



Management of intravenous thrombolysis in case of mechanical thrombectomy: global real-life data from SITS centers

Katharina Feil^{1,2} · Marianne Dieterich^{1,2,3} · Frank A. Wollenweber^{1,4} · Niaz Ahmed^{5,6} · Lars Kellert¹ · for the SITS investigators

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Dear Sirs,

In patients with acute ischemic stroke, due to large vessel occlusion (LVO) mechanical thrombectomy (MT) in combination with intravenous thrombolysis (IVT) is the standard of care [1, 2] and leads to good clinical outcome in 46.0% of patients with a mortality rate of 15.3% and a rate of symptomatic intracranial hemorrhage (SICH) of 4.4% [1, 3]. In clinical trials for MT, 80–100% of patients were treated in combination with IVT [1]. IVT-treatment despite risk of bleeding is proven to significantly increase the probability of good clinical outcome and therefore standard of care for about 20 years with an extended time window of 4.5 h since 2009 [4, 5]. Earlier reperfusion and recanalization are strongly associated with improved clinical outcome after stroke [3, 4]. On the other hand, while there are clear benefits for IVT, concerns about potential risks, especially the occurrence of SICH as well as about efficacy of

recanalization depending on thrombus length, may lead to withholding of IVT in MT-patients [6, 7] though there is clear evidence of clinical benefit [8]. However, while MT became evidence-based and a Level 1A recommendation in LVO stroke patients, there are growing questions regarding the importance of IVT-treatment in these patients.

It is not known whether MT-patients eligible for IVT are treated in real-life in a standardized manner according to recommendations based on clinical trials. Therefore, we aimed to analyze how IVT-management in case of MT is performed in clinical routine. To access data, we conducted a worldwide online survey consisting of 29 standardized questions. The survey was sent out in 10/2017 to all stroke centers actively participating in the Safe Implementation of Treatment (SITS) International Stroke Thrombolysis Registry ($n=476$). Until 01/2018 we received 103 answers (see Table 1). 49.5% of participating centers were comprehensive stroke centers, 45.6% primary stroke centers and 4.9% general hospitals with or without telemedicine consultation. 99 centers performed MT at the center, but operating hours differed (see Table 1). 54.4% stated to withhold IVT before MT; in 57.1% of these cases due to individual treatment decisions (Fig. 1a). 25.2% of centers stopped IVT in cases of MT, mostly (69.2%) based on individual treatment decisions

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✉ Lars Kellert
lars.kellert@med.uni-muenchen.de

Katharina Feil
Katharina.feil@med.uni-muenchen.de

Marianne Dieterich
Marianne.dieterich@med.uni-muenchen.de

Frank A. Wollenweber
Frank.wollenweber@med.uni-muenchen.de

Niaz Ahmed
niaz.ahmed@sl.se

² German Center for Vertigo and Balance Disorders, Ludwig Maximilian University (LMU), Munich, Germany

³ Munich Cluster for Systems Neurology (SyNergy), Munich, Germany

⁴ Institute for Stroke and Dementia Research, Ludwig Maximilian University (LMU), Munich, Germany

⁵ Department of Neurology, Karolinska University Hospital, Solna, Sweden

⁶ Department of Clinical Neurosciences, Karolinska Institute, Stockholm, Sweden

¹ Department of Neurology, Ludwig Maximilian University (LMU), Marchioninistrasse 15, 81377 Munich, Germany

Table 1 Baseline data of centers participating in survey

	<i>n</i>	%
Centers	103	
Countries	29	
Europe	91	88.3
Asia	5	4.9
Africa	3	2.9
South America	3	2.9
Australia	1	1.0
Specialty		
Neurologist/stroke specialist	95	92.2
Neurointerventionalist	3	2.9
Other	5	4.9
Type of stroke unit		
Primary stroke center	47	45.6
Comprehensive stroke center	51	49.5
General hospital (with/ without stroke telemedicine consultation)	5	4.9
IVT/year		
< 50	40	38.8
50–100	44	42.7
100–200	12	11.7
> 200	7	6.8
IVT /dosage		
0.9 mg/kg body weight	102	99.0
0.6 mg/kg body weight	1	1.0
MT/year		
< 20	35	34.0
20–50	19	18.4
50–100	17	16.5
> 100	11	10.6
Not available	4	3.9
Unknown	17	16.5
Specialty performing MT		
Neurointerventionalist	74	71.8
Other	25	24.3
No MT in center	4	3.9
MT availability in center		
Not available, drip and ship	4	3.9
24/7	73	70.9
Working hours	12	11.7
Individual	14	13.6

Abbreviations: *MT*: mechanical thrombectomy, *IVT* intravenous thrombolysis

or in-house SOP (30.8%). Stated reasons for IVT-stop were different, i.e., large thrombus size, missing clinical improvement during IVT-treatment, high bleeding risk in patients or groin puncture. Furthermore, IVT-stop in LVO-patients and MT was performed in 61.5% of patients before start of MT, while in 38.5% IVT was stopped at other time points, i.e., before stenting or after successful thrombectomy with reopened LVO. In cases of IVT-stop, only 30.8% of physicians restarted IVT. 34.0% of centers gave recombinant tissue plasminogen activator (rtPA) intraarterial based on individual decisions. Additional heparin in MT was given in 39.8% with individual dosages (from 500 to 5000 IE).

When being asked about the importance of IVT in LVO-patients eligible for MT, 12.6% of centers considered IVT as not important or needless. 33.0% were uncertain about national and international guideline recommendations regarding IVT in case of MT. Moreover, 6.8% believed that IVT is not recommended in patients eligible for MT and 13.6% of centers stated that IVT in these cases is based on individual treatment decisions.

In conclusion, this survey showed that at least 60% of patients were not treated according national and international guidelines for IVT in patients with LVO eligible for MT. Also, IVT-management before and during MT as well as administration of intraarterial thrombolysis and heparin are diverse.

Our results should be interpreted with caution due to following limitations: first, this is a non-representative survey of heterogeneous primary and secondary stroke centers in different countries. Second, the response rate of our survey was about 20% of the centers which might result in a selection bias. On the other hand, these findings emphasize a requirement for implementation of standards for the management of IVT in MT-treated stroke patients and further education upon the basis of these standards based on MT-trials where 80–100% of patients were treated in combination with IVT [1]. Therefore, the importance of concomitant IVT in patients with LVO should become more prominent. Moreover, due to the lack of evidence for intraarterial thrombolysis and additional heparin during MT, more data and especially clinical trials are urgently needed.

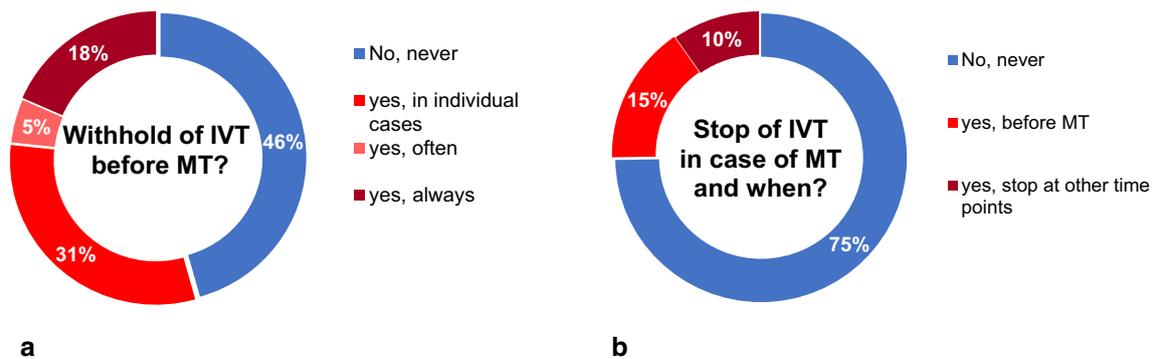


Fig. 1 Received answers to selected questions from the survey. **a** Withhold of IVT before MT. **b** Stop of IVT in case of MT and time of stop. Abbreviations: *IVT* intravenous thrombolysis, *MT* mechanical thrombectomy

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SITS Scientific Committee Members: Prof. Nils Wahlgren, Sweden (Chairman, until January 2019), Associate Prof. Niaz Ahmed, Sweden (Chairman, from February 2019), Prof. Valeria Caso, Italy, Prof. Gary A. Ford, United Kingdom, Prof. Kennedy R. Lees, United Kingdom, Prof. Danilo Toni, Italy, Prof. Christine Roffe, United Kingdom, Prof. Adam Kobayashi, Polen, Prof. Georgios Tsivgoulis, Greece, Prof. Peter Ringleb, Germany, Current SITS Coordination Team Members, Assoc. Prof. Niaz Ahmed, MD, PhD, Chairman from February 2019, Prof. Nils Wahlgren, MD, PhD, FESO, Chairman until January 2019, Charlotte Lahnborg Alme, PhD, COO - Chief Operating Officer, Michael V. Mazya, MD, PhD, FESO, Network and Research Executive, Tiago Moreira, MD, PhD, Research Executive, Johan Lundberg, MSc, Project Leader for Registry Development, Isa Ek, Executive and Network Coordinator Assistant, Shayer Rizvi, MSc, User Services and IT Manager, Linda Ekström, Research nurse, Charith Cooray, MD, PhD, SITS researcher, Irene Escudero, MD, visiting researcher, Sevilla, Spain.

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Compliance with ethical standards

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