Safety and Effectiveness of Mechanical Thrombectomy for Primary Isolated Distal Vessel Occlusions: a Monocentric Retrospective Comparative Study

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Title Page (with Author Details)

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Cover title

Distal vessel occlusions ischemic stroke management.

Key words

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Abstract

Background

Distal vessel occlusions represent about 25-40% of acute ischemic stroke (AIS), either as primary occlusion or secondary occlusion complicating mechanical thrombectomy (MT) for large vessel occlusion.

Objective

Our aim was to evaluate safety and effectiveness of MT associated with the best medical treatment (BMT) in the management of AIS patients with distal vessel occlusion in comparison with the BMT alone.

Methods

Retrospective analysis was conducted on AIS patients treated by MT+BMT for primary distal vessel occlusion between 2015 and 2020, and were compared with a historic cohort managed by BMT alone between 2006 and 2015 selected based on the same inclusion criteria. A secondary analysis was conducted using propensity score matching (PSM) including the following: NIHSS, age and treatment with intravenous thrombolysis (IVT) as covariates.

Results

Of 650 patients screened, 44 patients with distal vessel occlusions treated by MT+BMT were selected and compared with 36 patients who received BMT alone. After PSM, 28 patients in each group were matched without significant difference. Good clinical outcome defined as mRS≤2 was achieved by 53.6% of the MT+BMT group and 57% of the BMT group (OR, 0.87; 95%CI, 0.3–2.4; P=1.00). The mortality rate was comparable in both groups (7% *vs.* 10.7% in MT+BMT and BMT patients, respectively; OR=0.64; 95%CI, 0.1-4; P=1.00). Symptomatic intracranial hemorrhage (ICH) was seen in only one patient treated by MT+BMT (3.6%).

Conclusion

Mechanical thrombectomy seems to be comparable with the best medical treatment regarding the effectiveness and safety in the management of patients with distal vessel occlusions.

Abbreviations and acronyms

DVOs: Distal vessel occlusions, **AIS**: acute ischemic stroke, **MT**: mechanical thrombectomy, **LVO**: large vessel occlusion, **BMT:** best medical treatment, **IVT**: intravenous thrombolysis, **mTICI**: modified thrombolysis in cerebral infarction scale, **AOL**: Arterial occlusion lesion scale, **mRS**: modified Rankin scale, **ICH:** intracranial hemorrhage, **NIHSS**: National Institutes of Health Stroke Score, **GA:** General anaesthesia.

Introduction

Despite distal vessel occlusions (DVOs) represent about 25% to 40% of acute ischemic stroke (AIS), whether as primary occlusion or complicating mechanical thrombectomy (MT) for large vessel occlusion (LVO), they were underrepresented by the main randomized trials of MT.[1] MR CLEAN (Multicenter Randomized Clinical Trial of Endovascular Treatment for Acute Ischemic Stroke in the Netherlands) and EXTEND IA (Extending the Time for Thrombolysis in Emergency Neurological Deficits - Intra-Arterial) were the only among the five known randomized trials that included patients with isolated M2 occlusions per protocol, and this subgroup of patients represented about 8% in relation to other occlusion sites.[2, 3]

The risk-benefit ratio of MT in distal vessel occlusions is still uncertain. On one hand, even if AIS related to a distal occlusion may be considered less severe than a proximal occlusion, the clinical outcome may not be favorable in these patients with significant disability hampering the quality of life. According to the literature, the rate of good clinical outcome at 3 months after a distal intracranial occlusion treated medically ranges from 20% to 77%.[3-5]

On the other hand, the risks of MT in distal occlusions are well-known. The special characteristics of distal vessels of smaller diameters, increased tortuosity, and longer distances of navigation, along with the iterative advances in endovascular devices necessitate to pay more attention for the management of these types of occlusions.

The aim of this study was to evaluate effectiveness and the safety of mechanical thrombectomy in the management of AIS patients with distal vessel occlusion in comparison with the best medical treatment alone.

Patients & Methods

Study design

A retrospective analysis was primarily conducted on AIS patients who were treated by MT + BMT for primary and isolated distal vessel occlusion at our institution between January 2015 and June 2020. These patients were compared with a historic cohort of patients from the same Institution managed by best medical treatment (BMT) alone including intravenous thrombolytic therapy (IVT) between April 2006 and January 2015 and selected based on the same inclusion criteria. The study was approved by the institutional review board that waived the patients' consents. This retrospective study was conducted in accordance with the Declaration of Helsinki.

Inclusion criteria

Consecutive patients with isolated primary distal vessel occlusion proven by vascular imaging were included except patients with secondary distal vessel occlusion as a complication of MT for LVO who were excluded. Distal vessel occlusion was identified as occlusion of the distal aspect of the M2 segment and M3 segment of the middle cerebral artery, any segment of the anterior cerebral artery, or any segment of the posterior cerebral artery. Occlusion of the distal aspect of the M2 segment was defined as an occlusion above the mid-height of the insula, while M3 occlusion was defined as occlusion at any point from the parietal operculum till emerging from the Sylvian fissure at the lateral surface of the brain according to the Fischer's classification. Proximal M2 occlusions were excluded.[6, 7]

Clinical severity was assessed using the NIHSS at admission, 24 hours and one week by a vascular neurologist. The modified Rankin Scale (mRS) was evaluated at three-months.

Pre-procedure and Post-procedure Imaging Assessments

All the patients underwent a pre-procedure brain magnetic resonance imaging (MRI) including diffusion-weighted imaging (DWI) and 3D Time of Flight (TOF) MR angiography (MRA). Brain computed tomography (CT) scan was performed if there was contraindication for MRI, like cardiac pacemakers. An unenhanced brain CT scan and/or MRI was performed within 24 hours after the endovascular procedure to exclude any haemorrhagic complications.

Procedure and intervention

When eligible, patients received IVT within 4.5 h of stroke symptoms' onset. Otherwise, an anti-platelets agent was the reference. Afterward, the individual decision to perform a MT was a multidisciplinary consensus by the neurologist and neurointerventionalist. Arguments to perform MT were a relevant clinical deficit. Moreover, it was upon the operator's discretion to weigh the specific procedural risk against the potential benefit of recanalization; and given the current absence of evidence for MT in such population, the decision was not based on predefined fixed criteria.

For MT, all the procedures were systematically performed in a biplane neuroangiography suite using a tri-axial system with a 6F long sheath, an intermediate distal access catheter (5F or 6F) and a microcatheter. When combined to IVT, endovascular preparation was initiated simultaneously with or soon after IVT administration was started without waiting for evaluation of its initial response (bridging paradigm).

Mechanical thrombectomy was performed with approved devices, using stent-retrievers with maximal diameter of 3 mm or 3MAX aspiration catheter (Penumbra, Alameda, CA, USA). The choice was left to the attending neuroradiologist's discretion.

Baseline parameters, technical features, and angiographic were noted.

Study outcome

The primary end point was the rate of good clinical outcome defined as mRS ≤ 2 at 3-months. Secondary efficacy criteria included the rate of excellent clinical outcome, defined as a 3-month mRS ≤ 1 and early neurological improvement, defined as a complete resolution of the neurological deficit or an improvement from baseline in the National Institutes of Health Stroke Scale (NIHSS) by 4 or more points 24 hours after the onset of stroke.[8]

Moreover, the rate of successful reperfusion, defined as mTICI ≥2b (Modified Thrombolysis in Cerebral Infarction) at the end of the procedure for the MT + BMT group; and defined as AOL ≥ 2 (Arterial Occlusion Lesion scale) on 24 hours MRI and MRA for the BMT group.[9]

The safety criteria were the rate of symptomatic intracranial hemorrhage (ICH), according to the trial of thrombolytic therapy with intravenous alteplase in acute ischaemic stroke (ECASS II) study criteria [10], asymptomatic ICH, the frequency of distal emboli, procedural arterial dissection and perforation in the MT + BMT group.

As an additional analysis, we developed a propensity score matched cohort in order to explore the robustness of our analyses. The variables for the propensity score included the following: baseline NIHSS score, age, and treatment with IVT. The patients in the BMT group were matched to those in the MT group using a 1:1 matching technique. We compared primary outcomes and secondary outcomes of the propensity score matched cohort between the MT+BMT and BMT groups. The effects of MT+BMT relative to BMT are displayed as ORs and 95% CIs.

Statistical Analysis

Data analysis was performed using (IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.) $\chi 2$ or Fisher's exact test was used to compare frequencies, when appropriate. Comparison of means was performed using Student-t test or Mann-Whitney test, depending on the data distribution. Results were considered statistically significant when P value <0.05. Propensity score matching was used with a calliper width of 0.1 based on age, initial NIHSS and treatment with IVT as covariates. The patients in the BMT group were matched to those in the MT+BMT group using a 1:1 matching technique. For outcome variables, unadjusted odds ratios (ORs) were calculated by using univariate logistic regression models, including treatment by MT+BMT as independent variable.

Results

Among the 650 patients treated by mechanical thrombectomy in our centre during the predetermined period screened (2015-2020), 44 patients with distal vessel occlusions who met the inclusion criteria were treated by MT + BMT and compared with 36 patients who received BMT alone (2006-2015). (**Figure 1** shows the study flow chart)

Table 1 shows baseline characteristics. Compared with patients in the BMT group, those in the MT + BMT group had a higher baseline NIHSS score (median [IQR], 11 [7-21] *vs.* 6 [3-10], p<0.001) and were older (median [IQR], 78 [64 -85] *vs.* 70 [57-78], p<0.04); and tended to have higher rates of IVT treatment (63.6 % *vs.* 41.7 %; P = 0.07). There was no difference among the groups for stroke comorbidities.

Regarding MT, stent retrievers (with or without aspiration) was used in 33 cases (75%) and 7 MT procedures (16%) were performed under general anaesthesia.

After the propensity score matching, 28 patients in each group were matched. Baseline characteristics of the two groups after propensity score matching are shown in **Table 1**. No significant difference was noted between the two groups.

Clinical outcomes in the entire cohort

Good clinical outcome (defined as mRS ≤ 2 at 3-months) was observed in 47.7% and 58.3% (p=0.38) of MT + BMT and BMT patients, respectively; while excellent clinical outcome (defined as mRS ≤ 1 at 3-months) was achieved by 29.5 % and 38.9% (p=0.48) of MT + BMT and BMT patients, respectively. Early neurological improvement was observed in 45.5 % and 38.9 % (p=0.65) of MT + BMT and BMT patients, respectively.

The overall successful reperfusion rate in the MT group defined as mTICI ≥ 2B was 77.3%.

Comparing both groups regarding the final recanalization state, the MT + BMT group had significantly higher successful recanalization defined as AOL ≥ 2 (90.9% *vs.* 47.2% in MT+BMT and BMT groups; p= <0.001) (**Figure 2** shows an illustrative case)

For the safety outcome, mortality rate at 90 days occurred in 18.2% and 13.9% (p=0.76) of MT+BMT and BMT patients.

Symptomatic ICH occurred in two patients (4.5%) in the MT+BMT group with no observed symptomatic ICH in the BMT group (P=0.5). However, asymptomatic ICH occurred in further 4 patients in the MT+BMT group (9%), and one patient in the BMT group (2.8%, p=0.37) (**Table 2**).

As procedural complications, distal embolization to the same territory occurred in two patients (4.5%). Moreover, vessel perforation occurred during the procedure in two other patients (4.5%); one of them suffered from symptomatic ICH.

Clinical outcomes in the propensity score-matched cohort

After balancing of both groups by using NIHSS score, age, and treatment with IVT as covariates to develop a propensity score matched model; 3-months good clinical outcome was achieved by 53.6% of the MT+BMT treated patients and by 57% of the BMT group (odds ratio [OR], 0.87; 95% CI, 0.3-2.4; P=1.00). Thirty two percent and 39.3% of patients treated by MT+BMT and BMT, respectively, had achieved excellent clinical outcome at 3-months (odds ratio [OR], 0.73; 95% CI, 0.24-2.2; P=0.78). Early neurological improvement had been achieved by 35.7% and 39.3% in MT+BMT and BMT groups, respectively (odds ratio [OR], 0.86; 95% CI, 0.29-2.5; P=1.00).

For the safety outcome, the mortality rate was comparable in both groups (7% in MT+BMT treated patients *vs.* 10.7% in patients with BMT; odds ratio [OR], 0.64; 95% CI, 0.1-4; p=1.00). Vessel perforation during the procedure occurred in one patient and leaded to symptomatic ICH (3.6%). Asymptomatic ICH occurred in 3 patients in the MT+BMT group (10.7%), and one patient in the BMT group (3.6%, p=0.61) (**Table 2**).

Discussion

The main findings of our study found that both mechanical thrombectomy and best medical treatment could achieve similar rates of good and excellent clinical outcome in distal vessel occlusions despite of the final recanalization rate in the patients treated by MT+BMT was significantly higher than those in the BMT group. Noting that patients treated by MT+BMT were the only complicated by symptomatic ICH. The 3-months mortality rate was comparable between both groups.

Our results were comparable with those showed by a recent metanalysis by Waqas et al.[11] comparing MT+BMT with BMT only in the management of patients with distal vessel occlusions. This metanalysis had found 77 % successful recanalization of mTICI ≥ 2B, 54.7% good outcome of 3-months mRS ≤ 2, 16.5% 3-months mortality rate, and 5.8 % symptomatic ICH. However, this study did not demonstrate a significant difference between both modalities in the management of such patients.

Moreover, our results were comparable with a recent large multicenter study by Anadani et al. 2021, studying primary distal vessel occlusions (M3, and anterior and posterior cerebral arteries) treated by MT.[12] This study showed results of 78 % successful recanalization of mTICI ≥ 2B, 45% good outcome of 3-months mRS ≤ 2, 19% 3-months mortality rate, and 5 % significant and symptomatic ICH.

However, our results were more favorable than those showed by the metanalysis from the HERMES collaborators (mRS score≤1 in 27%, and mRS score≤2 in 46%). [13] This may be explained by the differences and non-homogenous cut off point to define distal vessel occlusions; as M2 occlusion was considered to start just after the origin of the anterior temporal artery, bringing no evident landmark between distal M1 segment and proximal M2 segment. [13]

It is noteworthy that the distal occlusions have not been defined homogenously across all the previous results. Regarding our study, we have defined distal MCA occlusions as occlusions located distally to the insula's mid-height of the M2 segment according to Fischer's classification. [6] On contrary to other studies, considering M2 occlusions starting just by M1 bifurcation or the reflecting upward segment [14], we chose the insula's mid-height as a landmark to define distal M2 occlusions, since we think that proximal M2 occlusions are very close to distal M1 occlusions and cannot be considered as distal occlusions.

Recently, a consensus regarding the precise definition of distal vessel occlusion has been published, which might help to resolve this conflict and better delineating the guidelines to treat such patients. This consensus sheds the light on the importance of evaluating the vessel diameter beside its distal location as both represent a real challenge to navigate through and recanalize safely and efficiently.[1] We did not retain the use of a size threshold to define a distal occlusion in our study, since we believe that measuring the size proximal to an occluded vessel is highly imprecise to evaluate the target artery's size.

Although the efficacy of MT+BMT in patients with distal vessel occlusion is still unclear, previous retrospective studies and systematic reviews reported encouraging results.[15, 16] Of these, only a few studies compared the efficacy and safety of MT+BMT with those of medical treatment.[14, 17-20] Interestingly, these comparative studies are still having conflicting results. Meyer et al. 2021[21], Miura et al. 2019 [14] and Sarraj et al. 2016 [17] have shown significant higher efficacy of MT+BMT than the medical management. By contrary, Rai et al. 2013 [18], Qureshi et al. 2017 [19] and Nagel et al. 2020 [20] did not find significant difference between both strategies of management.

Denoting that only our study and Nagel et al.'s study [20] included all distal occlusions sites (M3, anterior and posterior cerebral arteries) in addition to M2 occlusions. However, Nagel et al. 2020 [20] only included patients with minor strokes (NIHSS ≤5) despite those distal vessel occlusions frequently cause disabling symptoms if an eloquent area is affected.[1]

Yet, there is neither consensus on clinical selection criteria nor uniform imaging criteria for MT for DVOs patients. Several studies used an NIHSS threshold of ≥6, as it is currently recommended for LVOs. However, a recent data analysis has shown that more than 30% of DVOs patients have a baseline NIHSS <6. Moreover, the variety of clinical symptoms of DVOs, which are dependent on the eloquence of the affected area, also seems to play an important role in the complexity of decision-making. [22]

Furthermore, NIHSS is heavily focused on motor function and thus, unable to capture the more subtle domain-specific impairment in DVOs stroke-related disability. Therefore, more fine-grained scales or language and cognitive evaluations should be used in DVOs. [23]

More than eighty percent of our patients underwent MT under conscious sedation, as our institute protocol is to initiate MT with conscious sedation with potential conversion to general anaesthesia (GA) if patient presents agitation or excessive motion. However, the higher anatomical variability in distal vessels in relation to proximal vessels and the need for an excellent roadmap to navigate through distally located clots seem to bring GA more beneficial by complete elimination of the patient's movement. Thus, further trials investigating impact of GA on functional outcome in DVOs are warranted.

From a technical perspective in M2 and M3 occlusions, despite lack of statistical evidence in our cohort, it was observed that the navigation through the superior division was more challenging with excessive microwire manipulation than the inferior one. A possible explanation for this is that superior divisions are usually more angulated and tortuous than the inferior ones. A recent retrospective study compared MT in superior and inferior division occlusions had found that perforations were non-significantly more frequent in superior division occlusions compared to inferior division occlusions.[24]

Distal vessel occlusions are still managed for now subjectively on case-by-case basis, according to the dispersion of the operator, the degree of vessel tortuosity and the different institutional protocols. Indeed, distal vessel occlusions management warrant randomised clinical trials to better precise the selecting criteria of patients who could benefit from MT+BMT in a safe manner, especially those having disabling symptoms despite of the small calibre or the distality of the occluded vessel.

Study limitations

Our study suffers some limitations. First, the monocentric and retrospective fashion of the study. Second, the patient selection for MT+BMT and the devices used for thrombectomy was performed case by case and according to the treating neurologist or neurointerventionalist's choice, without predefined fixed clinical or radiological criteria; rendering additional bias to our results. This bias is underlined by the difference of stroke severity between the two cohorts before the propensity score matching. Moreover, the continuous evolution by iterative studies in the eligibility criteria for thrombolysis adds more biases to the study. Finally, the heterogeneity regarding the precise definition of distal vessels between different studies rendering more bias on comparing our results to other trials.

Conclusion

Mechanical thrombectomy and best medical treatment seem to be comparable regarding the effectiveness and safety in the management of patients with distal vessel occlusions. However, further investigations through randomized studies with larger samples are warranted.

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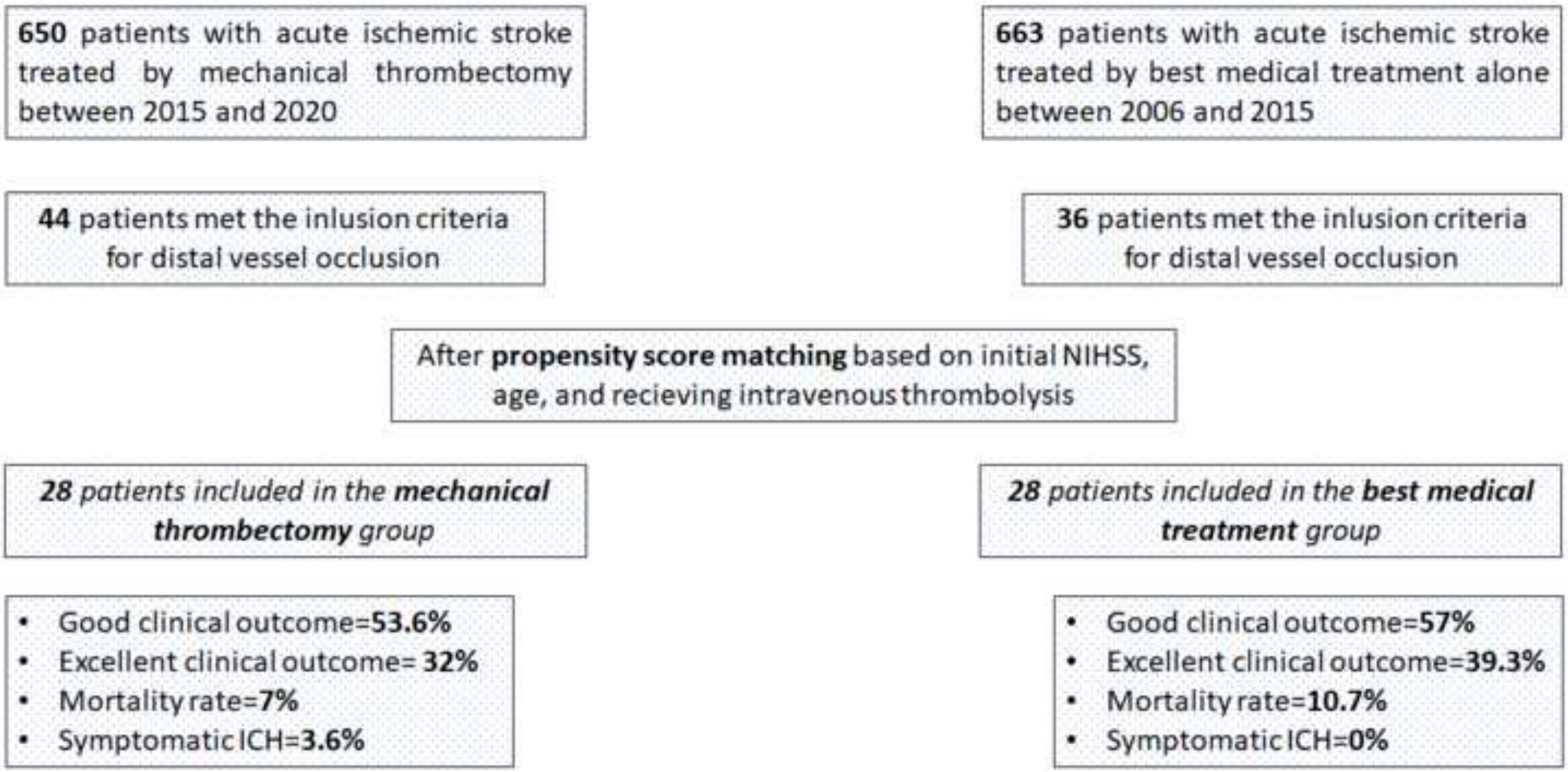
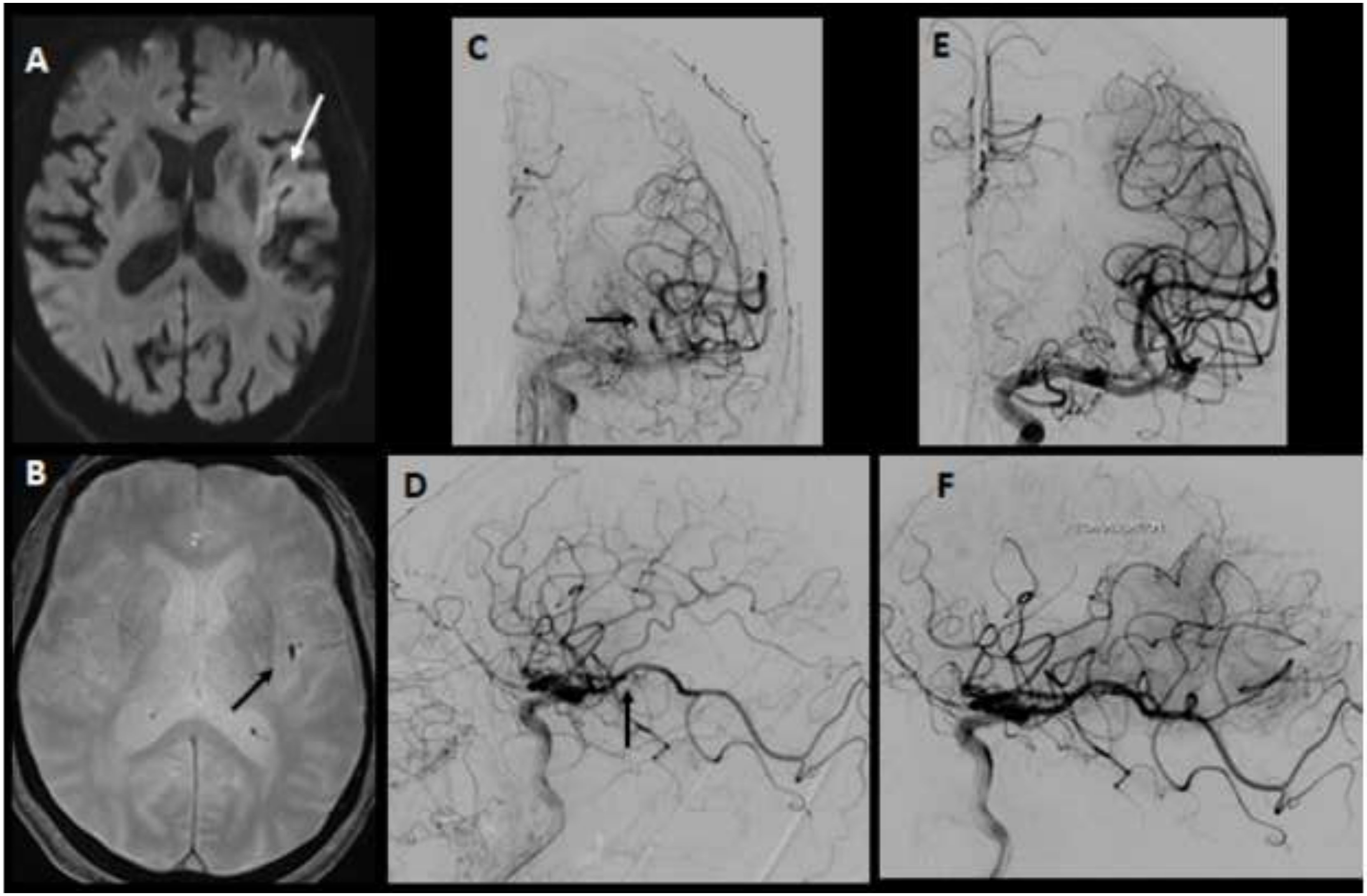
Figure captions

Figure. 1 Study flowchart

Figure. 2 A 89-year-old male presenting a sudden onset of right-sided hemiplegia and aphasia, with initial NIHSS of 18. (**A**) MRI brain diffusion-weighted imaging shows recent infarction in left middle cerebral artery territory (white arrow). **(B)** MRI brain T2 echo gradient sequence shows the occluding clot (black arrow). (**C**, **D**) Left internal carotid artery (ICA) digital subtraction angiography (DSA) in posterior-anterior (PA) and lateral projections shows left M2 segment occlusion (black arrows). (**E**, **F**) Left ICA DSA in PA and lateral projections shows complete recanalization (mTICI 3) after one passage using a 3x20 mm Trevo XP ProVue stentriever (Stryker Neurovascular, Fremont, CA, USA) in combination with proximal aspiration. NIHSS after 24 hours was 8, NIHSS at discharge was 6 and 3-months mRS was 2.


650 patients with acute ischemic stroke treated by mechanical thrombectomy between 2015 and 2020
663 patients with acute ischemic stroke treated by best medical treatment alone between 2006 and 2015
44 patients met the inlusion criteria for distal vessel occlusion
36 patients met the inlusion criteria for distal vessel occlusion
After propensity score matching based on initial NIHSS, age, and recieving intravenous thrombolysis
28 patients included in the mechanical thrombectomy group
28 patients included in the best medical treatment group
• Good clinical outcome=53.6%
• Excellent clinical outcome= 32%
• Mortality rate=7%
• Symptomatic ICH=3.6%
• Good clinical outcome=57%
• Excellent clinical outcome=39.3%
• Mortality rate=10.7%
• Symptomatic ICH=0%


A
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1 **Table.1 Patients' baseline demographics and procedural parameters**

Parameter	Entire cohort			Propensity score matched cohort		
	MT+BMT Group (n=44)	BMT Group (n=36)	*P Value*	MT+BMT Group; (n=28)	BMT Group; (n=28)	*P Value*
Age	78 (64-85)	70 (57-78)	0.04*	74 (61-83)	73 (63-79)	0.61
Initial NIHSS	11 (7-21)	6 (3-10)	*<0.001**	*10 (5-17)*	*7 (4-11)*	*0.28*
NIHSS at 24 hours	10 (3-16)	4 (2-8)	0.008*	10 (4-16)	5 (3-9)	0.15
Sex males, N (%)	25/44 (56.8)	24/36 (66.7)	0.49	17/28 (60.7)	18/28 (64.3)	1.00
Vascular risk factors						
HTN N, (%)	21/44 (47.7)	21/36 (58.3)	0.38	13/28 (46.4)	15/28 (53.6)	0.79
DM N, (%)	5/44 (11.4)	9/36 (25)	0.14	4/28 (14.3)	8/28 (28.6)	0.33
AF N, (%)	18/44 (40.9)	8/36 (22.2)	0.1	13/28 (46.4)	7/28 (25)	0.16
IHD N, (%)	15/44 (34)	13/36 (36)	1.00	8/28 (28.6)	11/28 (39.3)	0.57
Smoker N, (%)	14/44 (31.8)	9/36 (25)	0.62	9/28 (32)	7/28 (25)	0.77
Dyslipidemia N, (%)	13/44(29.5)	9/36 (25)	0.8	8/28 (28.6)	8/28 (28.6)	1.00
IVT N, (%)	28/44 (63.6)	15/36 (41.7)	0.07	16/28 (57)	15/28 (53.6)	1.00
Patients under GA N, (%)	7/44 (15.9)	NA	NA	3/28 (10.7)	NA	NA

Time between SO to hospital's door	119 (82-199)	164 (119-233)	0.11	117 (87-185)	139 (114-196)	0.32
Site of occlusion			<0.001*			<0.001*
M2 (%)	24/44 (54.5)	7/36 (19.4)		15/28 (53.6)	5/28 (17.9)	
M3 (%)	5/44 (11.4)	9/36 (25)		2/28 (7.1)	7/28 (25)	
P1 (%)	8/44 (18.2)	1/36 (2.8)		6/28 (21.4)	1/28 (3.6)	
P2 (%)	4/44 (9.1)	7/36 (19.4)		4/28 (14.3)	6/28 (21.4)	
P3 (%)	0 (0)	10/36 (27.8)		0/28 (0)	7/28 (25)	
A1 (%)	1/44 (2.3)	0/36 (0)		0/28 (0)	0/28 (0)	
A2 (%)	1/44 (2.3)	2/36 (5.6)		0/28 (0)	2/28 (7.1)	
A3 (%)	1/44 (2.3)	0/36 (0)		1/28 (3.6)	0/28 (0)	

Numbers are median and IQR. MT indicates mechanical thrombectomy, **BMT;** best medical treatment, **IQR**; interquartile range; **NIHSS**; National Institutes of Health Stroke Score, **HTN**; hypertension, **DM**; diabetes mellitus, **AF**; atrial fibrillation, **IHD**; ischemic heart disease, **IVT**; intravenous thrombolysis, **GA;** general anesthesia, **SO**; stroke onset, * indicates *P*<0.05.

Table 2. Clinical outcomes

Parameter	Entire cohort			Propensity score matched cohort		
	MT+BMT Group; (n=44)	**BMT Group; (n=36)**	***P* Value**	**MT+BMT Group; (n=28)**	**BMT Group; (n=28)**	***P* Value**
Successful recanalization (AOL ≥ 2) N, (%)	40/44 (90.9)	17/36 (47.2)	<0.001*	24/28 (85.7)	15/28 (53.6)	0.02*
Successful reperfusion (mTICI ≥ 2B) N, (%)	34/44 (77.3)	NA	NA	20/28 (71.1)	NA	NA
ENI N, (%)	20/44 (45.5)	14/36 (38.9)	0.65	10/28 (35.7)	11/28 (39.3)	1.00
mRS 0–2 at 3 months N, (%)	21/44 (47.7)	21/36 (58.3)	0.38	15/28 (53.6)	16/28 (57.1)	1.00
mRS 0–1 at 3 months N, (%)	13/44 (29.5)	14/36 (38.9)	0.48	9/28 (32.1)	11/28 (39.3)	0.78

Mortality at 3 months N, (%)	8/44 (18.2)	5/36 (13.9)	0.76	2/28 (7.1)	3/28 (10.7)	1.00
Symptomatic ICH N, (%)	2/44 (4.5)	0 (0)	0.5	1/28 (3.6)	0 (0)	1.00
Asymptomatic ICH N, (%)	4/44 (9.1)	1/36 (2.8)	0.37	3/28 (10.7)	1/28 (3.6)	0.61

MT; mechanical thrombectomy**, BMT;** best medical treatment, **OR**; odds ratio, **95%CI**; confidence interval; **AOL**: Arterial occlusion lesion scale**, mTICI**; modified thrombolysis in cerebral infarction scale, **ENI;** indicates Early neurological improvement**, mRS**; modified Rankin Scale, **ICH**; intracranial hemorrhage, **NA**; not applicable, *When P<0.05.