

**UNIWERSYTET RZESZOWSKI
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**OKOŁOZABIEGOWE WARTOŚCI CIŚNIENIA
TĘTNICZEGO A WYNIKI LECZENIA UDARU
NIEDOKRWIENNEGO MÓZGU METODĄ
TROMBEKTOMII MECHANICZNEJ**

Streszczenie rozprawy doktorskiej

Promotor:

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1. SUMMARY

Introduction:

Mechanical thrombectomy is the most effective treatment method of acute ischemic stroke caused by large intracranial vessel occlusion. However, there is still a group of patients not achieving functional independence despite fast and successful recanalization. They count for about two thirds of treated individuals. Then the search for potential modifiable factors that affect management outcome appears to be one of the topmost priority. The periprocedural blood pressure could be one of those factors.

According to current state of knowledge, changes of blood pressure that are elevation, uncontrolled falls or increased variability can worsen the outcome of the unselected group of acute ischemic stroke patients. Among the endovascularly treated individuals, the extent of brain ischemia and procedural factors (e.g. need for anesthesia) can cause these changes to be even more pronounced and have deeper consequences. The data from observational (mostly retrospective) studies seems to confirm this statement. The paucity of studies, mostly limited to one phase of periprocedural period and inconsistency of individual factor evaluation makes the comprehensive analysis of hemodynamic parameters impact on endovascularly treated patients worth conducting.

Aim of study:

The aim of this study is to evaluate the association of periprocedural blood pressure and their changes with mechanical thrombectomy short and long term outcome, as well as procedure complications in the settings of acute ischemic stroke.

Materials and method:

The patient individual data of mechanical thrombectomy treated patients between December 2018 and December 2019 at the single academic stroke center was retrospectively reviewed. The study group consisted of 148 individuals.

The blood pressure was measured noninvasively at admission, in 5-minute intervals during the procedure and 5 minutes after its termination. The studied hemodynamic parameters consisted of systolic/diastolic/mean arterial blood pressure and pulse pressure at admission and at the end of the treatment procedure, maximal systolic/diastolic/mean arterial blood pressure

during treatment before successful recanalization (or termination of procedure in case of futile recanalization), and also the difference between aforementioned values and their equivalent at admission.

The treatment outcome markers were: modified Rankin Scale 3 months after management (long term treatment outcome; favorable outcome was 0-2 points), 3-month mortality, short term outcome parameters (early neurological improvement, in-hospital mortality, prolonged hospitalization), successful recanalization (grade 2b or 3 in modified Treatment in Cerebral Ischemia scale). The hemorrhagic transformation, symptomatic intracranial hemorrhage and cerebral oedema causing midline shift were considered as treatment complications.

The statistical analysis was conducted using the PQStat Software 1.8. The p value below 0,05 was considered statistically significant.

Results:

The systolic blood pressure values was significantly higher among patients with unfavorable long term treatment outcome ($p=0,041$) and in the subgroup of anterior circulation large vessel occlusion patients without hypotension at admission it was the independent risk factor for functional dependency at 3 months after treatment (adjusted OR for every 10 mmHg increase 1,24; 95% CI 1,00-1,53; $p=0,046$). Every 10 mmHg increase of admission systolic blood pressure independently elevated the risk of cerebral oedema with midline shift (adjusted OR 1,17; 95% CI 1,00-1,36; $p=0,043$) and lessened the chance for early neurological improvement (adjusted OR 0,84; 95% CI 0,71-0,99; $p=0,039$).

In the group of individuals functionally dependent at 3 months after management the maximal procedural systolic arterial pressure significantly more often exceeded the 180 mmHg threshold ($p=0,048$). The elevation of systolic blood pressure during procedure was also associated with treatment complications (hemorrhagic transformation of brain ischemia, cerebral oedema with midline shift).

General anesthesia was associated with significantly higher risk of over 40% decrease of mean arterial pressure (adjusted OR 11,8, 95% CI 1,5-91,0, $p=0,018$) with such a decrease itself being the independent risk factor of unfavorable long term treatment outcome (adjusted OR 5,52; 95% CI 1,9-16,0; $p=0,002$), 3-month mortality (adjusted OR 2,35; 95% CI 1,00-5,53; $p=0,049$), unfavorable short term outcome parameters (prolonged hospitalization, lost chances

for early neurological improvement) and procedure complications (symptomatic intracranial hemorrhage, cerebral oedema with midline shift).

The elevation of post-procedural systolic arterial pressure ($p=0,028$) and 10% increase of diastolic arterial pressure above its admission value ($p=0,028$) were associated with symptomatic intracranial hemorrhage occurrence.

Conclusions:

1. The systolic blood pressure at admission is inversely associated with long term treatment outcome of mechanical thrombectomy and in the subgroup of anterior circulation large vessel occlusion patients without hypotension at admission it is an independent risk factor for functional dependency at 3 months after treatment.
2. The admission systolic arterial pressure is an independent risk factor for cerebral oedema with midline shift and decreases the chances of early neurological improvement.
3. There was no association of post-procedural blood pressure parameters with short and long term outcome of mechanical thrombectomy treatment, however these findings could be affected by methodology of this study and the anesthesia modality used.
4. The elevation of post-procedural systolic arterial pressure is associated with symptomatic intracerebral hemorrhage occurrence.
5. There was no significant association of lowest blood pressure values during mechanical thrombectomy procedure with short/long term treatment outcome or procedural complications. These observations could be affected by the procedural factors such as no procedural hemodynamic parameters thresholds established prior to treatment.
6. The higher values of maximal systolic blood pressure during treatment are associated with treatment complications (increased risk of infarct hemorrhagic transformation and cerebral oedema with midline shift) and crossing the 180 mmHg threshold in the anterior circulation vessel occlusion subgroup with functional dependency as well.
7. The blood pressure drop during mechanical thrombectomy is a frequent finding: over 20% decrease of admission mean arterial pressure value is seen in over two thirds and over 40% in about one third of patients.

8. General anesthesia is an independent risk factor of blood pressure drop during mechanical thrombectomy treatment.
9. The mean arterial blood pressure decrease is an independent risk factor of unfavorable clinical outcome, and its over 40% decrease of admission value also of 3-month mortality, prolonged hospitalization, lack of early neurological improvement, symptomatic intracranial hemorrhage and cerebral oedema with midline shift.
10. The over 10% post-procedural increase of diastolic blood pressure was independently associated with symptomatic intracranial hemorrhage.

Keywords: acute ischemic stroke, mechanical thrombectomy, blood pressure, hemodynamic parameters.