

ORIGINAL RESEARCH

Efficacy and safety of endovascular treatment in patients older than 90 with acute ischemic stroke: A retrospective cohort study

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Received: 12 June, 2023

Accepted: 15 July, 2023

ABSTRACT

Background: To study efficacy and safety of endovascular treatment in subjects older than 90 years with acute ischemic stroke. **Materials & Methods:** A total of 100 subjects were enrolled. The individuals undergoing treatment were categorized into three subgroups depending on their age. The results were analysed using SPSS software. The p-value less than 0.05 was considered significant. **Results:** A total of 100 subjects were enrolled. Out of which 8 were non-agenarians, 25 were octogenarian and 67 were subjects under 80 years of age. There was no statistically significant difference identified between the non-agenarian and octogenarian groups concerning patient baseline characteristics. **Conclusion:** The mortality rates exhibited a correlation with age.

Keywords: Acute ischemic stroke, Endovascular treatment.

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INTRODUCTION

Owing to the demographic change in industrialized countries, the health-related and socioeconomic burden of stroke is constantly increasing.¹ While there is good evidence for the effectiveness and safety of therapeutic interventions in mid to late adulthood patients presenting with acute stroke, only sparse data exist for older age groups. Most of the trials investigating therapeutic interventions in acute stroke (i.e. intravenous thrombolysis with recombinant tissue plasminogen activator and mechanical thrombectomy) did not enroll subjects above the age of 80 years.² This is somehow surprising, as it is exactly this group which is particularly prone to developing stroke due to the wide array of age-associated comorbidities resulting in an elevated cerebrovascular risk profile.³ Only sparse data are available regarding specific treatments in stroke patients older than 80 years. Yet, existing data indicate that mechanical thrombectomy and intravenous thrombolysis are associated with a favourable outcome in this patient cohort as well.^{4,5} Endovascular therapy (EVT) has been proven to improve outcomes in patients with stroke from large-

vessel occlusion.⁶ However, 3 of the 6 major trials of EVT for acute stroke excluded older patients.⁷ Trials that included octogenarians clearly showed better outcomes among patients treated with EVT in this age subgroup compared with intravenous thrombolysis alone, with odds ratios even more favorable than among younger patients.⁸ Yet, octogenarians were relatively underrepresented even in those trials that did not exclude them, suggesting a possible selection bias (ie, only the octogenarians with greater chances of recovery may have been preferentially enrolled). Meanwhile, there have been several prospective and retrospective observational studies reporting the outcomes of endovascular revascularization in acute stroke in octogenarians. However, many of these studies are limited by small sample sizes or restricted to single centers, thus limiting the generalizability of the results.⁹⁻¹¹ Hence, this study was done to study efficacy and safety of endovascular treatment in subjects older than 90 years with acute ischemic stroke.

MATERIALS & METHODS

A total of 100 subjects were enrolled. The individuals undergoing treatment were categorized into three subgroups depending on their age: Non-agenarians, Octogenarians, and patients younger than 80 years old. These groups were then compared concerning their initial characteristics and stroke-related factors. Furthermore, clinical and radiological results were assessed, which included functional outcomes measured using the modified ranking scale (mRS) at day 90, and mortality rates. Chi-squared test was done. The results were analysed using SPSS software. The p-value less than 0.05 was considered significant.

RESULTS

A total of 100 subjects were enrolled. Out of which 8 were non-agenarians, 25 were octogenarian and 67 were subjects under 80 years of age. There was no statistically significant difference identified between the non-agenarian and octogenarian groups concerning patient baseline characteristics. There was no significant distinction in favorable clinical outcome, as measured by an mRS score of ≤ 2 at 90 days, between non-agenarians and octogenarians (16% vs. 12.5%, p-value = 1). Nevertheless, a considerable difference was observed when compared to the <80 yrs group, where the average rate of favorable clinical outcomes was 37.4%.

Table 1: Baseline parameters

Variable	Age groups			P-value
	<80 years	80-89 years	>90 years	
Mean age(years)	67.8	85.2	91.4	0.01 (Significant)
Risk factors				
Hypertension	45	20	5	0.74
Diabetes	30	8	2	0.38
Ischemic heart disease	20	5	1	0.45

Table 2: Subjects outcomes

	Age group			P-value
	<80 years	80-89 years	>90 years	
Good clinical outcome	25 (37.4)	4(16)	1(12.5)	0.49
Early neurological outcomes	18 (26.8)	5(20)	2(25)	0.37
Mortality rate at 90 days	10 (15)	8(32)	4(50)	0.02 (Significant)

P-value <0.05 : significant

DISCUSSION

Acute Ischemic stroke (AIS) is one of the leading causes of morbidity and mortality worldwide.¹² Treatment for AIS with large vessel occlusion (LVO) is primarily divided into intravenous thrombolysis (IV tPA), and endovascular thrombectomy (EVT) treatments, either by stent retrievers or catheter aspiration devices.¹³ Clinical randomized controlled trials (RCTs) demonstrated significantly better functional outcomes in patients treated with EVT, with or without prior administration of IV-tPA.¹³⁻¹⁵ Hence, this study was done to study efficacy and safety of endovascular treatment in subjects older than 90 years with acute ischemic stroke.

In the present study, a total of 100 subjects were enrolled. Out of which 8 were non-agenarians, 25 were octogenarian and 67 were subjects under 80 years of age. There was no statistically significant difference identified between the non-agenarian and octogenarian groups concerning patient baseline characteristics. A study by Friedman I et al, studied three hundred and forty seven patients, 20 (5.7%) of them were non-agenarians, 96 (27.7%) were octogenarians and 231 (66.6%) were <80 yrs. No statistically significant differences were found between groups regarding baseline characteristics, cardiovascular risk factors, stroke variables, or successful revascularization rates. Puncture to

recanalization time intervals showed an age-related non-significant increase between the groups with a median time of 67.8, 51.6, and 40.2 min of the non-agenarian, octogenarian, and <80 yrs groups, respectively (p-value = 0.3). Favorable outcome (mRS 0-2) was 15% in non-agenarians vs. 13.54% in octogenarians (p-value = 1) and 40.2% in <80 yrs. sICH occurred among 5% of non-agenarians, compared to 4% among octogenarians (p-value = 1) and 2.6% in <80 yrs. The mortality rate at 3 months was significantly higher (55%) in non-agenarians compared to octogenarians (28%) (p-value = 0.03) and to <80 yrs (19.48%). EVT in nonagenarians demonstrated a high rate of successful revascularization, whilst also showing an increased rate of sICH when compared to octogenarians. Mortality rates showed an age-related correlation. Although further studies are needed to clarify the patient selection algorithm and identify sub-groups of elderly patients that could benefit from EVT, we showed that some patients do benefit from EVT therefore exclusion should not be based on age alone.¹⁶

In the present study, there was no significant distinction in favorable clinical outcome, as measured by an mRS score of ≤ 2 at 90 days, between non-agenarians and octogenarians (16% vs. 12.5%, p-value = 1). Nevertheless, a considerable difference

was observed when compared to the <80 yrs group, where the average rate of favorable clinical outcomes was 37.4%. Another study by Kauffmann J et al, 566 inpatient stays of subjects aged 90 years or older. Three hundred sixty-seven of the 566 patients (64.8%) were admitted and discharged due to symptoms indicative of stroke. Two hundred eleven patients received a diagnosis of ischaemic stroke. These 211 patients were analysed subsequently. Sixty-four patients qualified for acute stroke treatment (intravenous thrombolysis n=22, mechanical thrombectomy n=26, intravenous thrombolysis followed by mechanical thrombectomy n=16) and showed a significant improvement in their functional status as measured by change in mRS score (admission vs. discharge, p 0.001) with 7 (10.9%) observed potentially therapy-related complications (relevant drop in haemoglobin n=2, subarachnoidal haemorrhage n=1, cerebral haemorrhage n=3, extracranial bleeding n=1). One intravenous thrombolysis was stopped because of an uncontrollable hypertensive crisis. Patients who did not qualify for these treatments (including those declining acute treatment) did not show a change of their functional status between admission and discharge (p 0.064). The data indicate that acute stroke treatment is effective and safe in the oldest old. Age alone is no criterion to withhold an acute intervention even in oldest old stroke patients.¹⁷ The benefits of endovascular therapy (EVT) in older adults with AIS with LVO remain controversial.¹⁶ A recent meta-analysis conducted by the HERMES collaborators demonstrated that older adults aged \geq 80 years may benefit more from EVT than conservative treatment.⁸ However, the results of this study should also be interpreted cautiously, owing to the relatively small number of older adults in this study. Moreover, the elderly typically have more comorbid conditions; therefore, strict patient selection is required. EVT should be performed only in patients who qualify as a registry study based on Solitaire FR stent thrombectomy in North American patients with acute ischemic stroke showed that older age was an independent factor contributing to poor prognosis and high morbidity and mortality rates for mechanical thrombectomy compared with the younger age group.¹⁸ This result was supported by the previous relevant studies and the recent endovascular Treatment for Acute Ischemic Stroke in the Netherlands (MR CLEAN) Registry study.¹⁹⁻²¹ Khan et al.²² compared 18 nonagenarian patients to 175 patients <90 years of age, and showed very similar results regarding good clinical outcome (with 11.1 vs. 48%, respectively). Similarly, Alawieh et al. reviewed over 560 patient files in a single center cohort and compared the results of 108 patients \geq 80 years of age, 15 of them nonagenarians, with younger counterparts and reported similar results with 20.5 vs. 44.4% respectively.²³

CONCLUSION

The mortality rates exhibited a correlation with age. While additional studies are necessary to clarify the patient selection process and identify specific sub-groups of elderly patients that could potentially benefit from EVT (Endovascular Therapy), this research demonstrated that certain patients indeed derive benefits from EVT. Therefore, the exclusion of patients from EVT should not be solely based on age.

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