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The impact of occlusion location and bridging therapy in patients affected by Acute Ischemic Stroke in determining the total number of passes required to remove the clot and the final revascularization outcome.

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Purpose

Our purpose was to assess the impact of occlusion location in patients suffering from Acute Ischemic Stroke (AIS) on the total number of passes (attempts) necessary to retrieve the clot and on final revascularization outcome. Moreover, we analysed the impact of bridging-therapy, i.e. the concomitant use of IV tPA (intravenous tissue plasminogen activator) and mechanical thrombectomy (MT) on the different categories of occlusion locations.

Methods

550 mechanically extracted thrombi were collected from four partner hospitals: Beaumont (Dublin) Sahlgrenska (Gothenburg), National Institute of Clinical Neurosciences (Budapest) and Metropolitan Hospital (Piraeus). In the vast majority of the cases (311 patients, 56.5%) the thrombus was located in the Middle Cerebral Artery (MCA), followed by Carotid Terminus/Internal Carotid Artery (ICA) in 89 cases (16.2%) and by vertebral/basilar artery (45 patients, 8.2%). In 65 cases (11.8%) a tandem occlusion, i.e. the occlusion of both ICA and MCA was found, while a dual occlusion occurred in 26 cases (4.7%). 248 patients (45.1%) underwent bridging-therapy, while 291 patients (52.9%) were treated with MT alone. For 11 patients (2%) we have no information whether tPA was administered or not. Recanalization rate was defined by using the modified Thrombolysis In Cerebral Infarction (mTICI) score. Non-parametric Kruskal-Wallis test using IBM SPSS-25 software was used for statistical analysis.

Results

Occlusion location had a significant impact on the total number of passes required to retrieve the clot as well as on final revascularization outcome. The cases with tandem and dual occlusion showed higher number of procedural passes and lower percentage of complete revascularizations (mTICI=3, Table 1). Bridging-therapy did not significantly reduce the total number of passes or improve the recanalization rates for patients with singular occlusion. On the other hand, bridging-therapy significantly lowered the total number of passes to remove the clot in patients with dual and tandem occlusion (N=87, mean for MT+tPA= 2.63±1.73, MT alone=3.80±2.14, H_1=7.608, p=0.006*), but had no statistically significant effect on the final mTICI score (N=87, H_1=0.266, p=0.606).

Conclusion

This study suggests that occlusion location significantly influences the total number of procedural passes in MT procedures as well as the final revascularization outcome. Furthermore, bridging-therapy lowers the number of procedural passes in cases of tandem and dual occlusion without having significant effect on final mTICI score.

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Table 1. Impact of occlusion location on total number of passes and final mTICI score

Variable	Occlusion Location						Statistical analysis
	MCA	**Carotid T/ ICA**	**Vertebral/basilar**	**Other**	**Tandem occlusion**	**Dual occlusion**	
Mean Number of passes (±SD)	2.04±1.76	2.97±1.83	1.71±1.12	1.89±1.05	3.46±2.48	3.23±1.86	N=545, H_5=61.346, p=0.000*)
Final mTICI score (N (%))							
mTICI 0	3 (1.0)	4 (4.5)	0 (0.0)	0 (0.0)	1 (1.5)	0 (0.0)	N=538, H_5=22.635, p=0.000*
mTICI 1	5 (1.6)	0 (0.0)	1 (2.4)	0 (0.0)	2 (3.1)	0 (0.0)	
mTICI 2a	14 (4.5)	6 (6.8)	1 (2.4)	1 (11.1)	6 (9.2)	2 (7.7)	
mTICI2b	66 (21.4)	19 (21.6)	9 (21.4)	3 (33.3)	24 (36.9)	11 (42.3)	
mTICI 2c	46 (14.9)	15 (17.0)	7 (16.7)	0 (0.0)	15 (23.1)	4 (15.4)	
mTICI 3	174 (56.5)	44 (50.0)	24 (57.1)	5 (55.6)	17 (26.2)	9 (34.6)	