Mechanical thrombectomy in stroke in nonagenarians: useful or futile?

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Background: Mechanical thrombectomy is the standard treatment in acute ischemic stroke due to large vessel occlusion, but there is limited evidence about its efficacy in very old patients. We sought to analyse safety and effectiveness of mechanical thrombectomy in nonagenarian versus octagenarian patients. *Methods:* We included consecutive patients with acute ischemic stroke due to large vessel occlusion subjected to mechanical thrombectomy, during 29 months in a tertiary center. Patients were divided into two sub-groups, according to age: 80−89 and >90 years old. Recanalization, complications, functional outcome and mortality at discharge and at 3 months were compared. Multivariable analysis was performed to identify independent predictors of functional outcome at 3 months of follow-up, assessed by the modified Rankin Scale. *Results:* A total of 128 octogenarians (88.9%) and 16 nonagenarians (11.1%) met the inclusion criteria. Successful revascularization was achieved in 87.5% of octagenarians and in 81.3% of nonagenarians ($p = 0.486$). Symptomatic hemorrhage occurred in 3.1% and 6.3% of younger and older patients, respectively ($p = 0.520$). Cerebral edema occured in 35.2% of octagenarians versus 25.0% of nonagenarians ($p = 0.419$). Functional independence (mRS ≤ 2) at 3 months was achieved in 28 (22.6%) and 5 (31.3%) of octagenarians and nonagenarians, respectively ($p = 0.445$). Mortality at 3 months was not significantly higher in nonagenarians (37.5%) versus octagenarians (33.9%, $p = 0.773$). *Conclusions:* No significant diferences were found in functional outcome, mortality, recanalization and complication rates between octagenarians and nonagenarians submitted to mechanical thrombectomy, underlining that patients should not be excluded from mechanical thrombectomy based on age alone.

Keywords: Acute stroke—Aging—Thrombectomy—Cerebrovascular disease—Ischemic stroke—Computerized tomography—Angiography

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Received May 13, 2020; accepted May 31, 2020.

Grant support: none

To this study ethics approval was obtained from the local institutional review board and this board waived the need for patient consent.

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1052-3057/$ - see front matter

https://doi.org/10.1016/j.jstrokecerebrovasdis.2020.105015

Introduction

Stroke is a leading cause of disability and represents the second most common cause of death worldwide.[1] Elderly people are more vulnerable to stroke, meaning that with the aging of general population, the burden of cerebrovascular disease will increase.[2]

In patients with acute ischemic stroke due to intracranial large vessel occlusion (LVO) of the anterior circulation, mechanical thrombectomy (MT) is the standard treatment.[3] However, there is uncertainty about the efficacy of this treatment in elderly people, especially in nonagenarians, as these patients were under-represented or even excluded from some of the landmark randomized clinical trials.[4,5]

It is relevant to evaluate the effectiveness of MT in patients aged ≥ 90 years-old, since they have more comorbidities, shorter life expectancy and possibly worse prognosis after stroke than younger patients. With the increasing numbers of MT and limited neurointerventional staff resources, MT procedures should be directed to patients that will benefit from recanalization.

In this retrospective study in a single center, we compare the functional outcomes, recanalization and complication rates in octagenarians versus nonagenarians with acute ischemic stroke due to LVO submitted to MT.

Material and Methods

Patients and Study Design

This is a retrospective observational analysis of 144 consecutive patients aged ≥ 80 admitted for acute ischemic stroke with LVO (intracranial internal carotid artery, middle cerebral artery - M1 or M2 segments - and basilar artery) treated with MT by the interventional neuroradiology team of [blinded for review], between January 2016 and May 2018.

The patients were divided according to age into two sub-groups: 80−89 and ≥ 90 years old.

Patient data was prospectivelly collected, and included demographic data (sex and age); past medical history (arterial hypertension, diabetes mellitus, hyperlipidemia, atrial fibrillation, coronary artery disease, cardiac insufficiency, previous stroke, active smoking); pre-admission medications (antiplatelet/ anticoagulant therapy); pre-stroke functional status (assessed by the modified Rankin Scale - mRS),[6] inferred from patient's previous medical records or information provided by the family; clinical stroke severity (assessed by National Institutes of Health Stroke Scale [NIHSS] score); severe stroke was considered if NIHSS > 15; stroke etiology (according to Trial Org 10172 in Acute Stroke Treatment [TOAST] classification);[7] severity of white matter age related lesions (assessed by age related white matter changes [ARWMC] scale);[8] early ischemic changes on head CT (computerized tomography) scan, according to Alberta stroke program early CT [ASPECTS] score,[9] intra-arterial thrombolysis; time between symptoms onset and arrival to our hospital; time between symptoms onset and recanalization; interventional procedure data, including arterial access, endovascular approach (stent retriever and/or aspiration devices), number of passes with thrombectomy device, time between arterial puncture and recanalization, recanalization status (according to modified thrombolysis in cerebral infarction [mTICI]);[10] mortality and functional outcome at discharge and at follow-up consultation at 90 days using mRS, assessed by the stroke physicians of the stroke unit.

Outcome Assessment

The primary outcome of the study was functional Independence at 90 days, defined by a mRS score ≤ 2.

Secondary outcomes were mRS score = 6 (considered as in-hospital mortality and at 90 days mortality), successful recanalization, symptomatic hemorrhage and cerebral edema.

Modified Thrombolysis In Cerebral Infarction (mTICI) grading system was used to evaluate the status of recanalization. Successful recanalization was considered mTICI grade of 2b, 2c or 3.

Complications after mechanical thrombectomy, including symptomatic hemorrhagic transformation and cerebral edema, were assessed on follow-up CT at 24 h. Hemorrhagic transformation was defined as a parenchymal hemorrhage type 1 (PH1) and type 2 (PH2), according to the European Cooperative Acute Stroke Study (ECASS).[11,12] Cerebral edema included types 1, 2 and 3 (COED1, COED2, COED3) according to Safe Implementation of Thrombolysis in Stroke-Monitoring Study (SITS-MOST) protocol.[13]

Neuroimaging analysis, including white matter age related lesions, ASPECTS score and complications as hemorrhagic transformation and cerebral edema, was performed by a neuroradiologist blinded to patient outcomes.

Statistical Analysis

Patients were divided into 2 subgroups according to age: 80−89 and ≥ 90 years old. Descriptive analysis for both subgroups was performed. Continuous variables were expressed as median and interquartile range ($P_{25}-P_{75}$) and categorical variables as frequencies and percentages. Variables were compared between the two subgroups using the Mann-Whitney test for continuous variables and the Chi-square or Fisher exact tests for categorical variables.

Generalized additive regression models were used to identify the variables that were associated with the outcomes (Mrs ≤2 and mRS = 6). After the univariable study, variables that attained a p value ≤ 0.25 were considered for multivariable analysis. The time from symptom onset to recanalization was included in both multivariable models and was modeled with splines due to their nonlinear association with the logit (natural logarithm of the odds of outcomes). Crude and adjusted odds ratios were estimated (OR) with corresponding confidence intervals. Discriminative and predictive abilities of the final multivariable models were assessed using the area under the receiver operating characteristic (ROC) curve (AUC) and the Hosmer-Lemeshow test, respectively. A level of significance α=0.05 was considered. Statistical analysis was carried out with R (R: A Language and Environment for Statistical Computing, R Core Team, R Foundation for Statistical Computing, Vienna, Austria, year = 2020, http://www.R-project.org.)

Results

A total of 144 patients aged ≥ 80 years were treated with MT between January 2016 and May 2018. Of these, 88.9% were aged 80−89 years and 11.1% were ≥ 90 years old. Most (69.4%) patients were female.

Regarding risk factors, arterial hypertension was the most common diagnosis in both groups (82.8% in 80−89 years old group and 81.3% in ≥ 90 years old), followed by atrial fibrillation (67.4% of all patients). Two thirds of all patients had white matter age-related disease, and this was significantly more common in the patients over 90 years-old (93.8% in ≥ 90 years old group versus 62.5% in the 80−89 years old group, p = 0.013).

There were no diferences in the clinical severity of stroke or prestroke mRS between both groups. A prestroke mRS > 2 was present in 24.2% of octagenarians and 25.0% of nonagenarians (p = 1.000). Intravenous fibrinolytic therapy before thrombectomy was administered in 88 patients (61.1%). Table 1 summarizes all baseline demographic and clinical data of both subgroups.

Total anterior circulation infarcts represented 91.0% of all strokes and the most common vessel occlusion was the M1 segment of middle cerebral artery, in both groups (Table 2). Median ASPECTS score was 9, with a weak evidence of a difference between the two age groups (p = 0.068).

Femoral artery was the most used acess for MT (137 patients, 95.1%). Alternative arterial approaches included the humeral artery in 5 patients (all in the 80−89 years old group), and 1 direct carotid puncture in each group.

At our stroke center, we use aspiration as first-intention technique. Aspiration was performed in 142 patients (98.6%); rescue stent-retriever was necessary in 14 patients (9.7%), almost all (92.9%) of them belonging to the younger group. There were no differences in the median number of passes between groups (Table 2).

Median time from: symptom onset to hospital admission was 106 minutes (74−197), arterial puncture to recanalization was 27 min (17−46) and symptom onset to recanalization was 286.5 min (212−386). Again, there were no significant diferences between groups (Table 2).

Successful recanalization (TICI ≥ 2b) was achieved in 86.8% of patients, and there were no relevant diferences between older and younger patients (87.5% in octagenarians and 81.3% in nonagenarians, p = 0.445). However, unsuccessful recanalization (TICI 0) was more common in older patients (6.3% versus 3.1%, p = 0.450).

Regarding complications, symptomatic hemorrhage (including types PH1 and PH2) was documented in 5

Table 1. *Baseline demographic and clinical characteristics.*

	All patientsN = 144	80-89 yearsN = 128	≥ 90 yearsN = 16	*P* value
Sex female, n (%)	100 (69.4)	85 (66.4)	15 (93.8)	0.023*
Age, years⊥	85.0 (83−87)	85.0 (83−86.7)	91.5 (90−93)	<0.001
Medical history, n (%)			13 (81.3)	
Hypertension	119 (82.6)	106 (82.8)		1.000*
Atrial fibrillation	97 (67.4)	85 (66.4)	12 (75.0)	0.489
Diabetes mellitus	32 (22.2)	30 (23.4)	2 (12.5)	0.524*
Hyperlipidemia	80 (55.6)	74 (57.8)	6 (37.5)	0.123
Coronary artery disease	25 (17.4)	23 (18.0)	2 (12.5)	0.739*
Cardiac insufficiency	39 (27.1)	38 (29.7)	1 (6.3)	0.070*
Active smoking	4 (2.8)	4 (3.1)	0	1.000*
Previous stroke	23 (16.0)	23 (18.0)	0	0.057*
Previous TIA	7 (4.9)	7 (5.5)	0	1.000*
Antiplatelet/ anticoagulant therapy	79 (54.9)	72 (56.3)	7 (43.8)	0.343
WM age-related lesions, n (%)				
Present				
Severe				
Admission NIHSS⊥	95 (66.0)	80 (62.5)	15 (93.7)	0.013
	16 (11.1)	13 (10.2)	3 (18.8)	0.048
Stroke etiology, n (%)	18 (14−23)	18 (14−23)	19 (11.3−23)	0.604
Cardioembolic				
Atherothrombotic			13 (81.3)	
Arterial dissection	99 (68.8)	86 (67.2)	0	0.571*
Unknown	12 (8.3)	12 (9.4)	0	
IV fibrinolytic therapy, n (%)	1 (0.7)	1 (0.8)	3 (18.8)	
Previous mRS > 2, n (%)	32 (22.2)	29 (22.7)		
			11 (68.8)	
	88 (61.1)	77 (60.2)	4 (25.0)	0.506
	35 (24.3)	31 (24.2)		1.000*

Abbreviations: TIA, transient ischemic attack; WM, white matter
⊥values are expressed as median (P_{25}−P_{75})
*Fisher's exact test; remaining p-values were obtained by Mann-Whitney or Chi-square tests.

Table 2. *Imaging and endovascular data.*

	All patientsn = 144	80-89 yearsn = 128	≥ 90 yearsn = 16	*P* value
Occlusion site, n (%)				
Anterior circulation	131 (91.0)	116 (90.6)	15 (93.8)	1.000*
ICA	32 (22.2)	28 (21.9)	4 (25.0)	
M1	72 (50.0)	64 (−0.0)	8 (50−0)	
M2	27 (18.8)	24 (18.8)	3 (18.8)	
Posterior circulation (BA)	13 (9.1)	12 (9.4)	1 (6.3)	
Occlusion side[1]				
Left	69 (53.1)	60 (51.7)	9 (64.3)	0.374
ASPECTS⊥	9 (8−10)	9 (8−10)	10 (9-10)	0.068
Vascular access, n (%)				
Femoral	137 (95.1)	122 (95.3)	15 (93.8)	
Humeral	5 (3.5)	5 (3.9)	0	
Carotid	2 (1.4)	1 (0.8)	1 (6.3)	0.288*
Reperfusion technique, n (%)				
Aspiration	142 (98.6)	127 (99.2)	15 (93.8)	0.211*
Stent retriever	14 (9.7)	13 (10.2)	1 (6.3)	1.000*
Intra-arterial fibrinolytic therapy	9 (6.3)	8 (6.3)	1 (6.3)	1.000*
Number of passages⊥	2 (1−3)	2 (1−3)	2 (1−3)	0.945
Carotid stent, n (%)	4 (2.8)	4 (3.1)	0	
Intra-cranial stent, n (%)	2 (1.4)	2 (1.6)	0	1.000*
Time (min) symptom onset − hospital admission⊥				
Time (min) arterial puncture − recanalization⊥	106 (74−197)	107 (74−206)	106 (63−152)	0.633
Time (min) symptom onset − recanalization⊥				
Successful recanalization	27 (17−46)	26 (16−46)	33.5 (19−48)	0.313
(TICI ≥ 2b), n (%)				
	286.5 (212−386)	294.5 (215−386)	244.5 (197−372)	0.401
	125 (86.8)	112 (87.5)	13 (81.3)	
				0.445*

Abbreviations: ICA, internal carotid artery; M1, M1 segment of middle cerebral artery; M2, M2 segment of middle cerebral artery; BA, basilar artery
⊥values are expressed as median (P_{25}-P_{75})
*Fisheŕs exact test; remaining p-values were obtained by Mann-Whitney or Chi-square tests
[1]applicable only to anterior circulation (ICA, M1 or M2 occlusions).

patients (3.5%); cerebral edema (including types COED 1, 2 and 3) occured in 49 patients (34.0%) (Fig. 1), and there were no significant diferences between groups (Table 3).

The five patients with symptomatic hemorrhage had a median ASPECTS of 8 (6.5−10.0). Three of them were previously under anticoagulation, and had a median of 2 (2−5) passes of the thrombectomy device. The patients with cerebral edema had a median ASPECTS of 8 (7−10), and 20.4% had an unsuccessful recanalization (TICI < 2b).

In-hospital mortality was 9.7% (9.4% in the group 80−89 years old and 12.5% in the group ≥ 90 years old). Outcomes were not significantly diferent between octagenarians and nonagenarians. Thus, at discharge, 12.6% of patients aged 80−89 and 18.8% patients ≥ 90 years old were independent (mRS ≤ 2), and at 90 days, 22.6% in the younger group and 31.3% in the older group had a good functional outcome (mRS ≤ 2) (Figure 2). There were no differences between groups also regarding mortality at 90 days (37.5% in the older group versus 33.9% in the younger group). Clinical outcomes, complications, and mortality are presented in Table 3.

Poor clinical outcome (mRS ≥ 2) at 90 days

Univariable analysis for variables associated with functional dependence at 90 days yielded atrial fibrillation, premorbid mRS, admission NIHSS, discharge NIHSS, side of occlusion, location of occlusion, number of passes, time from puncture to recanalization and the presence of cerebral edema as candidates for the multivariable model (Supplementary table 1).

We obtained a multivariable model that included premorbid mRS (OR = 1.45; 95% CI: 1.02, 2.07; p = 0.039), admission NIHSS (OR = 1.13; 95% CI: 1.04, 1.22; p = 0.002) and cerebral edema (OR = 3.97; 95% CI: 1.18, 13.42; p = 0.026). Although without statistical significance, the odds of funcional independence were 22% lower in

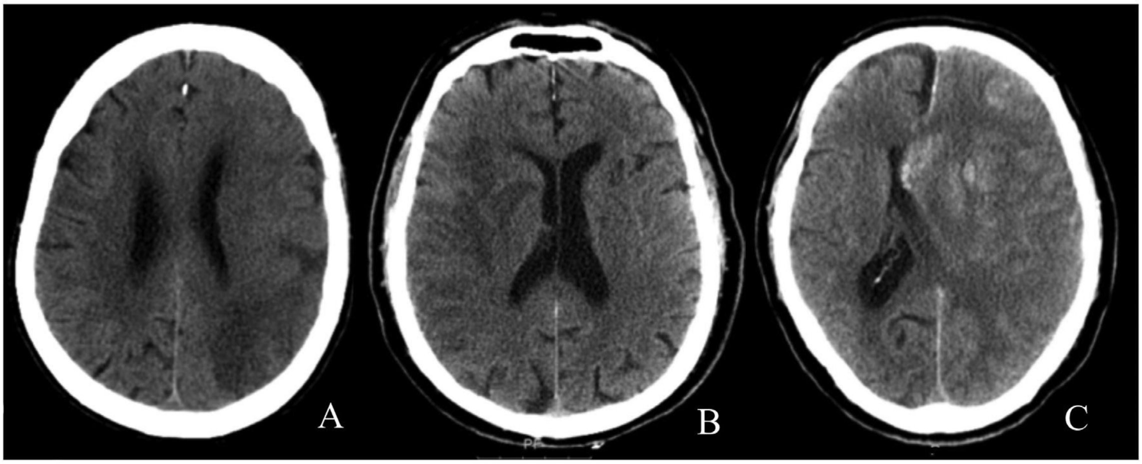

Fig. 1. *Non contrast head CT of patients with cerebral edema at 24h post thrombectomy (A: COED 1, B: COED 2 and C:COED 3).*

the older group (OR = 0.78; 95% CI: 0.20−3.09; p = 0.726). The ROC curve achieved an AUC = 0.84 (95% CI: 0.76−0.91) (good discriminative ability), with a Hosmer-Lemeshow test p-value of 0.821.

Death at 90 days

The univariable analysis for variables associated with death at 90 days yielded past history of coronary disease, sex, previous antiplatelet/anticoagulation, premorbid mRS, admission NIHSS, discharge NIHSS, presence of vascular leucoencephalopathy, side of occlusion, location of occlusion, use of a stent retriever, number of passes, time from puncture to recanalization, successful recanalization, symptomatic cerebral hemorrhage and the presence of cerebral edema as candidates for the multivariable model (Supplementary table 2).

We obtained a multivariable model that included age group (OR = 1.70; 95% CI: 0.34, 8.54; p = 0.520), sex (OR = 3.16; 95% CI: 1.11, 8.97; p = 0.031) with higher odds for male gender, previous history of coronary disease (OR = 0.09; 95% CI: 0.02, 0.40; p = 0.002), presence of vascular leucoencephalopathy (OR = 0.19; 95% CI: 0.06, 0.57; p= 0.003), time from puncture to recanalization (OR = 1.03; 95% CI: 1.01, 1.05; p = 0.002), successful recanalization (OR = 0.08; 95% CI: 0.02, 0.43; p = 0.003), cerebral edema (OR = 5.54; 95% CI: 1.91, 16.04; p = 0.002), and premorbid mRS, where, for each point in the premorbid mRS score, there was an increase of 41% in the odds of death at 90 days (OR = 1.41; 95% CI: 1.03, 1.94; p = 0.033). The

Table 3. *In-hospital complications, clinical outcomes and mortality at discharge and at 90 days.*

	All patientsn = 144	80−89 yearsn = 128	≥ 90 yearsn = 16	*P* value
Hemorrhagic transformation (PH1, PH2), n (%)	5 (3.5)	4 (3.1)	1 (6.3)	0.450*
Cerebral edema, n (%)				
Present				
COED 1	49 (34.0)	45 (35.2)	4 (25.0)	0.419
COED 2	36 (25.0)	33 (25.8)	3 (18.8)	
COED 3	5 (3.5)	5 (3.9)	0	
NIHSS at discharge⊥[1]	8 (5.6)	7 (5.5)	1 (6.3)	
mRS at discharge[2], n (%)	13 (5.0-19.0)	13 (5.0-19.3)	5 (1.8-19.0)	0.236
≤ 2	19 (13.3)	16 (12.6)		
>2	124 (86.7)	111 (87.4)	3 (18.8)	0.448*
In-hospital mortality, n (%)	14 (9.7)	12 (9.4)	13 (81.3)	0.658*
mRS at 90 days[3], n (%)			2 (12.5)	
≤ 2				
> 2	33 (22.9)	28 (22.6)	5 (31.3)	
Mortality at 90 days, n (%)	107 (74.3)	96 (77.4)	11 (68.8)	0.531*
	48 (33.3)	42 (33.9)	6 (37.5)	0.773

Abbreviations: ⊥, values are expressed as median (P_{25}-P_{75})
*Fisher's exact test; remaining p-values were obtained by Mann-Whitney or Chi-square tests
[1]Information about 16 patients was missing
[2]Information about 1 patient was missing
[3]Information about 4 patients was missing.

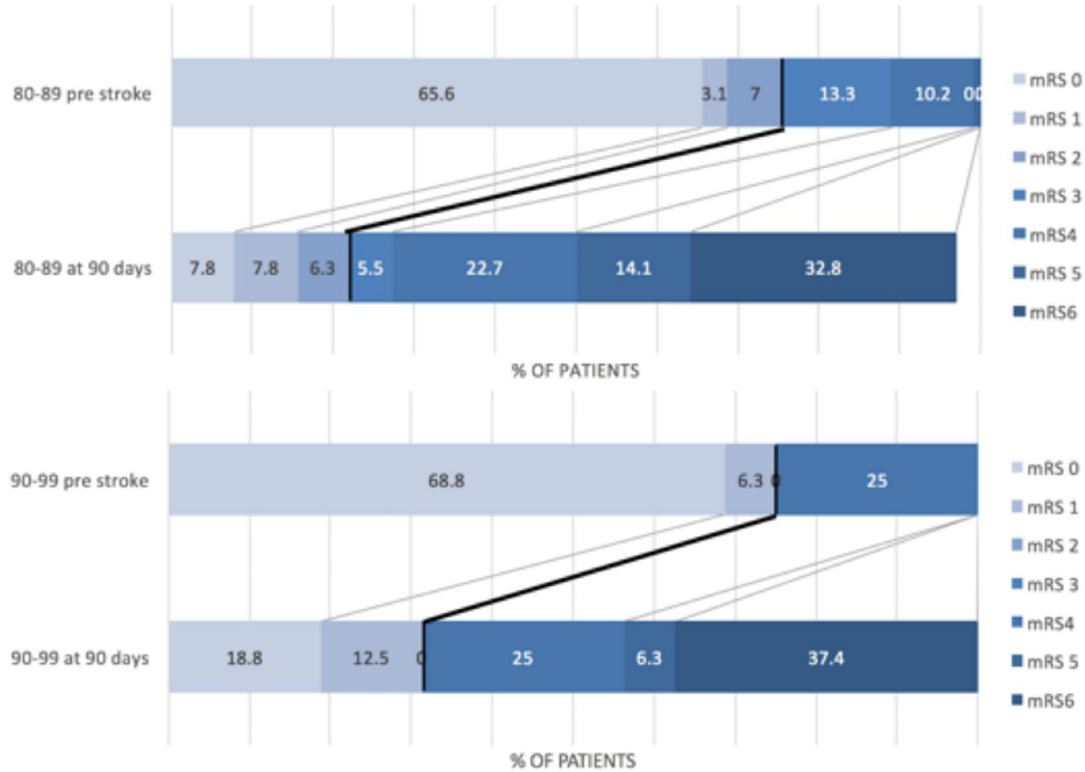

Fig. 2. *Comparison of pre-stroke mRS with mRS at 90 days, in octagenarians and nonagenarians.*

ROC curve achieved an AUC = 0.86 (95% CI: 0.80−0.92) (good discriminative ability), with a Hosmer-Lemeshow test p-value of 0.517.

Discussion

We compared a population of octagenarians with acute stroke due to LVO, submitted to MT, with a population of nonagenarians, to evaluate effectiveness and safety of treatment in these older age groups. We found similar results in terms of recanalization rates, complications and immediate and long-term outcomes beetween octagenarians and nonagenarians.

Our study results regarding clinical and imaging data are in line with the literature, namely the HERMES Collaboration, regarding stroke severity (NIHSS score), ASPECTS and recanalization results.[14] The prevalence of comorbidities was similar in both groups, except for cardiac insuficiency and previous stroke that were significantly higher in octagenarians compared with nonagenarians. This is an unexpected finding, probably explained by the small sample size of the nonagenarian cohort. Other medical conditions had similar prevalence in both age groups. As expected, nonagenarians had significantly more and more severe age-related white matter lesions, compared to octagenarian patients. Medical comorbidities tend to be more frequent in elderly patients[5,15,16] and this may affect functional outcome after stroke.[17] However, according to the HERMES study,[14] age does not modify the treatment effect and thrombectomy should not be declined solely due to age. In fact, treating octagenarians and nonagenarians is current practice in most centers in the world,[18] and subanalysis of major trials such as MR CLEAN[19] and ESCAPE[20] have shown benefit in performing MT in very old patients.

The primary outcome of this study, functional independence at 90 days, was similar between octagenarians and nonagenarians: good functional outcome in 22.6% in octogenarians and 31.3% in nonagenarians. Our results are in line with recent studies of MT in elderly and very elderly patients.[17,18,20-28] In these studies, functional independence reaches up to 30% in nonagenarians. For exemple, Sussman et al.[21] reported a 3-month good functional outcome (mRS ≤ 2) in 19.7% of octagenarians and in 12.5% of nonagenarians. According to Andrews et al.[22] 18.6% and 28.6% of 80−89 and ≥ 90 years old patients, respectively, had good outcomes.

Comparing to patients younger than 80 years, with functional independence rates that go beyond 50%,[28,29] functional independence in elderly patients is lower, but still beneficial compared with no treatment, underlining the importance of not excluding very old patients from treatment.

We expected to find higher times from puncture to recanalization, and higher numbers of carotid and humeral punctures in the nonagenarian group, as others have found,[30] considering increased vessel tortuosity, but this was not true in our sample, perhaps due to the small number of patients. Also, we are comparing old patients with very old patients, and perhaps, vessel tortuosity is not different between these two groups.

We found slightly higher rates of symptomatic hemorrhage following MT in nonagenarians compared with octagenarians, and a trend towards a higher mortality rate in older patients, but the difference was not statistically significant, again, in line with other studies.[23] Mortality in old and very old patients after MT is high: 33% in our study, in line with others.[24,27,31]

Our findings regarding outcome are in agreement with other studies in the literature.[21,22] Andrews et al.[22] found similar outcomes in terms of mortality in nonagenarians and octogenarians. According to Sussman et al.[21] there were higher mortality rates and worse long-term functional outcomes in nonagenarians, but the difference was not statistically significant. However, Khan et al.[17] described a fivefold higher risk of having an mRS ≥3 by 90 days in the nonagenarian group. Also, Alawieh et al described a “real world” experience in treating octagenarians with MT, with significantly worse results than younger patients regarding outcome and complications.[32]

Therefore, we tried to identify independent factors associated with poor functional outcome and mortality at 3 months in our cohort of patients over 80 years old.

The multivariable model for poor functional outcome at 3-months showed that age group is not associated with functional outcome, while previous mRS, severe stroke (NIHSS > 15) and cerebral edema after mechanical thrombectomy are associated with functional dependence (mRS ≥ 3).

Male gender, previous mRS, longer time between arterial puncture and recanalization, and cerebral edema after mechanical thrombectomy were associated with 3-month mortality in our sample. On the other hand, coronary disease, age related white matter disease and successful recanalization (mTICI ≥ 2b) were protective factors, according to our multivariable model.

The importance of successful and quick recanalization for favorable outcomes has already been reported. Rha and Saver[33] found a strong association between recanalization and outcome in acute ischemic stroke, with recanalization being associated with better functional outcomes and lower mortality. The first-pass effect seems to apply also to nonagenarians, having an impact on mortality and functional outcome.[26]

Prestroke functional dependence seems to influence functional outcome and mortality in our population. According to the most recent guidelines, treating previously dependent patients is not recommended,[34] however there are no randomized trials.

Cerebral edema after ischemic stroke is associated with large core or futile recanalization.[35] The group of patients with cerebral edema had a high incidence of unsuccessful recanalization (61.5% had TICI 2a) that seemed to be the determinant factor, since the occurrence of cerebral edema was not different between octagenarians and nonagenarians.

The protective effect of coronary disease and age related white matter disease on outcome is difficult to understand from a clinical point of view. This association probably reflects the small sample size, and also the fact that most patients (especially in the nonagenarian group) had vascular white matter disease. However, patients with coronary disease and chronic cerebrovascular disease often have regular medical follow-up and better risk factor control, and this might help understand this association with better outcome.

Our study has limitations, including its retrospective design and the small sample size, particularly of the nonagenarian group, possibly conditioning our ability to detect statistically significant differences between 80−89 and ≥ 90 year-old patients. Also, we have a mixed sample of LVO, and a proportionally higher prevalence of basilar occlusions in the octagenarian group, which might worsen clinical results for these patients in our analysis.

Conclusions

In this study, comparing octagenarians to nonagenarians with acute ischemic stroke due to large vessel occlusion following MT, we found similar functional outcomes and mortality, recanalization and complication rates. In this sample of patients aged ≥ 80 years old, previous functional dependence, severe stroke and cerebral edema were associated with poor functional outcome. Previous functional dependence, higher procedural time, failed recanalization and cerebral edema were associated with death at 3 months.

Our results suggest that patients above 90 years old might benefit from mechanical thrombectomy, as octagenarians.

Disclosures

none.

Supplementary materials

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.jstrokecerebrovasdis.2020.105015.

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