

Endovascular treatment for acute ischemic stroke patients

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Impact paragraph

This thesis involves acute ischemic stroke patients with large vessel occlusion (LVO) and focuses on functional outcome after endovascular treatment (EVT). The results are therefore of interest to physicians in vascular neurology and radiology and can be useful for clinical decision making. Additional to the research perspectives, this scientific document can also be relevant for general society when translated to a societal context. This chapter states the added social and economic value of the research performed.

Acute stroke is one of the leading causes for disability and mortality in the Western world. As described by The National Stroke Association approximately 40% of all stroke patients suffer moderate to severe impairments and need personalized home care, while 10% require more intensive care in long-term care facilities. This major impact on quality of life contributes to a large social and economic burden. In 2009, the annual costs for stroke treatment and care in 27 European Union countries were estimated to be 27 billion euros, with 18.5 billion accounting for direct medical costs and 8.5 billion for indirect costs (e.g., loss of productivity).

Fortunately, the latest advances in treatment and prevention of ischemic stroke have resulted in significant improvements in clinical outcomes and potentially lower costs. One of these advances includes EVT as a standard stroke treatment. The high effectiveness of EVT not only results in reduced costs in public health care, but also supports the economic earnings by overall increased work participation of stroke survivors. As such, EVT has been proven cost-effective over a period of two years of follow-up, despite the initial high treatment costs.

Risk factors and stroke outcome

Although advances in stroke care have resulted in better clinical outcomes, the Global burden of stroke has still increased due to expanding population numbers and aging as well as the increased prevalence of stroke risk factors. Comorbidities such as ischemic heart disease and atrial fibrillation are known for its higher costs in stroke patients. The same might be expected in patients with obesity and peripheral artery disease.

The first two articles of this thesis describe exploratory research on the association between stroke risk factors and outcome after EVT. The first article describes an obesity paradox in LVO stroke patients and similar EVT benefit for all BMI subgroups. Based on the effect of the treatment, EVT remains indicated for all subgroups and patients should not be excluded from EVT based on BMI. The second article counters a previously described paradox between peripheral artery disease and good clinical

outcome after EVT. The previously suggested paradoxical associations were explained by hypotheses on neuroprotective phenomena. If these paradoxical associations could be found in large patient groups it may be fundamental for future therapeutic strategies on neuro-protection. Currently there is increasing research interest in neuroprotection, mainly targeting the pre-hospital phase. Since economic studies have shown that general preventive measures are more cost-effective than curative measures, our exploratory research may encourage further studies on neuroprotective mechanisms in stroke.

Expanding indications

The third article shows that repeat EVT is safe and effective in stroke patients with a recurrent LVO. The results also suggest that the secondary preventive measures are often insufficient at the time of a recurrent LVO. With regard to the phrase 'prevention is better than cure', it points out the importance of adequate secondary prevention.

This thesis contains two articles on the effect of EVT in late window stroke patients. Until recently approximately 30% of the ischemic stroke patients were excluded from EVT based on the lack of proof regarding EVT benefit beyond 6 hours after symptom onset of last seen well. Since the publication of two late-window trials, EVT benefit in the late window has been proven for a highly selected patient population. A cost-utility analysis on these two trials showed that performing EVT up to 24 hours is still cost-effective. Based on the high effectiveness in the selected population, it is expected that EVT is also beneficial for a much larger late-window population. Expanding the indication of EVT may result in larger proportion of functionally independent stroke patients and lower health care costs.

Finally, the last two articles describe the outcome after EVT in posterior circulation stroke patients. Though a LVO in the posterior circulation is relatively rare, the risk of severe impairment and mortality is significant. There is a high impact on quality of life and many uncertainties exist for patients, relatives and treating physicians. Consequently, a proven beneficial treatment for this patient group has the potential to significantly influence quality of life without the additional implementation costs, since EVT has already been embedded in standard stroke care. Although our research does not solve the uncertainty of EVT benefit, it provides novel insight in the underlying pathophysiology and the influence on outcome.

Conclusion

The benefit of EVT for individuals or subgroups in the population may influence the overall cost-effectiveness of the treatment. Since the use of EVT for LVO is growing and the proportion of patients with comorbidities is increasing we believe that exploratory

research on outcome after EVT in these subgroups is relevant in predicting the socio-economic impact. Moreover, research on expanding the indication of EVT may have significant impact on patient groups for whom appropriate treatment strategy is still lacking.