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Clinical outcomes of acute ischemic stroke patients treated by direct catheter-based trombectomy depending on their baseline characteristics

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ABSTRACT

Background: Direct catheter-based thrombectomy (d-CBT) was proven to be an effective treatment for proximal occlusions of the major intracranial arteries in acute stroke patients. The aim of this study was to compare clinical outcomes of patients treated by d-CBT depending on their baseline characteristics.

Methods: A single center, prospective, observational registry of consecutive patients (pts) treated by d-CBT for an acute ischemic stroke. The degree of dependence after a stroke was measured by the modified Rankin scale (mRS) at 3 months follow-up and pts were divided into 2 subgroups based on functional independence/dependence (mRS 0–2 vs. 3–6).

Results: A total of 111 consecutive patients (mean age 65.9 ys, men 55%) have been enrolled. A favorable outcome (mRS ≤ 2 at 3 months) was reached in 39.8% (44 pts). The pts with favorable outcome (mRS ≤ 2) compared to pts with poor outcome (mRS 3–6) were younger (61 ys vs. 70 ys, $p < 0.01$), had higher prevalence of cigarette smoking (45.5% vs. 25.4%, $p < 0.002$) and had lower prevalence of known atrial fibrilation (25% vs. 53.7%, $p < 0.001$). There were no significant differences between the subgroups in: sex (men 50% vs. 58%, $p = 0.27$), body mass index (27.8 vs. 29.2, $p = 21$), arterial hypertension (70.5% vs. 77.6%, $p = 0.26$), diabetes mellitus (15.9% vs. 25.4%, $p = 15$), chronic kidney disease (11.4% vs. 22.4%, $p = 0.08$) and NIHSS on admission (15 vs. 18, $p = 0.69$).

Conclusions: Mechanical thrombectomy achieved better clinical results in younger patients, in smokers and in patients with stroke not caused by atrial fibrillation.

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Background

According to estimates by the World Health Organization, stroke is the second leading cause of preventable death worldwide and the leading cause of serious, long-term disability [1]. It is also the second most common cause of dementia, the most frequent cause of epilepsy in the elderly, and a frequent cause of depression [2,3]. Stroke mortality rate decreased from 1990 to 2010 by 37% in high-income countries and by 22% in low-income countries. Globally, in 2010, the incidence-to-mortality ratio was 0.35 [4]. A majority of strokes (87%) are classified as ischemic, the rest (13%) as hemorrhagic [5]. Approximately 15% of all acute ischemic strokes are caused by atrial fibrillation.

Arterial hypertension, diabetes, current smoking, cardiac causes, abdominal obesity, poor diet, physical inactivity, heavy alcohol consumption, abnormal lipid profile and psychosocial stress/depression are recognized as major population-level risk factors for stroke. However, the impact of modifiable risk factors on stroke incidence is not equal among different ethnic groups, sexes, or age groups [6–10].

Death or severe disability occur in patients with emergent large vessel occlusion. Until recently, intravenous tissue plasminogen activator (t-PA) was the only proven treatment for large vessel occlusion. However, the landscape of ischemic stroke treatment has changed with the publication of five randomized multicenter controlled clinical trials in 2015. According to these trials, the direct catheter-based mechanical thrombectomy (d-CBT) was proven to be an effective treatment for proximal occlusions of the major intracranial arteries in acute stroke patients, and became the class IA indication for patients presenting within less than 6 h from symptom onset [11–14].

The aim of this study was to compare clinical outcomes of patients treated by d-CBT depending on their baseline characteristics.

Methods

A single center, prospective, observational registry of consecutive patients (pts) treated by d-CBT for an acute ischemic stroke. The study was based on the pre-specified protocol approved by the Ethic Committee and was designed in collaboration with cardiologists, neurologists, interventional neuroradiologists and radiologists. All participants (or legal representatives) provided written informed consent. Inclusion criteria were: moderate to severe acute ischemic stroke (National Institutes of Health Stroke Scale score ≥ 6), time interval < 6 h from symptom onset (except for basilar artery occlusion, where the therapeutic window was not strictly limited and the treatment strategy was assessed individually) or CT scan < 2 h from time of "wake-up stroke" diagnosis, non or only small ischemia visible on the admission CT scan, CT evidence for an occluded major artery (either CT-angio or dense artery sign on CT scan), expected ability to start intervention within <60 min from CT and age ≤ 18 ys. Exclusion criteria were: previously known neurologic symptoms (mRS 2–5), known severe hypoglycaemia, intracranial bleeding, CT evidence of large ischemia and pregnancy.

Table 1 – Modified Rankin scale (mRS).

0 – No symptoms.
1 – No significant disability. Able to carry out all usual activities, despite some symptoms.
2 – Slight disability. Able to look after own affairs without assistance, but unable to carry out all previous activities.
3 – Moderate disability. Requires some help, but able to walk unassisted.
4 – Moderately severe disability. Unable to attend to own bodily needs without assistance, and unable to walk unassisted.
5 – Severe disability. Requires constant nursing care and attention, bedridden, incontinent.
6 – Dead.

The primary endpoint was a functional neurologic outcome in three months assessed by board-certified neurologists. The secondary endpoints were angiographic recanalisation rate, change of the National Institutes of Health Stroke Scale score (ΔNIHSS) from admission to discharge and symptomatic intracranial bleeding (defined as ΔNIHSS ≥ 4 within 48 h after intervention). The degree of dependence after a stroke was measured by the modified Rankin scale (mRS) 3 months follow-up and patients were divided into 2 subgroups based on functional independence or dependence (mRS 0–2 vs. 3–6; Table 1).

The study registry included patients' baseline characteristics, e.g. age, sex, body mass index, prior stroke/transient ischemic attack, known coronary and peripheral arterial disease, arterial hypertension, hyperlipidemia, diabetes mellitus, chronic kidney injury, current smoking (defined as ≥ one month prior to admission), atrial fibrillation (known or de novo identified during the hospitalization), chronic antithrombotic therapy, time intervals (symptoms onset – door time – CT scan – needle time (if) – groin puncture time – recanalisation time (if)), change of NIHSS from admission to discharge and angiographic findings (type of occluded artery, pre- and postprocedural TICI flow). During the hospitalization, sonography of the carotid arteries and transthoracal echocardiography were performed in all patients to exclude other possible sources of embolization.

Results

A total of 111 consecutive patients (mean age 65.9 ys, men 55%) were enrolled. A favorable outcome (mRS ≤ 2 at 3 months) was achieved in 39.8% (44 pts, men 50%). The patients with favorable outcome (mRS ≤ 2) compared to patients with poor outcome (mRS 3–6) were younger (61 ys vs. 70 ys, $p < 0.01$) and had higher prevalence of cigarette smoking (45.5% vs. 25.4%, $p < 0.002$). In addition, this subgroup had a lower prevalence of known or de novo identified atrial fibrillation (25% vs. 53.7%, $p < 0.001$), which may be related to lower frequency of any antitrombotic therapy (31.8% vs. 49.3%, $p = 0.02$) in this subgroup.

There were no significant differences between the subgroups in: sex (men 50% vs. 58%, $p = 0.27$), body mass index

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