STROKE

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Dear Doctor,

Greetings from Micro Labs. We are happy to bring you "Stroke Newsletter" which contains latest and interesting news in the field of Neuropsychiatry.

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1. **Evaluating the incidence, risk factors, and outcomes of cerebral edema with severe hemispheric syndrome**
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Looking forward to your valuable feedback
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Evaluating the incidence, risk factors, and outcomes of cerebral edema with severe hemispheric syndrome

Introduction: The prognosis of acute ischemic stroke is made worse by cerebral edema (CED), which, in severe cases, may result in life-threatening intracranial tissue destruction. The size of the ensuing infarct in patients who initially exhibit cerebral ischemia is influenced by a number of variables, including the effectiveness of treatments intended to restore blood flow to the blocked artery. The degree and clinical severity of the resulting edema and possible haemorrhage are greatly influenced by the size of the infarct. A high National Institutes of Health Stroke Score (NIHSS) score at baseline, a sign of a sizable region of cerebral ischemia, is referred to as severe hemispheric syndrome (SHS).[1] Large hemispheric infarction (LHI) is a severe form of ischemic stroke characterised by the development of life-threatening cerebral edema and affecting the majority of or the entire middle cerebral artery (MCA) distribution area with or without anterior cerebral artery and posterior cerebral artery involvement.[2]

The aim of this study was to investigate the occurrence, risk factors, and consequences of CED in patients with severe ischemia.

Method: In this prospective study, ongoing study data of 8,560 ischemic stroke patients treated with intravenous thrombolysis (IVT) and/or endovascular treatment (EVT) were taken from the Safe Implementation of Treatments in Stroke—International Stroke Treatment Registry (SITS—ISTR). The National Institutes of Health Stroke Score (NIHSS) >15 was used to diagnose severe hemispheric syndrome (SHS) at baseline and persistent SHS (pSHS) at 24 hours. The main objectives were to evaluate the moderate or severe cerebral edema indicated by neuroimaging, functional independence (modified Rankin Scale 0-2), and mortality at 90 days.

Results: In this study 82.2% of the patients received intravenous thrombolysis (IVT), 10.5% underwent IVT + thrombectomy, and 7.3% underwent thrombectomy alone. NIHSS was 21, and the median age was 77. Among 7,949 individuals with cerebral edema, there was moderate to severe CED in 28.9% of cases and any CED in 47.6% of patients. Age less than 50 years (RR-1.56), acute infarct signals (RR-1.29), hyperdense artery sign (RR-1.39), blood glucose > 128.5 mg/dl (RR-1.21), and reduced level of awareness (RR-1.14) were all linked to moderate to severe CED in the multivariable analysis. ($P<0.05$) (Table.1) pSHS patients had a poorer

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rate of functional independence than SHS patients and a greater incidence of symptomatic intracranial haemorrhage (SICH), any type of haemorrhage, and mortality. In terms of mortality, severe CED was linked to a greater risk of death at 90 days.

Discussion: In this study 82.2% of the patients received intravenous thrombolysis (IVT), 10.5% underwent IVT + thrombectomy, and 7.3% underwent thrombectomy alone. NIHSS was 21, and the median age was 77. Similarly compared to Thorén M, et al. study, the baseline NIHSS score was 16. Most of the patients had received IVT therapy,

Conclusion: This study concludes that in patients with extensive ischemia, low blood glucose, signs of an acute infarct, hyperdense arteries on baseline scans, and a reduced state of awareness were the most significant predictors of moderate or severe CED. CED was linked to a lower functional result and a higher risk of death at 3 months.

Table 1. Multivariable model for prediction of moderate and severe CED with Relative risk

Variable	Moderate to severe CED		
	RR	95% CI	*P*
Age (yr)			
<50	1.00		
50–59	0.89	0.73–1.08	0.230
60–69	0.80	0.67–0.96	0.014
70–79	0.76	0.64–0.90	0.002
≥80	0.66	0.55–0.78	<0.001
Age <50 years	1.56	1.24–1.97	<0.001
Male sex	1.02	0.95–1.10	0.577
Acute infarction on imaging	1.29	1.19–1.39	<0.001
Hyperdense artery sign baseline	1.39	1.29–1.50	<0.001
Blood glucose (>128.5 mg/dL)	1.21	1.12–1.31	<0.001
Previous stroke	0.91	0.81–1.03	0.150
Previous mRS 0	1.01	0.93–1.10	0.852
Oral antidiabetics	1.07	0.97–1.18	0.201
Decreased consciousness (NIHSS 1a ≥1)	1.14	1.06–1.24	0.001

CED, cerebral edema; RR, relative risk; GEE, generalized estimated equation; CI, confidence interval; mRS, modified Rankin Scale; NIHSS, National Institutes of Health Stroke Scale.

Moderate and severe cerebral edema were linked to poorer functional results and a higher risk of mortality at three months.

References:

1. Escudero-Martínez I, et al. Cerebral Edema in Patients with severe Hemispheric Syndrome: Incidence, Risk Factors, and Outcomes-Data from SITS-ISTR. J Stroke. 2023 Jan;25(1):101-110.
2. Liebeskind DS, et al. Cerebral Edema Associated with Large Hemispheric Infarction. Stroke. 2019 Sep;50(9):2619-2625.
3. Thorén M, et al. Effect of Recanalization on Cerebral Edema in Ischemic Stroke Treated with Thrombolysis and/or Endovascular Therapy. Stroke. 2020 Jan;51(1):216-223.

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Evaluation of incidence and risk factors for a poor functional outcome following endovascular thrombectomy for acute ischemic stroke

Introduction: Recanalization rates after endovascular thrombectomy (EVT) for large vessel occlusion (LVO) in acute ischemic stroke are comparatively high, although a significant number of patients have a poor functional prognosis (AIS). It is generally characterised as modified Rankin Scale (mRS) 3-6 after 90 days despite successful recanalization of modified thrombolysis in cerebral infarction (mTICI) 2B3. Several baseline clinical and imaging features, procedure time metrics, and post-procedural events have been related to fruitless recanalization. These characteristics must be understood in order to identify modifiable risk factors for prospective target treatments and to optimise patient selection and care.[1] Endovascular thrombectomy (EVT) for major artery occlusion in acute ischemic stroke (AIS) is successful when initiated within 6 hours of stroke onset, but better treatment benefit was shown when perfusion-based imaging was employed for patient selection with confined core infarct sizes compared to nonperfusion-based neuroimaging.[2]

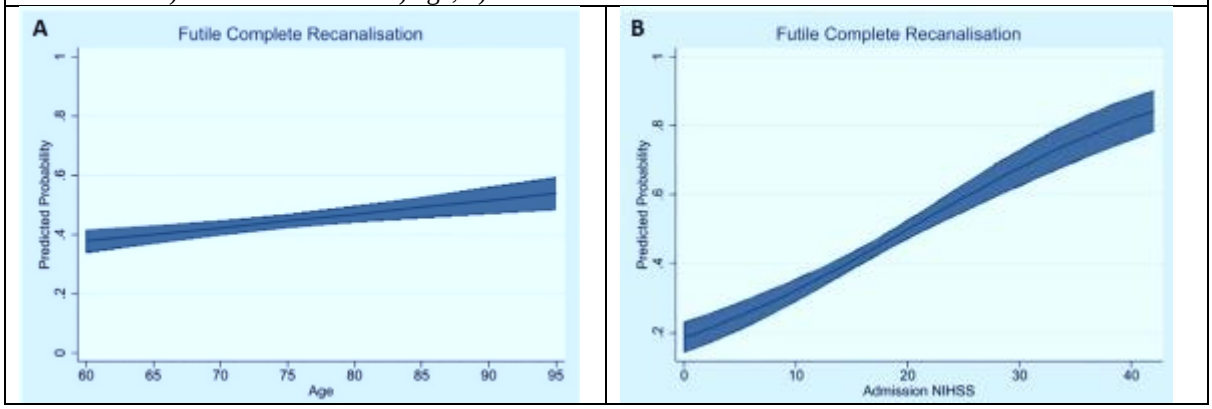
The aim of the study was to determine the prevalence and determinants of futile complete recanalization (FCR) in a nationwide stroke registry.

Method: A total of 4383 patients who exhibited complete recanalization (mTICI 3) after EVT were included in the study. Data were taken from the Sentinel Stroke National Audit Programme (SSNAP) registry. Poor or futile results were defined as a Modified Rankin Scale of 4-6 at discharge. Using the mRS, a member of the stroke team or physician evaluated the patient's functional outcome. Scores ranged from 0 (no symptoms) to 5 (severe disability/bedridden) and 6 (death). Futile complete recanalization (FCR) was defined as having mRS 4-6 at hospital discharge or worsening of the pre-stroke disability of mRS 4-5 while achieving mTICI-3 recanalization.

Results: In this study, 48.8% of patients were present with complete recanalisation post-EVT, among 44.4% developed FCR. Patients with FCR were associated with multiple baseline patient, imaging, and procedural factors after multivariable regression analysis adjusted for potential confounders: age, admission NIHSS scores, (Figure.1) pre-stroke disability, onset-to-puncture and procedural times, presence of diabetes, and use of general anaesthesia. Post-procedural events, including the occurrence of any intracranial haemorrhage (ICH),

symptomatic ICH (sICH), and early neurological deterioration (END), were associated with FCR even though they weren't indicators of the outcome. The use of a stentretriver alone, a contact aspirator alone, or a combination of the two, as well as the use of a balloon guide catheter during EVT, were not linked with FCR.

Figure.1. Futile complete recanalization (modified Rankin Scale 4-6 at discharge despite complete mTICI3 recanalization) is associated with: a) age; b) admission to the NIHSS.



Discussion: In this study, FCR was associated with a variety of post-procedural events, including the development of 13.9% of any intracranial haemorrhage (ICH), 2.2% of symptomatic ICH (sICH), and 7.4% of early neurological deterioration (END). According to the Csecsei P, et al. study, the overall number of ICH in the whole population was 47 (13%), symptomatic (sICH) 12 (3.4%), and asymptomatic (aICH) 35 (9.9%).[3]

Conclusion: This study concludes that the increased age, admission NIHSS scores, pre-stroke impairment, onset-to-puncture and procedure delays, prevalence of diabetes, and use of general anaesthesia were all significant predictors of FCR. FCR was related to the development of any ICH, sICH, or END post-procedurally.

Age, NIHSS scores at admission, pre-stroke impairment, onset-to-puncture and procedural timeframes, diabetes, and use of general anaesthesia were all significant predictors of FCR.

References:

1. Dhillon PS, et al. Incidence and predictors of poor functional outcome despite complete recanalisation following endovascular thrombectomy for acute ischaemic stroke. J Stroke Cerebrovasc Dis. 2023 May;32(5):107083.
2. Dhillon PS, et al. Perfusion Imaging for Endovascular Thrombectomy in Acute Ischemic Stroke Is Associated with Improved Functional Outcomes in the Early and Late Time Windows. Stroke. 2022 Sep;53(9):2770-2778.

3. Csecsei P, et al. Risk analysis of post-procedural intracranial hemorrhage based on STAY ALIVE Acute Stroke Registry. J Stroke Cerebrovasc Dis. 2020 Jul;29(7):104851.

Assessment of endovascular treatment for vertebrobasilar stroke: general anaesthesia vs. non-general anaesthesia

Introduction: Perioperative treatment has received comparably less attention in terms of impacting clinical outcomes among the various investigations exploring the causes of this mismatch. Previous observational studies have revealed that patients who undergo EVT without general anaesthesia (non-GA) are more likely to have positive clinical outcomes than individuals who get general anaesthesia (GA). The negative effects of GA were eventually mediated through infarct expansion; however, non-GA could result in a quicker start to therapy and might prevent problems with intubation.[1] Endovascular therapy (EVT), which has been considered the gold standard for anterior circulation occlusions presenting in the early timeframe, is being employed more often in the treatment of patients with acute ischemic stroke (AIS).[2]

The aim of this study was to evaluate the impact of anaesthesia management on the outcomes in VBAO patients who underwent endovascular therapy (EVT).

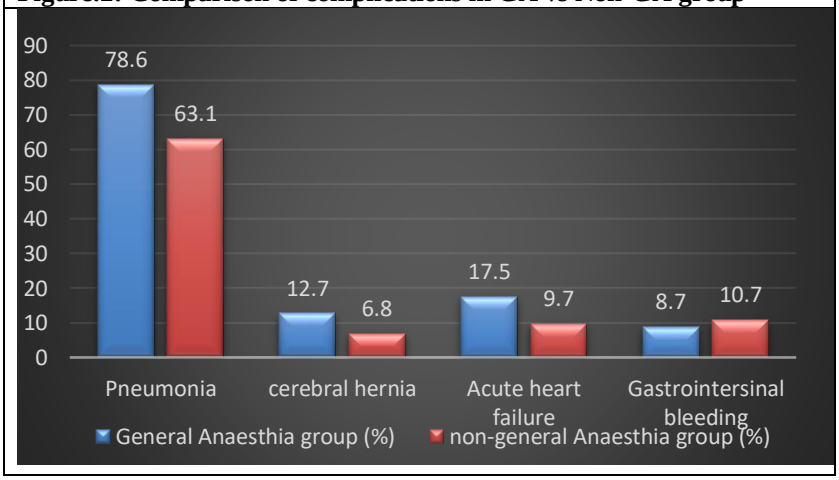
Method: In this retrospective study, a total of 571 patients with VBAO who received EVT during the study period were included. Patients were divided into a general anaesthesia (GA) group and a non-GA group. A modified Rankin Scale (mRS) score of 0 to 3 at 90 days was the main outcome, which was considered favourable. Functional independence (90-day mRS score 0-2) and the success rate of reperfusion were considered secondary objectives. The safety outcomes were the rate of symptomatic cerebral haemorrhage, all-cause death at 90 days, and the occurrence of any procedural complications (sICH). In addition, evaluations of the results in subgroups with Glasgow Coma Scale (GCS) scores (≤8 or >8) were conducted.

Results: Patients in the GA group had higher glucose levels and used intravenous thrombolysis more frequently before EVT than those in the non-GA group. The systolic blood pressure, NIHSS score, GCS score, and region of occlusion were comparable across the GA and non-GA groups. After using propensity score methods (PSM), the absolute standardised difference (ASD) significantly decreased, reaching a maximum of 2.3% for sex, 2.7% for atrial fibrillation history, 5.4% for alcohol history, 2.8% for glucose levels, and 5% for prior intravenous

thrombolysis use. In the GA group, the rate of aspiration pneumonia was 78.6%, which was substantially higher than the rate in the non-GA group (63.1%). (Figure.2) The primary outcome, secondary outcomes, and safety outcomes were the same for the two groups in the propensity score-matched cohort. The proportion of successful reperfusion was substantially greater in the GA group than the non-GA group among patients with a GCS score of 8 or below ($p = 0.04$). Similar outcomes were seen in the cohort with inverse probability treatment weighting and propensity score adjustment.

Discussion: In this study, both the GA and non-GA groups experienced vertebrobasilar stroke endovascular treatment with equal clinical results and safety outcomes. Compared to the Jadhav AP et al. study, the rates of successful reperfusion, positive clinical outcomes, haemorrhagic complications, and death were similar between the elective GA group and the monitored anaesthesia care group.[3]

Figure.2: Comparison of complications in GA vs Non-GA group



Conclusion: This study concludes that patients receiving general anaesthesia for vertebrobasilar stroke endovascular therapy were as safe and effective as those receiving non-general anaesthesia. General anaesthesia results in greater effective reperfusion even with a lower presenting GCS score (8).

Endovascular treatment in vertebrobasilar stroke patients under both general anaesthesia and non-general anaesthesia was safe and effective.

References:

1. Lu Y, et al. General anesthesia vs. non-general anesthesia for vertebrobasilar stroke endovascular therapy. Front Neurol. 2023 Feb 2; 14:1104487.
2. Hu G, et al. General anesthesia versus monitored anesthesia care during endovascular therapy for vertebrobasilar stroke. Am J Transl Res. 2021 Mar 15;13(3):1558-1567.
3. Jadhav AP, et al. Monitored anesthesia care vs intubation for vertebrobasilar stroke endovascular therapy. JAMA neurology. 2017 Jun 1;74(6):704-9.

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A rare case of repeated transient ischemic episodes and strokes caused by carotid dissection during air travel

Introduction: Carotid artery dissection is more prevalent in young individuals, accounting for 2.5% of all causes of ischemic acute stroke (IAS). Extra cranial lesions frequently present as temporary and reversible neurological impairments prior to a stroke. During the first 90 days, 31% of transient ischemic attacks (TIAs) result in strokes. Cervical arterial dissection develops when the wall leaflets detach, injuring the intima or rupturing the vasa vasorum and forming an intramural hematoma. The vascular lumen narrows as a result of dissection, and intimal damage releases thrombogenic substances.[1] Long-term death occurs in up to 40% of cases, and the prevalence of permanent neurological deficits ranges from 12.5% to 80%. The majority of dissections are thought to be the consequence of severe trauma, accounting for 0.86% of all instances, whereas the bulk are thought to occur spontaneously with no prior injury.[2]

Case presentation:

A 60-year-old male patient presents with complaints of two episodes of reduced muscular strength in the left upper limb lasting two to three minutes each, with spontaneous recovery, nausea, and an occipital headache with a continuous, non-pulsatile intensity of 7/10 on the numeric rating scale. Patient had a history of lumbar spine degenerative bone disease but no other known cardiovascular risk factors. The neurological examination showed no alterations during observation, and the EKG was within normal limits. Patient received symptomatic treatment before being sent to the emergency room for further evaluation.

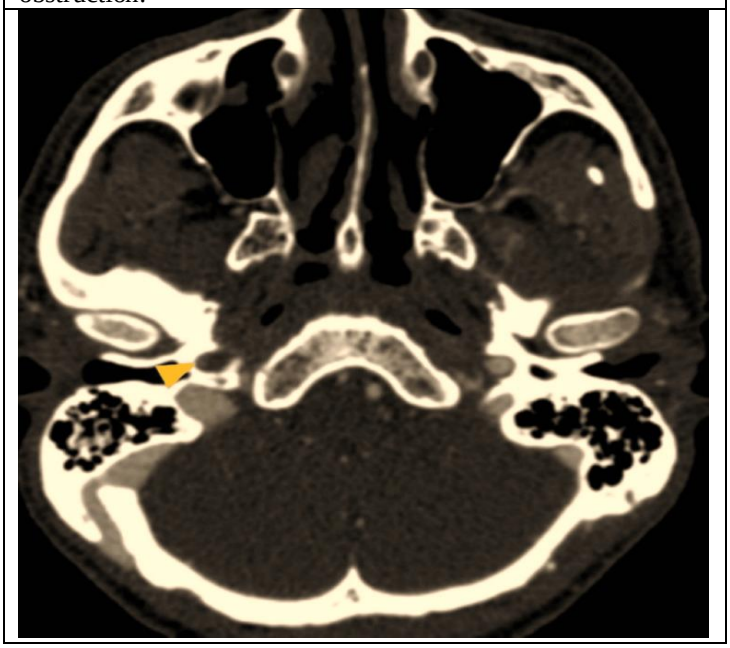
Analytical and cranioencephalic CT imaging did not reveal any hemorrhagic or ischemic vascular abnormalities. patient was discharged against medical advice with a prescription for 150 mg of acetylsalicylic acid (ASA) each day.

Patient experienced a severe right parietal headache and upper-limb muscle strength started decreasing a few hours after discharge. According to the National Institutes of Health Stroke Scale, the patient's neurological examination revealed preferential gaze to the right exceeding the midline, left homonymous hemianopsia, mild left-central facial paresis, and spastic left brachial paresis. A right internal carotid artery blockage at the cervico-petrous

transition caused by cervical segment dissection was identified in a CT angiography of the supra-aortic and cerebral trunks in the sagittal and axial (Figure.3) planes. This finding is consistent with arterial dissection. Digital subtraction angiography was used to confirm the diagnosis.

The patient was admitted to the cerebrovascular unit after undergoing balloon angioplasty, and three stents were placed in the right internal carotid artery with vascular permeabilization. A statin (40 mg of atorvastatin once daily) and dual antiplatelet treatment (150 mg of ASA once daily and 90 mg of ticagrelor twice daily) were started. After being hospitalised for 10 days, the neurological examination revealed no changes (National Institutes of Health Stroke Scale = 0), and the patient was discharged with the diagnosis of ischemic stroke in the region of the middle cerebral artery in the setting of occlusive dissection of the right cervical internal carotid artery.

Figure.3: Axial cerebral CT angiography reveals dissection-related right internal carotid artery cervical petrous transition obstruction.



In addition to high-potency statins, dual antiplatelet treatment (150 mg ASA once day and 90 mg ticagrelor twice daily) was advised for six weeks. It was suggested to stay away from flying for a month and to monitor carotid Doppler ultrasonography after a year, three years, and six years after the incident.

Discussion: The physical environment of the aeroplane (hypoxia, low humidity, and turbulence) also increases the risk of cerebral ischemia. Use standard cardiopulmonary resuscitation methods to help a patient who is thought to be in cardiac arrest. An automated external defibrillator (AED) and epinephrine, which may be used to treat in-flight cardiac arrest, are also included in the emergency medical kit.[3]

Conclusions: Pre-existing cerebral ischemia could worsen due to hypoxia, low humidity, turbulence, and poor cervical positioning during air travel. Hence, after a TIA or stroke, air travel should be avoided until clinical stability is ensured in order to prevent adverse patient outcomes.

Patients should have a thorough evaluation and avoid air travel for at least two days following transient ischemic attacks.

References:

1. Mendes M, et al. Recurrent Transient Ischemic Attacks and Stroke Due to Carotid Dissection During Air Travel: A Case Report. Cureus. 2023 Jan 29;15(1): e34340.
2. Taoussi N, et al. Traumatic bilateral dissection of cervical internal carotid artery in the wake of a car accident: A case report. Neurol Neurochir Pol. 2017 Sep-Oct;51(5):432-438.
3. Martin-Gill C, et al. In-Flight Medical Emergencies: A Review. JAMA. 2018 Dec 25;320(24):2580-2590.