

# Insights in acute endovascular treatment in ischemic stroke

## Citation for published version (APA):

Beumer, D. (2019). *Insights in acute endovascular treatment in ischemic stroke*. [Doctoral Thesis, Maastricht University]. ProefschriftMaken Maastricht. <https://doi.org/10.26481/dis.20191010db>

## Document status and date:

Published: 01/01/2019

## DOI:

[10.26481/dis.20191010db](https://doi.org/10.26481/dis.20191010db)

## Document Version:

Publisher's PDF, also known as Version of record

## Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
- The final author version and the galley proof are versions of the publication after peer review.
- The final published version features the final layout of the paper including the volume, issue and page numbers.

[Link to publication](#)

## General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal.

If the publication is distributed under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license above, please follow below link for the End User Agreement:

[www.umlib.nl/taverne-license](http://www.umlib.nl/taverne-license)

## Take down policy

If you believe that this document breaches copyright please contact us at:

[repository@maastrichtuniversity.nl](mailto:repository@maastrichtuniversity.nl)

providing details and we will investigate your claim.

## Valorization



## Introduction

In general, a PhD project in medicine embraces a specific discipline. This thesis embraces vascular neurology and focuses on clinical aspects of endovascular treatment of patients with acute ischemic stroke due to large vessel occlusion of the anterior circulation. Therefore, it will be of specific interest for vascular neurologists and radiologist and especially interventionists, who treat these patients. Nevertheless, it will be important to exhibit the results in a social and economic perspective. For this reason a chapter on valorization of the results of the studies in respect to its social and economic value next to research perspectives is added to this thesis.

### Impact of acute ischemic stroke and social and economic relevance

Patients with acute ischemic stroke (AIS) presenting at the emergency department often suffer from severe symptoms consisting for example of facial palsy, language disturbances and paralyzed arm or leg. These neurological symptoms can have severe impact on the life of patients and their relatives. AIS can even be life threatening. In The Netherlands every year about 40.000 patients are affected by AIS of whom 8.500 die. Intravenous thrombolysis (IVT) has been standard therapy in the acute phase since it was proven effective and safe in 1995 by the NINDS rtPA Stroke Trial. However, only 10% percent of patients benefit from IVT, which is just a small part of this severely disabling illness. Apart from the positive effect of IVT in AIS, a positive effect on the prognosis after cerebral ischemia has also been proven for aspirin 160-300 milligram as well as for post-stroke care on a specialized Stroke Care Unit.

In this thesis the results of the Multicenter Randomized CLinical trial on Endovascular treatment of Acute ischemic stroke in the Netherlands (MR CLEAN) are presented. MR CLEAN was the first study to demonstrate the safety and effectiveness of endovascular treatment (EVT) in AIS caused by large vessel occlusion (LVO) in the anterior cerebral circulation. After MR CLEAN, 6 other trials presented the same results for the effect of EVT in patients with an LVO. This has led to an enormous change in the care for patients with AIS worldwide.

From a societal point of view these results may have a strong positive effect, because patients suffering a severe stroke now have a significantly higher chance to regain independency. This is a major advancement compared to the situation before where many patients who were moderately or severely disabled required intensive nursing care. So, from both individual and societal perspective these results have major impact on patient survival with good quality of life and less usage of long term health facilities as home care and nursing homes. Results from economic evaluation analysis demonstrates that EVT added to usual care is cost effective over a period of two years of follow up. The

initial investment of a rather expensive therapy as EVT treatment pays off in reduced costs of rehabilitation, physiotherapy and nursing home stay in the end.

Furthermore, more patients will be able to participate in daily working life, which will also have a positive economic effect.

### The importance of logistics and intervention centers

In The Netherlands infrastructure and logistics for patients with AIS have changed drastically. Transfer of patients by ambulance services is now better accepted as an urgent procedure and patients are transferred as quickly as possible to a nearby hospital. Apart from the change in view and practice of ambulance services, another important change is the development of specialized Dutch stroke intervention centers in which dedicated teams, consisting of experienced neurologists, radiologists, interventionists and anesthesiologists, are able to treat patients immediately endovascularly 24/7 with adequate post stroke care.

### Medical devices in acute ischemic stroke

With the implementation of endovascular treatment as a standard novel therapy, several new medical devices have been developed. The results of the MR CLEAN study evoked renewed interest by the industry to improve or develop new thrombectomy devices, in order to better remove the clot.

### Valorization for research

The results of MR CLEAN that were confirmed by several other large randomized clinical trials led to an enormous change in the treatment of patients with AIS and an LVO. This led also to new ideas for future research. One of the questions raised was whether the time window in which patients should be treated could be extended. This will be investigated in a new trial with an extension of the inclusion window up to 24 hours after symptom onset or last seen well where patients are included if collaterals are (still) present on pretreatment CT Angiography. This study has been called MR CLEAN Late. Another important question was if direct EVT without prior IVT would lead to better patient's outcome; this will be assessed in a study called MR CLEAN NO IV. Since local hemostatic processes around the clot might influence outcome the question whether peri-procedural administration of anti-thrombotic medication has an effect on outcome will be assessed in MR CLEAN Med. Another study, MR CLEAN ASAP, will investigate the effect of prehospital transdermal nitroglycerin on patient outcome. Apart from these very interesting topics a lot of other topics deserve attention, for example effect of the interventionist's skills level, optimal anesthetic management, treatment effect in

patients with mild symptoms or with large infarct at baseline. With these future research topics a new scientific domain has developed in acute vascular neurology.

## Conclusion

The results of the studies presented in this thesis have shown that endovascular treatment in acute ischemic stroke in patients with a large vessel occlusion in the anterior circulation is effective and safe. This has led to enormous changes in acute stroke care for patients and clinicians nationally and globally, and has provided a basis for new research in vascular neurology.