

Intracranial hemorrhage following endovascular intervention

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Intracranial hemorrhage (ICH) following an endovascular intervention is a serious complication that can occur after procedures such as thrombectomy, aneurysm coiling, or stent placement in the treatment of conditions like ischemic stroke, cerebral aneurysms, and arteriovenous malformations. Here's an overview of the causes, risk factors, diagnosis, management, and outcomes related to ICH in this context:

Causes Procedure-Related Factors:

Mechanical Injury: During catheter navigation, mechanical injury to vessel walls can lead to hemorrhage. **Perforation:** Direct vessel perforation by the catheter or guidewire. **Device-Related:** Deployment of devices like stents or coils may disrupt vessel integrity. **Reperfusion Injury:**

After thrombectomy for acute ischemic stroke, sudden restoration of blood flow to previously ischemic tissue can cause hemorrhagic transformation. **Anticoagulation and Antiplatelet Therapy:**

Medications used during or after the procedure to prevent clotting may increase the risk of bleeding. **Hypertension:**

Blood pressure spikes during or after the procedure can precipitate hemorrhage. **Risk Factors Patient-Specific Factors:** Age, comorbidities (e.g., hypertension, diabetes), and previous history of stroke or ICH. **Procedure-Specific Factors:** Complexity and duration of the procedure, type of intervention (e.g., mechanical thrombectomy vs. coiling). **Diagnosis Clinical Signs:** Sudden neurological deterioration, headache, nausea, vomiting, or altered consciousness post-procedure. **Imaging:** CT Scan: The primary modality for detecting acute ICH. MRI: May provide more detail in certain cases, especially for subacute or chronic hemorrhages. **Management Medical Management:**

Blood Pressure Control: Aggressive management of hypertension. **Reversal of Anticoagulation:** Administration of agents to reverse anticoagulant or antiplatelet medications. **Supportive Care:**

Management in an intensive care unit, monitoring intracranial pressure. Surgical Intervention:

In cases of significant hemorrhage with mass effect or hydrocephalus, surgical evacuation or decompression may be necessary. Monitoring and Rehabilitation:

Continuous neurological monitoring and, once stable, initiation of rehabilitation to address any neurological deficits.

Preventive Strategies Pre-Procedural Assessment: Thorough evaluation of the patient's risk factors and optimization of medical conditions prior to the procedure. Intra-Procedural Techniques: Use of advanced imaging and careful technique to minimize vessel injury. Close monitoring of blood pressure and anticoagulation status during the procedure. Post-Procedural Care: Continued monitoring for early detection and management of complications. Intracranial hemorrhage after endovascular interventions is a complex and multifaceted issue, requiring a multidisciplinary approach for optimal management and outcome.

Despite the risk of symptomatic [intracerebral hemorrhage](#), successful [recanalization](#) via [mechanical thrombectomy](#) 6 hours after [stroke](#) may improve clinical outcomes in patients with [large vessel occlusion](#) ¹⁾.

[Intracranial hemorrhage](#) (ICH) can be a devastating complication of [mechanical thrombectomy](#) following [acute ischemic stroke](#) increasing disability and mortality. Patients with [low platelet count](#) were excluded from major trials.

A study of Desai et al., explored the association between platelet count and ICH after MT.

A retrospective review of patients undergoing MT for anterior circulation large vessel occlusions at a single comprehensive stroke center (CSC) between January 2015 and February 2018 was performed. Demographic and clinical information including NIHSS score, IV-tPA administration, ASPECTS, platelet count, INR, time from symptom onset to recanalization and mTICI score were analyzed. Radiological imaging and clinical course in the hospital was evaluated to identify parenchymal hemorrhage (PH) and symptomatic intracranial hemorrhage (sICH). Univariable and multivariable analysis was conducted.

555 patients underwent ET and 43% were male. Mean age and NIHSS score were 71 ± 14 years and 17 ± 6 . PH-2 and sICH (ECASS-III criteria) was noted in 9.7% and 5.8% patients respectively. Rate of sICH in patients with platelet count $<100,000$ ($n=15$), $100,000-150,000$ ($n=59$) and $\geq 150,000$ ($n=481$) were 6.7% ($n=1$), 10.1% ($n=6$) and 5.2% ($n=25$), respectively ($p=0.25$) and rates of mRS 0-2 at 90 days were 26.7%, 23.7% and 36.4%, respectively ($p=0.12$). Low ASPECTS was a significant predictor of sICH per ECASS III definition (p value=0.046). Platelet count was not a predictor ($p=0.386$) of sICH.

Risk of sICH after ET is low and comparable in patients with low and normal platelet counts. Low platelets should not exclude patients from undergoing intra-arterial therapy ²⁾.

Outcome

The [prognosis](#) of ICH after endovascular interventions varies widely based on the extent of hemorrhage, the patient's baseline condition, and the promptness of intervention. Some patients may recover fully, while others may experience significant neurological deficits or even death.

see [Asymptomatic intracranial hemorrhage following endovascular intervention](#)

1)

Cho YH, Choi JH. Outcomes of Mechanical Thrombectomy in Patients with Large Diffusion-Weighted Imaging Lesions. J Korean Neurosurg Soc. 2021 Nov 26. doi: 10.3340/jkns.2021.0064. Epub ahead of print. PMID: 34823275.

2)

Desai SM, Mehta A, Morrison AA, Gross BA, Jankowitz BT, Jovin TG, Jadhav AP. Endovascular Thrombectomy, Platelet Count and Intracranial Hemorrhage. World Neurosurg. 2019 Apr 10. pii: S1878-8750(19)31028-9. doi: 10.1016/j.wneu.2019.04.036. [Epub ahead of print] PubMed PMID: 30980980.

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