reached 57.14% of patients ($n = 8$).

Conclusion: Studies suggest that endovascular techniques are effective and safe in the treatment of ischemic stroke. Greater efficiency is characterized by intraarterial thrombolysis. Patients who were treated endovascular improved significantly.

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Abbreviations: rt-PA, recombinant tissue plasminogen activators; NIHSS, National Institutes of Health Stroke Scale; mRS, modified Rankin scale; DSA, digital subtraction angiography; MR-DWI, magnetic resonance diffusion weighted imaging; TICI, thrombolysis in cerebral infarction; TIMI, thrombolysis in myocardial infarction.

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1. Introduction

Stroke is the third leading cause of death and a major cause of disability in adults. Annually in our country due to stroke hospitalized is about 60 000 of people. The incidence of stroke in Poland is 177 cases per 100 000 men and 125 cases per 100 000 women [1]. In subsequent years, the number of patients hospitalized with acute stroke may increase considerably, that is why it is crucial to develop new treatments for this disease.

Recanalization of occluded artery is strongly associated with improved functional outcomes and reduced mortality [2]. Treatment of the acute ischemic stroke includes two possible methods of therapy: medication, mainly intravenous thrombolysis and endovascular treatment – intraarterial thrombolysis and mechanical thrombectomy. Intravenous thrombolytics (recombinant tissue plasminogen activator (rt-PA)) administered within 4.5 h after the onset of symptoms is standard procedure of treatment acute ischemic stroke [3,4]. The method of intravenous thrombolysis has a low percentage restoration of cerebral arteries patency [5,6]. Using endovascular methods such as: intraarterial thrombolysis and mechanical thrombectomy, extends the therapeutic window and allows to achieve larger number of successful recanalization [2,7,8].

The aim of this study (research) was to establishment the efficacy and safety of the endovascular management of stroke using endovascular techniques: intraarterial thrombolysis and mechanical thrombectomy.

2. Materials and methods

2.1. Patients

The retrospective study involved a group of 18 patients hospitalized in 2005–2012 who were treated with intraarterial thrombolysis and mechanical thrombectomy. In all cases assessed risk factors of stroke, the results indicate that the most common cause occurring in 66.67% of cases ($n = 12$), is hypertension. On further places there were found coronary artery disease, hyperlipidemia and diabetes (Fig. 1).

Overall 24 procedures were performed. Intraarterial thrombolysis was performed in 54.17% ($n = 13$) and mechanical thrombectomy was carried out in 45.83% ($n = 11$) interventions. The investigated group consisted of 7 (38.89%) women and 11 (61.11%) men. The average age of the patients was 60 years (SD ± 17; median 60 years; range 26–84 years).

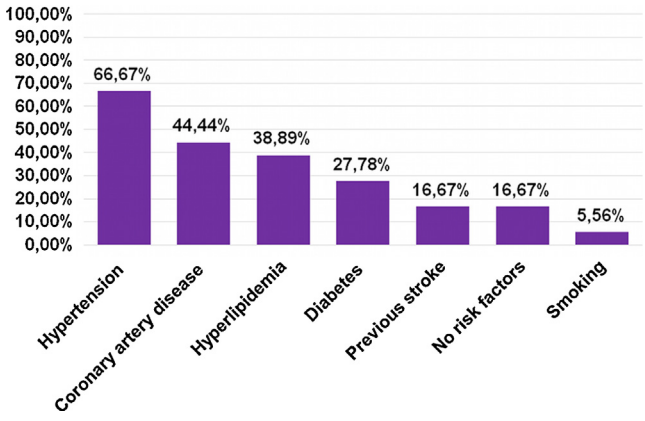

Fig. 1 – Risk factors of stroke.

Arterial occlusion refers to various cerebral arteries. Most frequently (22.22%) obliteration involved middle right cerebral artery. Subsequently, occlusion occurred in the basilar artery and the left middle cerebral artery (Table 1).

2.2. Conditions for being qualified to the procedure

To evaluate neurological deficit in patients with ischemic stroke National Institutes of Health Stroke Scale (NIHSS) has been used. The assessment of the neurological status before the surgery was performed in the emergency room. Afterwards, depending on the availability of diagnostic methods, the patients were mainly examined by using TK ($n = 14$), angio-CT ($n = 13$) and DSA ($n = 8$) (Fig. 2). First of all, CT was performed to patients with suspected stroke, to exclude intracerebral hemorrhage, subdural and epidural hematoma, and to confirm ischemia and determine the extent of ischemic damage. Angio-CT conducted for the identification and location of the occlusion. One patient underwent MR-DWI. All inclusion/exclusion criteria that were used to qualify for the endovascular treatment are shown in Tables 2 and 3.

2.3. Devices and description of the procedure

2.3.1. Intraarterial thrombolysis

- Invasive technique of the treatment of acute ischemic stroke.
- The time window for this technique is up to 6 h from the onset of symptoms.
- It involves the direct introduction of fibrinolytics to the clot within the obstructed vessel.
- This causes a local increase of the fibrinolytics concentration which is high enough to dissolve the clot, while maintaining low systemic concentrations. This is effective in preventing side effects.
- Medications: rt-PA dose <0.9 mg/kg (approximately 50 mg).

Course of treatment: surgery was performed under general anesthesia. At the beginning of the procedure there was a venipuncture of the femoral artery on the right side and the catheter was introduced by the Seldinger method. Then, the contrast media administered to show the obstructed cerebral

Table 1 – The most common location of obstruction.

Location	Number	%
Right middle cerebral artery (MCA R)	6	22.22
Basilar artery (BA)	5	18.52
Left middle cerebral artery (MCA L)	5	18.52
Right internal carotid artery (ICA R)	3	11.11
Left vertebral artery (VA L)	3	11.11
Right anterior cerebral artery (ACA R)	2	7.41
Superior cerebellar artery (SCA R)	1	3.70
Left internal carotid artery (ICA L)	1	3.70
Right posterior cerebral artery (PCA R)	1	3.70