ESOC 2025

21–23 MAY 2025
HELSINKI, FINLAND

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Best of Neurointervention

Disclaimer

This slide deck is designed for personal educational purposes only and should not be utilised for making patient management decisions. It is important to verify all information provided before treating patients or applying any therapies mentioned in these materials.

Information

- This slide deck showcases the latest data presented at the ESOC 2025
- All abbreviations displayed in these slides, along with a complete copy of the original abstract text can be found in the slide notes
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Safety and efficacy of drug-coated balloon in patients with symptomatic intracranial atherosclerotic stenosis and restenosis: The SPINAS clinical trial

Background

- Stenting offers no clear benefit over medical therapy for intracranial arterial stenosis (ICAS)
- Primary balloon angioplasty achieves better outcomes but is limited by high restenosis rates
- Drug-coated balloon (DCB) combines the simplicity of angioplasty with drug-mediated inhibition of intimal hyperplasia, showing potential advantages
- However, robust clinical evidence supporting their safety and efficacy in treating ICAS remains insufficient

Aim

- To evaluate the effect of DCB in symptomatic ICAS and restenosis following conventional endovascular therapy

Methods

SPINAS trial (NCT 06047964)
9 high-volume centers in China
from March 23, 2023, and January 23, 2025

Cohort I:
- Prospective, multicenter, randomized controlled trial comparing DCB to plain balloon (PB) for ICAS

Cohort II:
- Prospective, single-arm trial assessing DCB in cases of restenosis

Primary outcome:
- Incidence of restenosis at 6 months

Secondary outcomes:
- Incidence of transient ischemic attack (TIA), Stroke or death at 12 months

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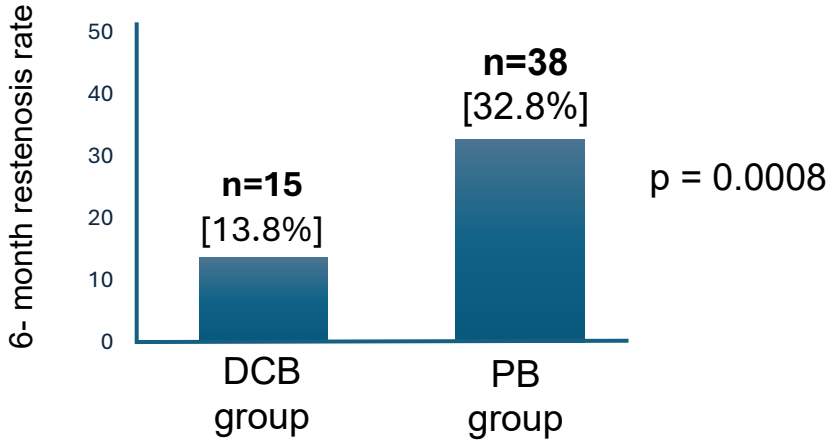
Safety and efficacy of drug-coated balloon in patients with symptomatic intracranial atherosclerotic stenosis and restenosis: The SPINAS clinical trial

Results

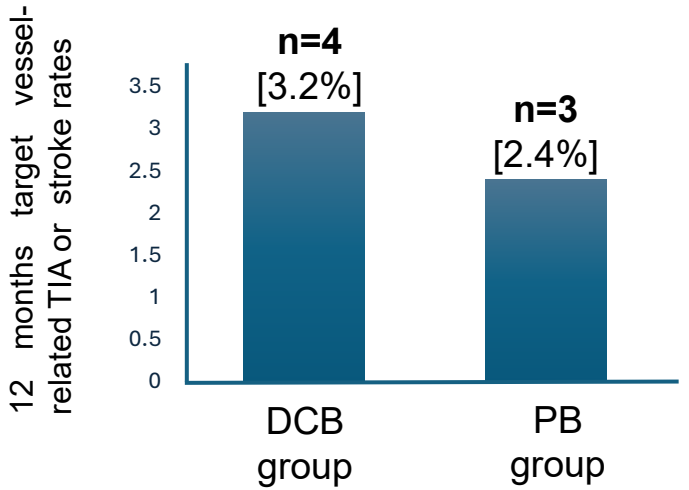
Cohort I

n=252 symptomatic ICAS patients randomized 1:1 into DCB and PB groups



p = 0.0008

- Significantly lower rate of the 6- month restenosis in the DCB group *vs.* PB group



p = 1.00

- No significant difference in target vessel-related TIA and stroke rates within 12 months

Cohort II

n=29 patients with restenosis and recurrent ischemic symptoms post-intervention

- The 6-month restenosis improvement rate reached **76%** after DCB treatment

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Stent angioplasty in patients with vertebral artery ostial stenosis: One year clinical and angiographic outcomes in 525 patients

Background

- Existing evidence on the best approach to treating patients with severe atherosclerotic vertebral artery ostial stenosis (VAOS) is insufficient
- Even with optimal medical treatment and effective risk factor modifications, a significant number of patients still experience symptoms or recurrent strokes
- Endovascular treatment may be a potential solution, especially when medical therapy alone has reached its limits

Aim

- To assess the safety and effectiveness of endovascular revascularization in carefully selected symptomatic and asymptomatic individuals with VAOS

Methods

Monocentric retrospective analysis

n=525 patients

n=260 asymptomatic

n=265 symptomatic

- Underwent stenting for the atherosclerotic VAOS between 2008 and 2022

Exclusion criteria:
- Vertebrobasilar tandem lesions and dissections excluded

- Patients underwent Digital subtraction angiography (DSA) after 3, 6, 12 months following stenting

Analysis
- Patients' characteristics, peri- and postprocedural events
- Follow-up (FU) data

Primary endpoint:
- Any vertebrobasilar stroke within 1-year follow-up

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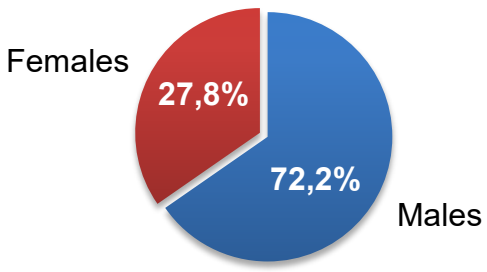
Stent angioplasty in patients with vertebral artery ostial stenosis: One year clinical and angiographic outcomes in 525 patients

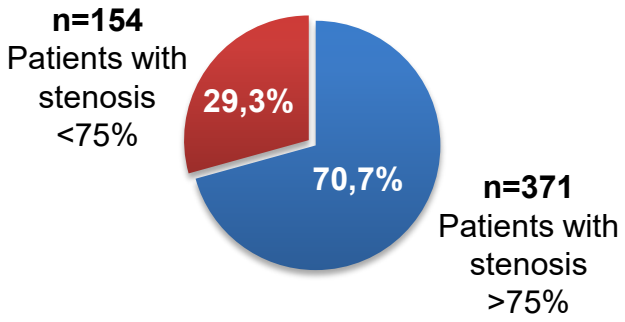
Results

n=525 patients (Median age: 70 years)

Gender distribution



Stenosis



- Stenting successfully performed in all cases
- The overall stroke rate in 1-year **FU=0.6%** (disabling n=2; non-disabling n=1)
- No treatment-associated death occurred
- Instent restenosis (ISRS) >50% diagnosed in **70** (12.4%) implanted stents in 1-year DSA FU within a mean time of 6.2 months

Conclusion

- Stent-Angioplasty demonstrates a favorable short-term safety and efficacy profile in patients with VAOS
- However, the incidence of ISRS appears to be higher, thus underscoring the importance of rigorous follow-up examinations
- Randomized controlled trials are necessary to evaluate the comparative effectiveness of stenting vs. best medical therapy alone

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Outcomes after thrombectomy for primary and secondary medium vessel MCA occlusions: A prospective nationwide registry study

Background

- Medium vessel occlusions (MeVO) can be either isolated events (primary), or secondary to thrombus migration from a large vessel occlusion to a medium-sized vessel
- Outcomes following endovascular thrombectomy (EVT) in the middle cerebral artery (MCA) may differ between primary and secondary MeVOs

Aim

- To assess the association between primary/secondary medium vessel occlusions and clinical outcomes following EVT

Methods

2 Quality registries with patients undergoing EVT

Secondary MeVO definition:
- Distal thrombus migration between baseline CT-angiography and EVT, or postoperative basal ganglia infarction in patients presenting with MeVO at baseline

Primary outcome:
- Good 90-day functional outcome (modified Rankin Scale 0-2)

Secondary outcome:
- Postoperative change in the National Institutes of Health Stroke Scale-score (NIHSS)

Exploratory analyses:
- To compare successful revascularization (mTICI 2b-3) with non-revascularization

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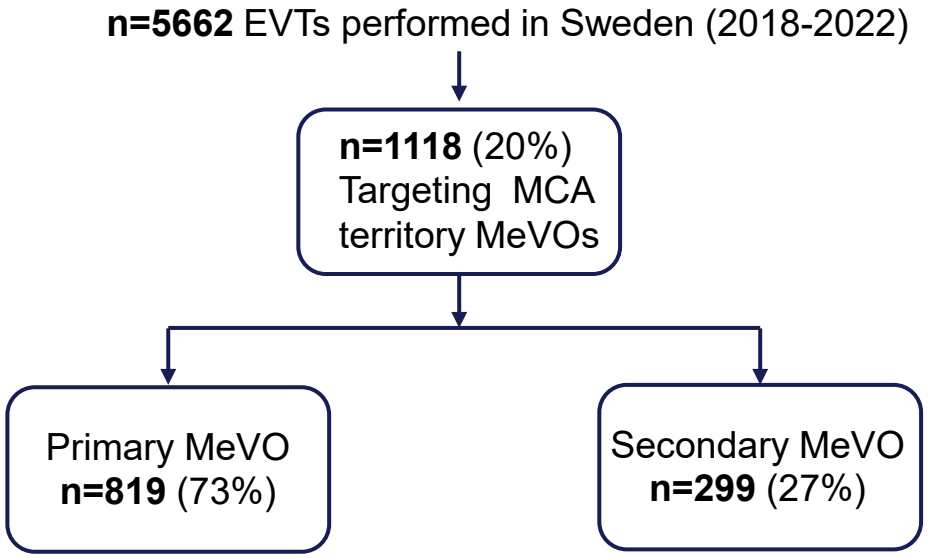
Outcomes after thrombectomy for primary and secondary medium vessel MCA occlusions: A prospective nationwide registry study

Results



- No difference in functional outcomes between the primary and secondary MeVO groups:

  OR=0.86 [CI 95% 0.65-1.14]

- No significant difference in postoperative NIHSS scores:

  0.26 [CI 95% -0.71 to 1.24]

Successful revascularization associated with increased chance of good functional outcome for both:

- Primary MeVOs **OR=3.77** [CI95% 2.28-6.24] p<0.001
- Secondary MeVOs **OR=2.49** [CI95% 1.21-5.14] p=0.013

Conclusion

- Patients with primary and secondary MCA MeVOs have similar EVT outcomes and recanalization is associated with better outcomes for both groups in exploratory analyses
- This indicates that EVT should not be withheld based on primary/secondary MeVO status

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Endovascular stenting in patients receiving mechanical thrombectomy for isolated cervical internal carotid artery occlusion: An ETIICA sub-study

Background

- Endovascular therapy (EVT) is a treatment option for patients with acute ischemic stroke due to isolated cervical internal carotid artery occlusion (c-ICA-O)
- Carotid artery stenting (CAS) is frequently used to obtain vessel patency (VP)

Aim

- To assess the technical and safety outcomes of CAS during EVT for isolated c-ICA-O

Methods

Study:
- Retrospective multinational cohort study (42 centers)
- Consecutive patients receiving EVT for isolated c-ICA-O within 24-hours from last-seen-well between 2018 and 2022

Patients with CAS (CAS)

Patients without CAS (NO-CAS)

Co primary outcomes:
- c-ICA vessel patency (VP) at 24 hours
- Symptomatic intracerebral hemorrhage (sICH)

Secondary outcomes:
- Any ICH and disability at three months (modified Rankin scale shift)

Statistical analysis:
Inverse probability of treatment weighting and multivariable regression

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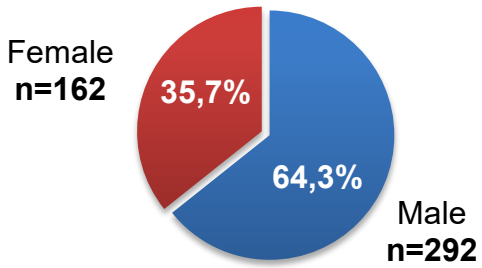
Endovascular stenting in patients receiving mechanical thrombectomy for isolated cervical internal carotid artery occlusion: An ETIICA sub-study

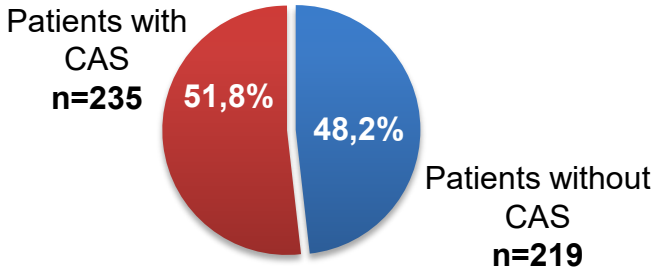
Results

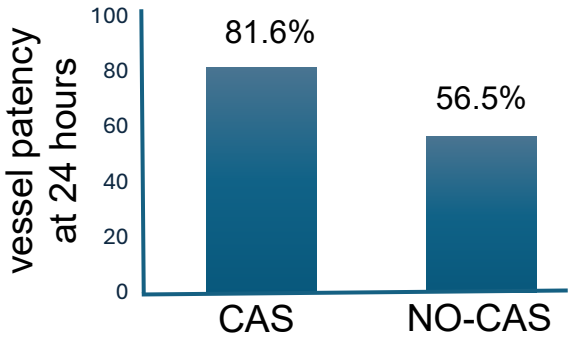
n=454 patients receiving EVT for isolated c-ICA-O
- Mean age=71 years (SD 13.5)
- Median NIHSS=13 [IQR 7–18]

Gender distribution

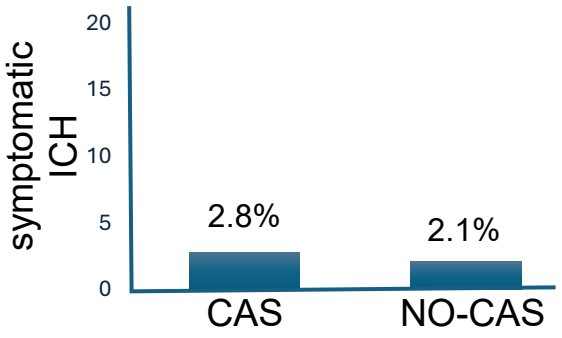


CAS status





aOR=**4.57** [2.33 – 8.96]



aOR=**0.65** [0.16 – 2.63]

- Any ICH was more common in CAS (19.2% vs. 11.0%):

  aOR=**2.08** [1.04 – 4.16]

- 3-month mRS did not differ between groups:

  aOR=**0.98** [0.63 – 1.53]

Conclusion

- In patients receiving EVT for isolated c-ICA-O, CAS seems to be technically effective and reasonably safe
- CAS was not associated with improved clinical outcome

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Major intracranial complications during balloon angioplasty and/or rescue stenting in failed thrombectomy are associated with worse functional outcomes: Analysis from a large retrospective registry

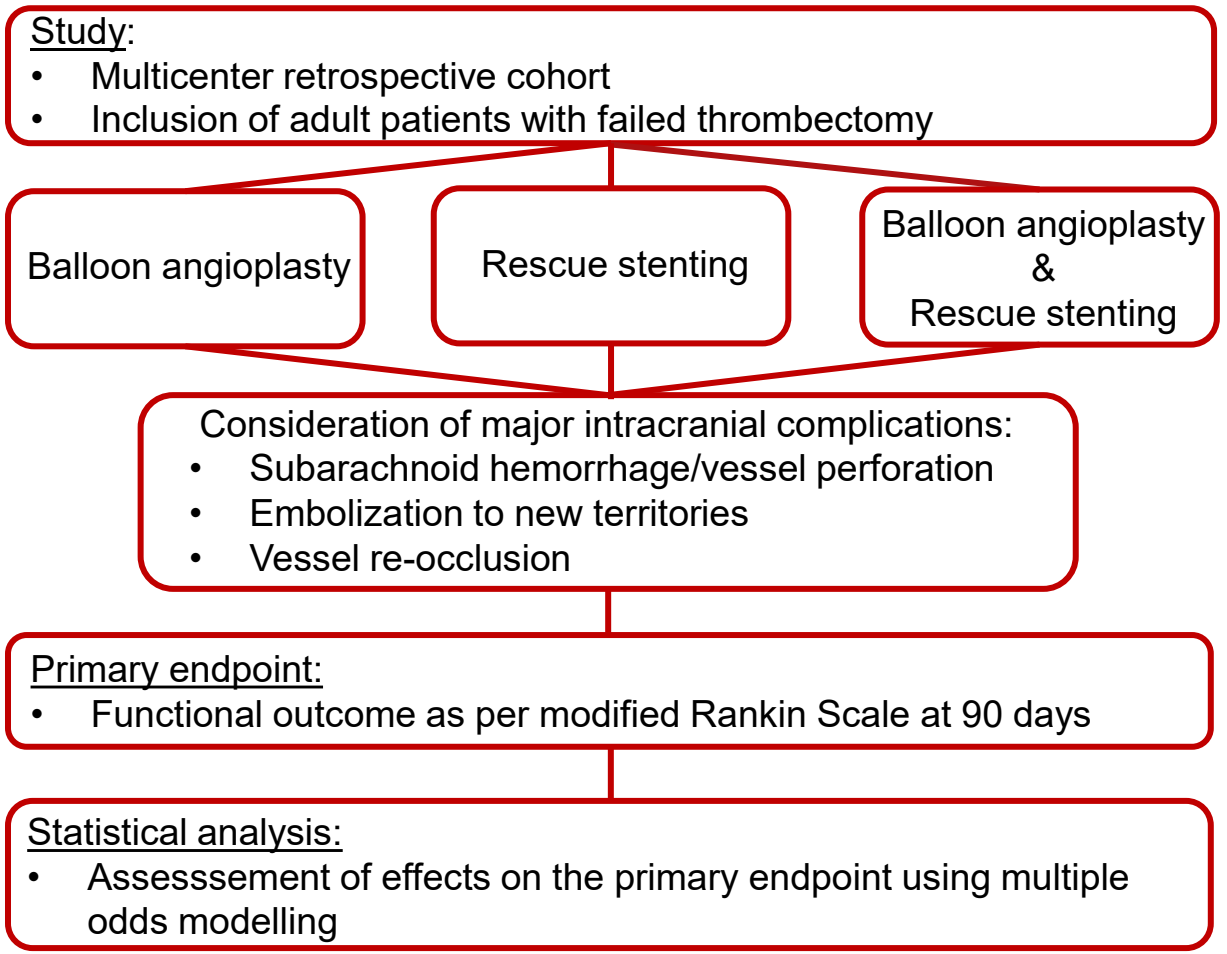
Background

- Balloon angioplasty, rescue stenting or a combination (BA/RS) are more and more considered as bail-out procedures in failed thrombectomy
- Little is known about corresponding complications

Aim

- To systematically report on major intracranial complications of BA/RS

Methods

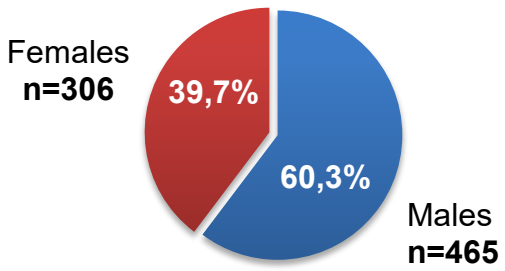


Major intracranial complications during balloon angioplasty and/or rescue stenting in failed thrombectomy are associated with worse functional outcomes: Analysis from a large retrospective registry

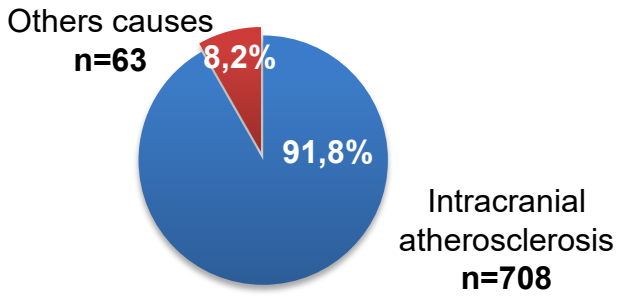
Results

n=771 patients with BA/RS (68.7±12.8y)

Gender distribution



Occlusion etiology



Type of complication	Number of patients	Percentage (%)
No complication	623	80,8
Major intracranial complications	148	19,2
- Subarachnoid hemorrhage/vessel perforation	53	6,9
- Embolization to new territories	53	6,9
- Re-occlusion	56	7,3
- More than one complication	14	1,8

Patients who experienced major intracranial complications compared to patients without these complications had significantly worse functional outcome:

OR=**0.53** [CI 0.37-0.74] p<0.001

and a 90d mortality of **30.2%**

Conclusion

- Major intracranial complications are not uncommon during BA/RS and are associated with worse functional outcomes and a substantial mortality
- This may inform patient treatment in current trials and the design of upcoming trials of BA/RS

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Procedural results of fusion imaging in endovascular thrombectomy

Background

- Endovascular thrombectomy (EVT) sometimes fails due to inability to access the target vessel
- 2D/3D fusion imaging in the Siemens ARTIS Icono biplane platform may facilitate access by fusing the preoperative CT angiography with procedural fluoroscopic or digital subtraction angiography

Aim

- To evaluate vascular access, success rates and procedural times in EVT performed with fusion imaging compared to standard treatment without fusion

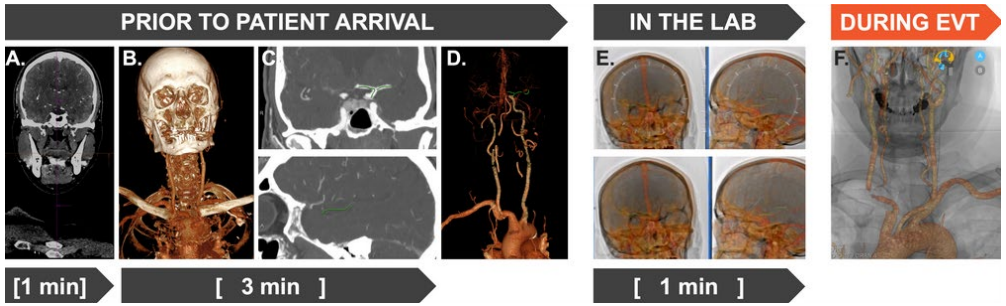
Methods

Study:Consecutive patient inclusion at Skåne University Hospital, Lund, Sweden

Evaluation:
- Procedural success rate
- Groin to target vessel access
- Groin-to-first-pass with stent-retriever/direct aspiration
- Groin-to-recanalization times

Assesment:
- Relationships between fusion imaging and recanalization, first pass recanalization and groin to first pass < 30 minutes

Fusion workflow



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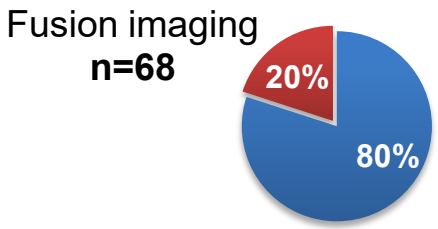
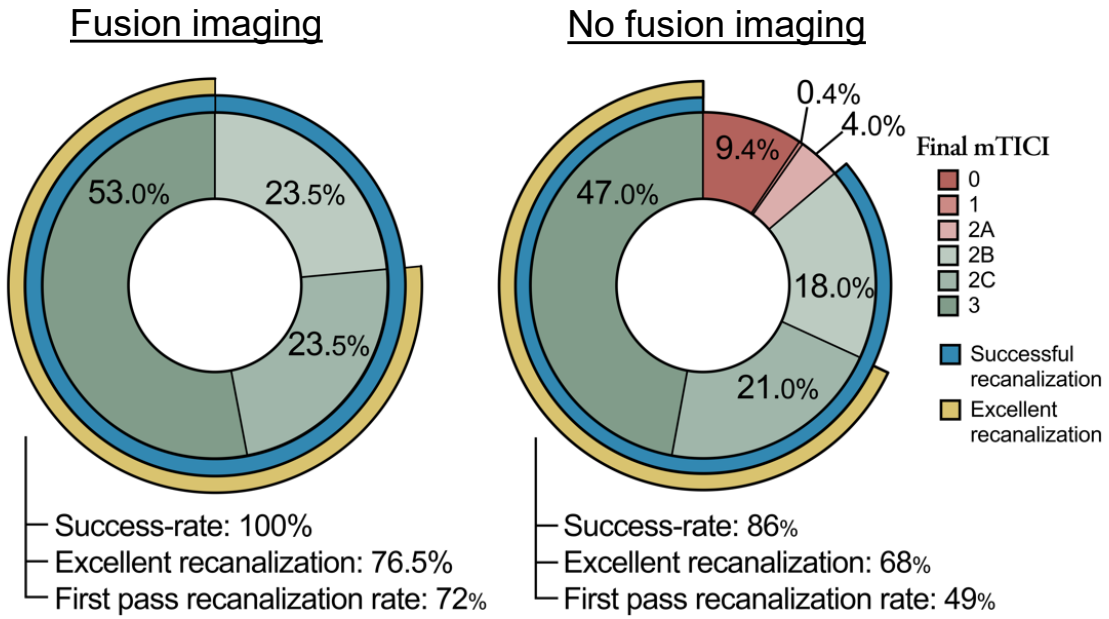
Procedural results of fusion imaging in endovascular thrombectomy

Results

n=347 consecutive patients





- When adjusting for age and sex, fusion was significantly associated with first pass recanalization:

  OR=**2.70** [95% CI 1.51-4.86] p<0.001

Conclusion

- Fusion imaging use in EVT may decrease the risk of failed target artery access and increase procedural success-rate and first pass success-rate without prolonging the procedures
- Future prospective, randomized studies are warranted to confirm these initial observational results

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Effect of time on EVT treatment effect and clinical outcomes in patients with large strokes: A pre-specified analysis of the SELECT2 trial

Background

- Endovascular thrombectomy (EVT) benefits patients with large strokes
- However, the effect of time from last known well (LKW) to randomization on functional outcomes and EVT treatment effect is not fully characterized

Methods

Study:
Pre-specified analysis of the SELECT2 trial

Assessment:
- Association of time from LKW to randomization with imaging characteristics, EVT treatment effect and clinical outcomes

- Adjustment of all analyses for age, stroke severity, CT-ASPECTS and CTP/MRI core volume

Results

- Median (IQR) time from LKW to randomization = 9.3 (5.7-15.3) hours, with 252 (71.6%) randomized within late window (6-24 hours) and similar clinical and imaging characteristics at baseline across treatment arms in both time windows

- EVT treatment effect consistent among those presenting in early (aGenOR=**1.84** [95% CI: 1.23-2.76] p=0.003) and late (aGenOR=**1.64** [95% CI: 1.25-2.16] p<0.001) time windows, without significant heterogeneity (p-interaction=0.53)

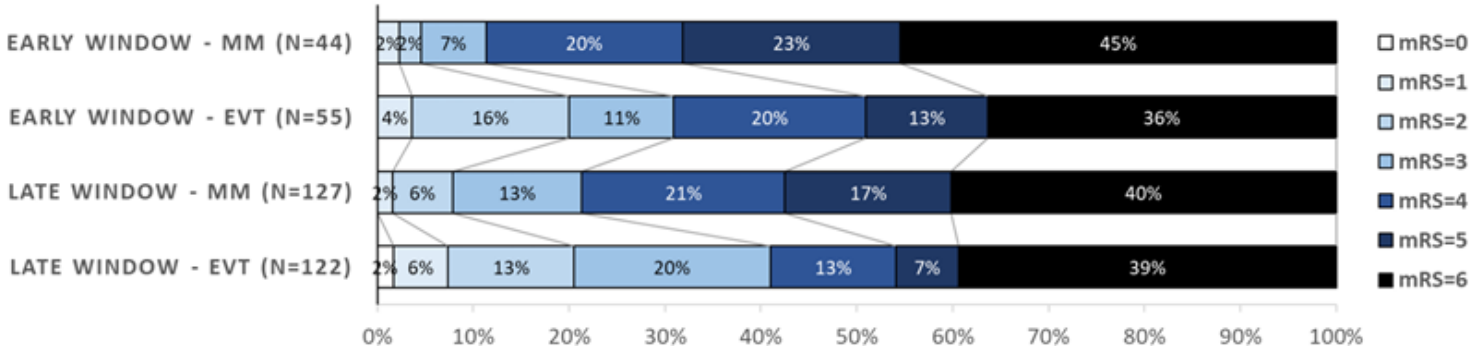

Figure 1. The distribution of modified Rankin Scale scores at 90-day follow-up in SELECT2 trial, across treatment arms and time windows. Patients randomized to receive Endovascular Thrombectomy demonstrated better clinical outcomes than those randomized to medical management across both early and late time window.

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Effect of time on EVT treatment effect and clinical outcomes in patients with large strokes: A pre-specified analysis of the SELECT2 trial

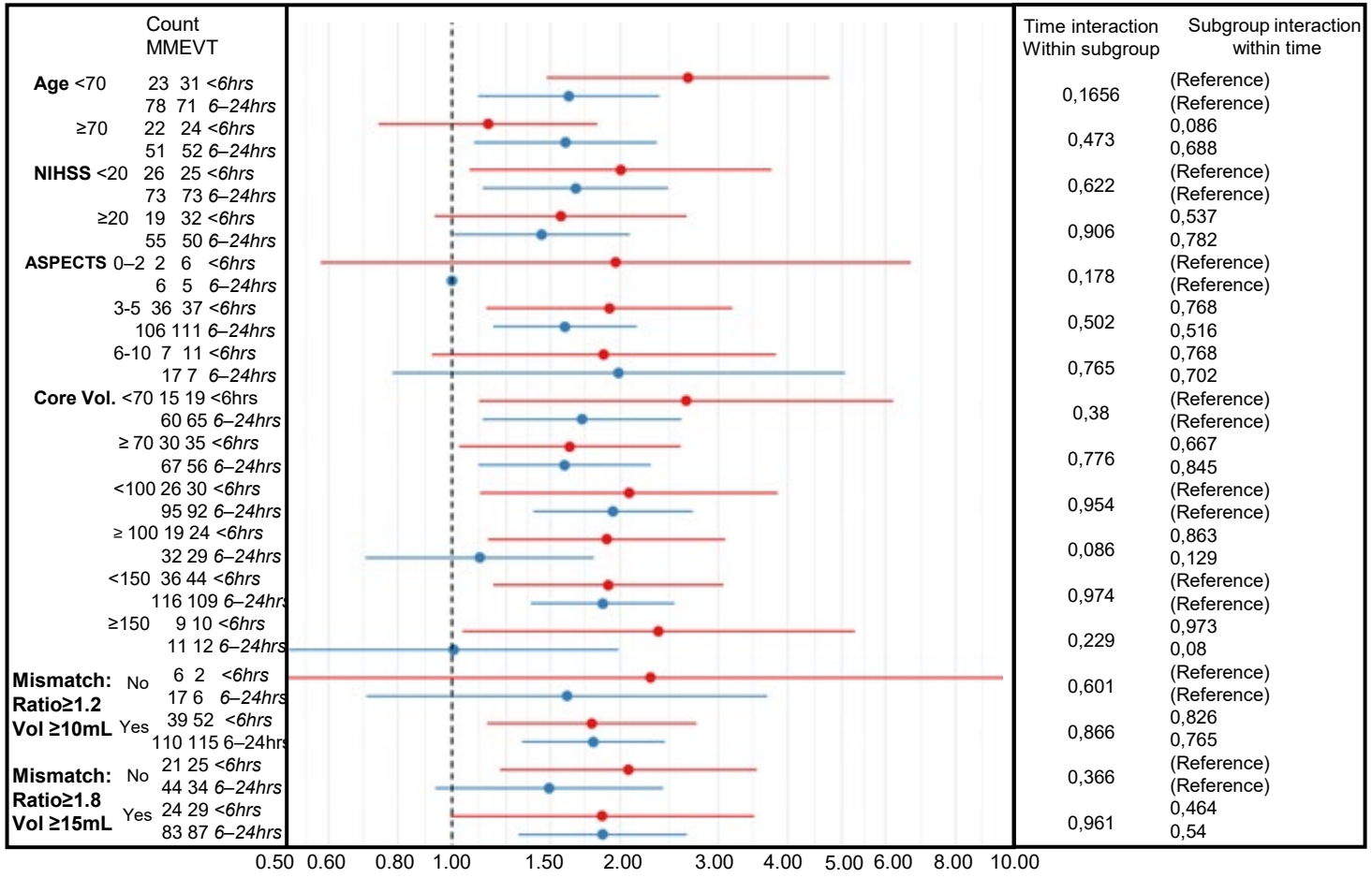

Figure 2. Forest plot illustration of EVT treatment effect estimates across various clinical and imaging strata in a) Early time window – 0–6 hours from last known well to randomization b) late time window – 6–24 hours from last known well. The treatment effect estimates largely favored EVT without significant heterogeneity across clinical and imaging subgroups without significant heterogeneity

- Treatment effect estimates favored EVT across various core estimates, ASPECTS, age and stroke severity strata in both early and late time windows (Figure 2)
- Similar results were observed at 1-year follow-up.
- Among EVT-treated patients, time to randomization was not significantly associated with worse functional outcomes (aGenOR=**0.98** [95%CI: 0.96-1.01 per hour] p=0.27), independent ambulation (aRR=**0.99** [95%CI: 0.96-1.02 per hour] p=0.68) or mRS 5-6 (aRR=**1.01** [95%CI: 0.98-1.03 per hour] p=0.69)

Conclusion

- Thrombectomy benefit was maintained in both early and late time window in patients with large core, without significant treatment effect heterogeneity based on age, stroke size and severity
- Longer time to randomization was not associated with worse clinical outcomes among EVT patients

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Rescue intracranial stenting for failed mechanical thrombectomy of vertebrobasilar occlusions: A pooled analysis from the French and German national stroke registries

Background

- Whether rescue intracranial stenting (RIS) should be performed in patients with vertebrobasilar occlusions refractory to mechanical thrombectomy (MT) remains an open question

Methods

Study:
Pooled analysis using data from two national stroke registries:
- The Endovascular Treatment in Ischemic Stroke registry in France
- The German Stroke Registry Endovascular Treatment in Germany

Inclusion criteria:
- Patients who underwent RIS for failed MT, defined as a mTICI score of 0-2a after MT, in basilar and/or vertebral artery occlusion from January 2015 to December 2023

Primary outcome:
- mRS score of 0-3

Secondary outcomes:
- mRS distribution at 90 days
- 90-day mortality
- any ICH and sICH

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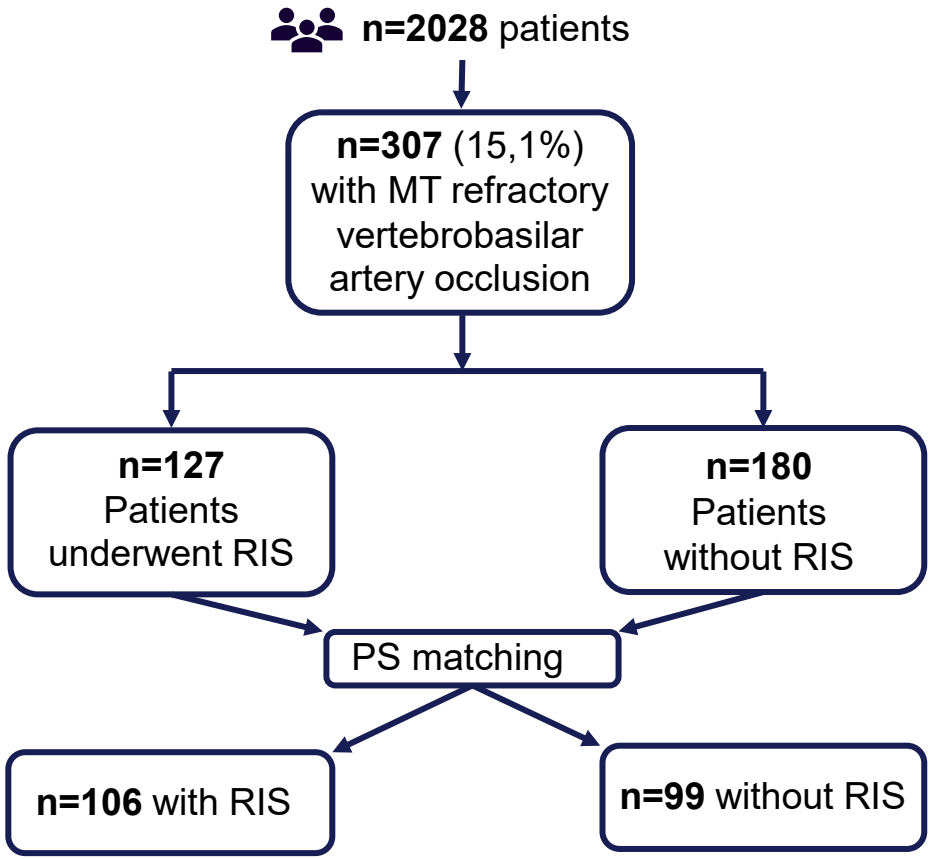
Rescue intracranial stenting for failed mechanical thrombectomy of vertebrobasilar occlusions: A pooled analysis from the French and German national stroke registries

Results



Patients with RIS:

- Higher odds of achieving mRS 0-3:
  aOR=**3.45** [95%CI 1.27-9.34] p=0.014
- A favorable mRS shift:
  aOR=**2.55** per 1-point mRS improvement [95%CI 1.22-5.34] p=0.013
- Lower odds of 90-day mortality:
  aOR=**0.26** [95%CI 0.09-0.71] p=0.008

No significant differences in any ICH and sICH

Conclusion

- This registry-based study provides level 3 evidence supporting the use of RIS in patients with vertebrobasilar artery occlusion refractory to MT
- Prospective randomized trials are necessary to validate the potential benefits of RIS in this condition

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Endovascular therapy for large core acute ischemic stroke is safe and effective regardless of prior antithrombotic therapy: A sub-analysis of the TENSION trial

Background

- The clinical relevance for acute decision making of prior antithrombotic medication in patients with acute ischemic stroke due to large vessel occlusion and established large infarcts is uncertain

Aim

- To investigate associations of prior antithrombotic therapy with the efficacy and safety of endovascular thrombectomy in this population

Methods

Study:
Secondary analysis of the TENSION trial
- Patients with acute ischemic stroke due to large vessel occlusion and an ASPECT Score of **3–5**

Randomization

EVT with medical therapy

Medical therapy alone

Exposure of interest:
- Prior antithrombotic therapy with antiplatelet agents, anticoagulants, or thrombolytics

Primary efficacy endpoint:
- Functional outcome assessed on the mRS at 90 days

Safety outcomes:
- Death by 90 days
- Symptomatic intracranial hemorrhage.

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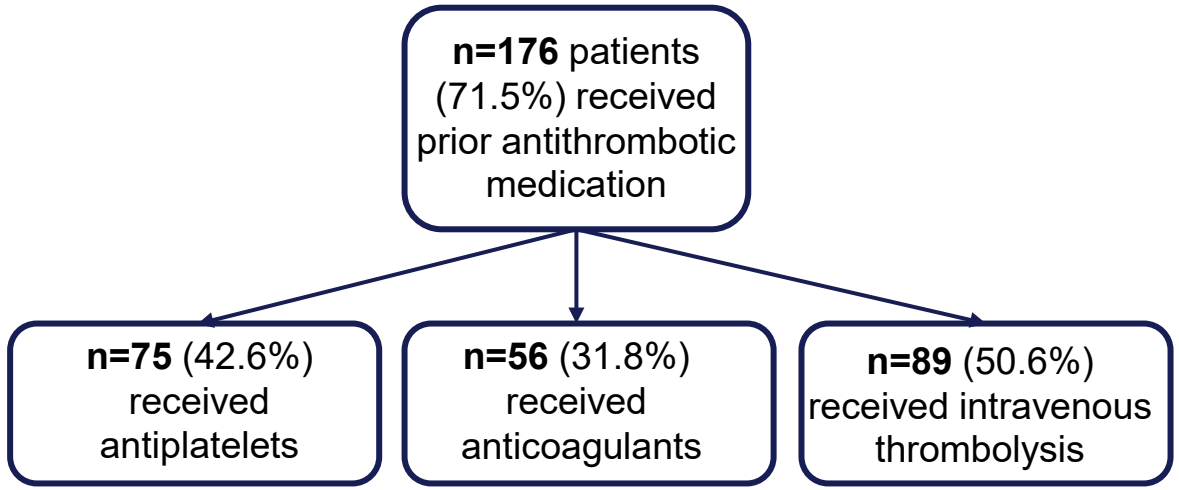
Endovascular therapy for large core acute ischemic stroke is safe and effective regardless of prior antithrombotic therapy: A sub-analysis of the TENSION trial

Results

n=246 patients (median age 74, IQR 65–80 years; 49% women)
-> **n=124** (50%) assigned to EVT



Treatment effect of EVT were similar in patients receiving

- Antiplatelets -> acOR=**2.40** [95% CI 1.22—4.99]
- Anticoagulants -> acOR=**2.45** [95% CI 1.17—5.28]
- Thrombolysis -> acOR=**1.46** [95% CI 0.83—2.61]

and patients without prior antithrombotic therapy -> acOR=**2.25** [95% CI 1.40—3.36]

Mortality at 90 days and rates of symptomatic intracranial hemorrhage were similar between groups

Conclusion

- EVT was safe and effective in patients with acute ischemic stroke due to large vessel occlusion and large established infarct regardless of prior antithrombotic therapy
- Exposure to antiplatelets, anticoagulants or thrombolytics should not be used to exclude stroke patients from endovascular thrombectomy

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Brain is money! Increasing the rate of endovascular thrombectomy is cost saving from a societal perspective

Background

- Endovascular thrombectomy (EVT) is the standard treatment for acute ischemic stroke (AIS) due to large vessel occlusion and the indication for EVT keeps expanding, but its implementation remains low in many regions

Aim

- To study the cost-effectiveness of attaining national EVT-rates on par with the best performing healthcare region and hospital in Sweden (population: 10.5 million)

Methods

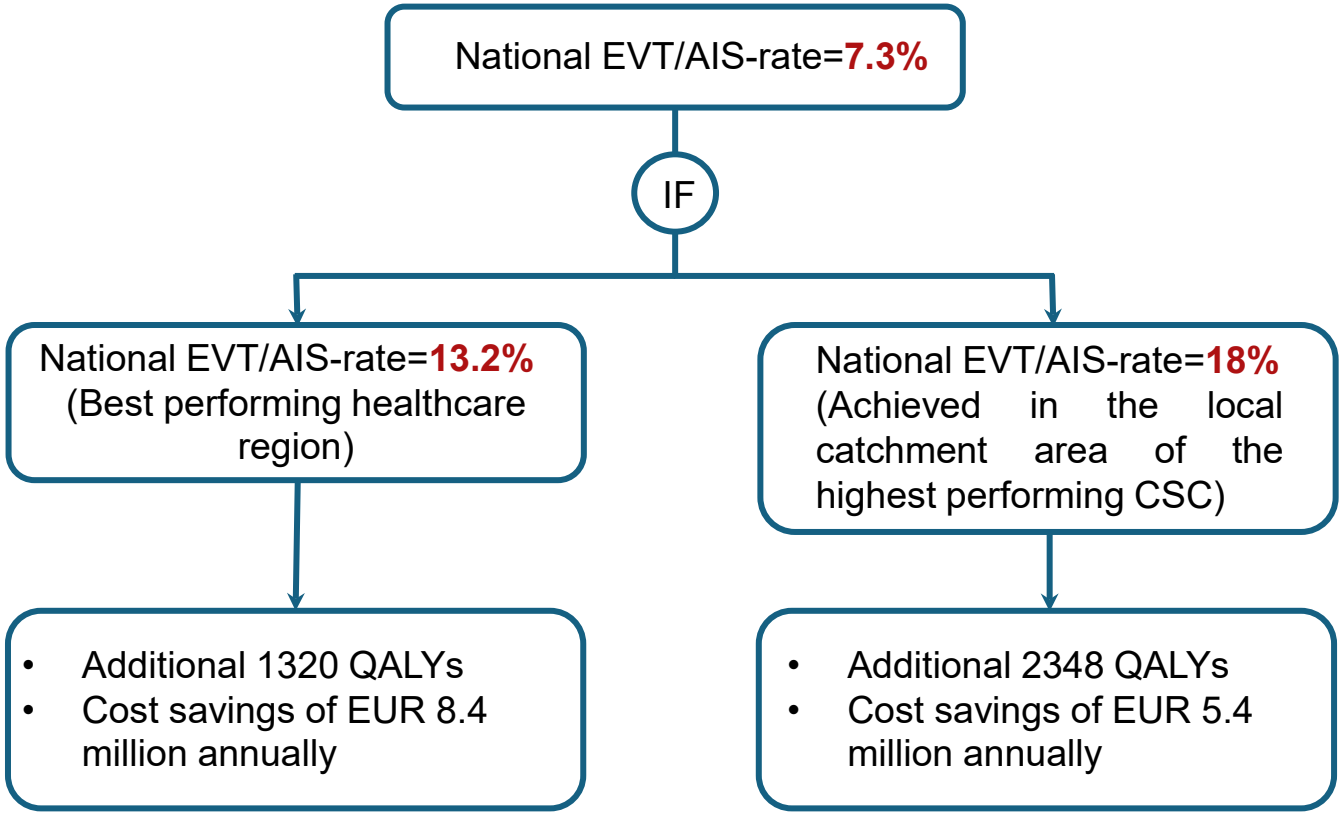
Study:
- Modelling the cost-effectiveness of increasing national EVT/AIS-rates using data from two national quality registries (2022)

Analyses:
- Case distribution at respective comprehensive stroke centre (CSC) and catchment area, covering both urban and rural areas

Quality-adjusted life years (QALY) and costs estimations:
- Published randomized clinical trial outcomes, as well as expected life years for AIS patients, based on age and post-stroke recovery

Brain is money! Increasing the rate of endovascular thrombectomy is cost saving from a societal perspective

Results



Conclusion

- This study shows that by increasing the national EVT rate to match the best-performing hospitals would not only significantly improve health outcomes for AIS patients but also generate substantial cost savings over their lifetime from a societal perspective
- The key question is not whether we can afford to expand EVT implementation, but whether we can afford not to

Carotid artery stenting in patients with radiation-induced carotid artery stenosis: Safety profile and long-term outcome with a focus on the frequency of in-stent-stenosis

Background

- Radiation-induced carotid artery stenosis (RICS) is a known adverse effect of radiotherapy (RT) and is associated with a risk of ischemic stroke
- Carotid endarterectomy (CEA) is considered to carry a higher risk in irradiated vessels, making carotid artery stenting (CAS) an increasingly favorable option

Aim

- To investigate long-term outcomes of CAS, particularly the incidence of in-stent restenosis (ISRS) in this patient subgroup

Methods

Study

Monocentric retrospective analysis
n=45 patients with CAS between 2009 and 2022
with 65 RICS

- Asymptomatic stenosis **n=41**
- Symptomatic stenosis **n=24**

- Male, n=40
- Median age, 66 years
- Mean degree of stenosis : 78.2%

Evaluation:

- Patients' characteristics
- Peri- and postprocedural events
- Follow-up data

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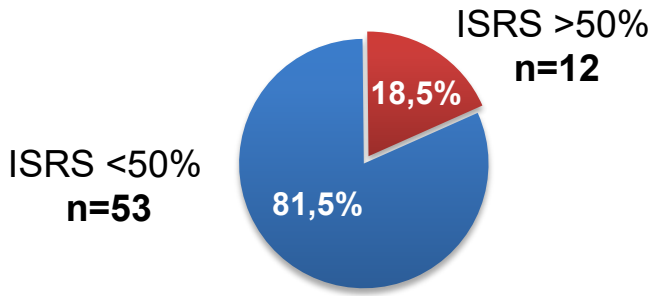
Carotid artery stenting in patients with radiation-induced carotid artery stenosis: safety profile and long-term outcome with a focus on the frequency of in-stent-stenosis

Results

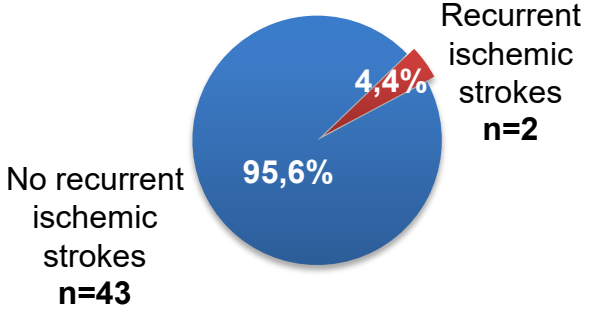
- CAS was successfully performed in all cases
- No ischemic strokes occurred
- Detection of an asymptomatic subarachnoid hemorrhage in one patient, potentially associated with cerebral hyperperfusion syndrome

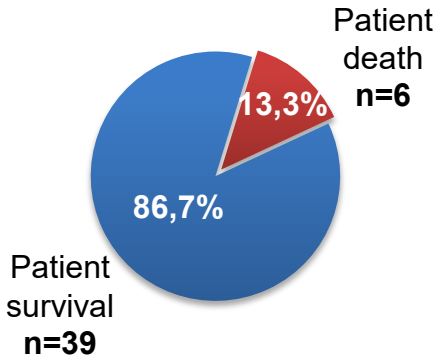
ISRS diagnosis in treated vessels



- Re-intervention performed in all cases within a mean time of 17.9 months (7–49 months)

>13 years of long-term follow-up:





Conclusion

- CAS demonstrates a favorable safety and efficacy profile in patients with RICS, offering the added advantage of addressing long-segment or multifocal stenoses
- However, the incidence of ISRS appears to be higher in this specific patient subgroup, thus underscoring the importance of rigorous follow-up examinations

ESOC 2025

Comorbidity burden and outcomes after endovascular thrombectomy for medium vessel occlusions

Background

- Patients with severe comorbidities are underrepresented in the ongoing randomized endovascular thrombectomy (EVT) trials for medium vessel occlusions (MeVOs)
- Observational data is needed to evaluate the benefits of EVT in this population

Aim

- To evaluate the impact of endovascular thrombectomy (EVT) outcomes in pre-stroke independent patients with medium vessel occlusions (MeVOs), stratified by comorbidity burden, using observational data

Methods

Observational study:

- All pre-stroke independent patients treated with EVT for middle cerebral artery MeVOs in Sweden 2015–2021

Comorbidity burden

- Categorized using the Charlson Comorbidity Index (CCI):
  - No (CCI 0)
  - Moderate (CCI 1–2)
  - Severe (CCI ≥3)

Primary outcome:

- Favorable functional outcome (modified Rankin Scale [mRS] 0–2) at 90 days

Exploratory analyses

- To assess changes in NIHSS and functional outcomes for successfully (mTICI 2b–3) and unsuccessfully recanalized patients, stratified by comorbidity groups

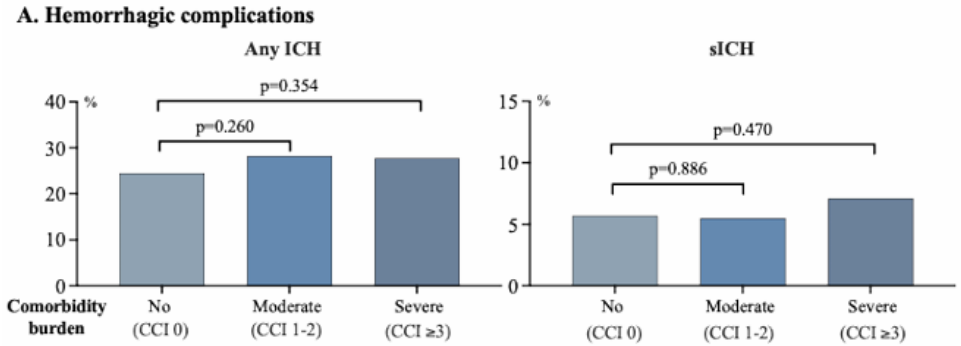
ESOC 2025

Comorbidity burden and outcomes after endovascular thrombectomy for medium vessel occlusions

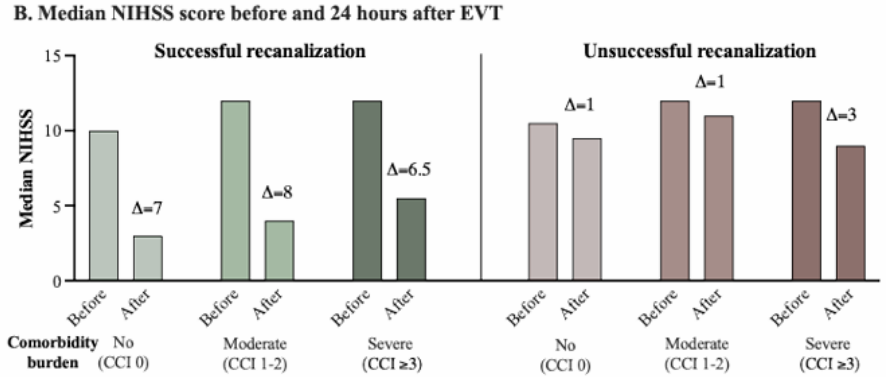
Results

- Among **n=983** patients, 35% had CCI 1–2 and 27% had CCI ≥3
- Favorable and excellent outcomes were highest in CCI 0 (61%, 25%), and lowest in CCI ≥3 (29%, 13%)

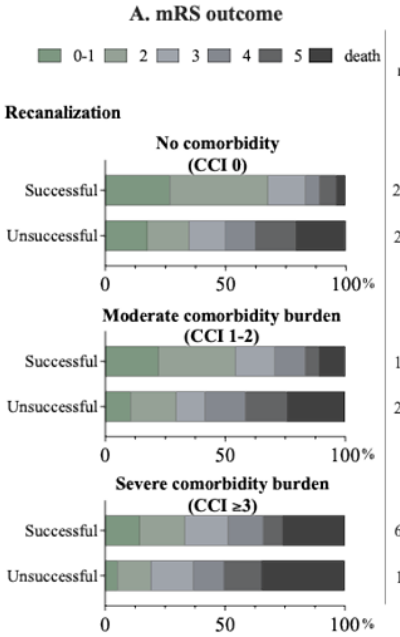
- Symptomatic intracranial hemorrhage rates did not differ between the CCI groups:



- Recanalization had a beneficial effect on postoperative NIHSS across all comorbidity groups and there was no neurological deterioration (median ΔNIHSS 1-3) in patients with unsuccessful recanalization:



- Successful recanalization significantly increased favorable outcomes within all CCI groups:



B. Favorable outcome (mRS 0-2)

	n (%)	Univariate logistic regression		Multivariate logistic regression	
		OR (95% CI).	p-value	OR (95% CI)	p-value
No comorbidity (CCI 0)					
Successful	201 (68)	3.92 (2.19-6.99)	<0.001	4.25 (2.18-8.25)	<0.001
Unsuccessful	25 (35)	ref		ref	
Moderate comorbidity burden (CCI 1-2)					
Successful	153 (54)	2.84 (1.54-5.23)	<0.001	3.39 (1.71-6.72)	<0.001
Unsuccessful	20 (30)	ref		ref	
Severe comorbidity burden (CCI ≥3)					
Successful	67 (32)	2.13 (1.00-4.51)	0.05	2.57 (1.14-6.00)	0.023
Unsuccessful	11 (19)	ref		ref	

Conclusion

- Severe comorbidity burden is common in MeVO patients and linked to poorer prognosis when compared to patients without comorbidities

- However, the results emphasize the importance of successful recanalization, and implies a significant treatment effect, across the whole range of comorbidity burden