**DOI:** 10.21088/ijnns.0975.0223.17125.5

International Journal of Neurology and Neurosurgery
Volume 17, Number 1 January-April 2025

CASE REPORT

# Mechanical Thrombectomy for Medically Refractory Cerebral Venous Thrombosis: A Case Series

**Naveen Kumar**

**How to cite this article:**

*Naveen Kumar.* Mechanical Thrombectomy for Medically Refractory Cerebral Venous Thrombosis: A Case Series. International Journal of Neurology and Neurosurgery. 2025; 17(1): 31-36.

## ABSTRACT

***Background:*** Cerebral venous thrombosis (CVT) is a rare but potentially life-threatening condition that can lead to significant neurological deficits. While medical management with anticoagulation is the standard treatment, some cases of CVT are resistant to medical therapy. In such situations, mechanical thrombectomy (MT) has emerged as a potential alternative. We present a case series highlighting the role of MT in patients with medically refractory CVT.

***Methods:*** This is a retrospective case series of patients diagnosed with CVT who underwent mechanical thrombectomy due to failure of medical management. Clinical, imaging, and procedural data were reviewed to assess the safety and effectiveness of the intervention.

***Results:*** A total of six patients, ranging from 29 to 81 years old, were included. All patients had failed conventional anticoagulation therapy and presented with worsening symptoms, including increased intracranial pressure, progressive neurological deficits, and impaired consciousness. Mechanical thrombectomy was successfully performed in all patients. Post-procedural outcomes showed significant improvements in neurological status, with four out of six patients achieving a modified Rankin Scale (mRS) score of 0 at three months. Two patients had a mRS score of 3, but their symptoms were markedly improved.

***Conclusion:*** Mechanical thrombectomy can be an effective treatment for patients with medically refractory CVT. Early identification of patients at risk of poor outcomes despite medical therapy and timely intervention with thrombectomy may significantly improve functional outcomes.

## KEYWORDS

• Mechanical thrombectomy • Cerebral venous thrombosis • Medically refractory • Anticoagulation • Headache

## AUTHOR'S AFFILIATION:

Consultant, Department of Interventional Radiology & Endovascular Surgery, Naruvi Hospitals, Vellore, Tamil Nadu, India.

## CORRESPONDING AUTHOR:

**Naveen Kumar,** Consultant, Department of Interventional Radiology & Endovascular Surgery, Naruvi Hospitals, Vellore, Tamil Nadu, India.
**E-mail:** knkumar483@gmail.com

➢ **Received:** 31-12-2024 ➢ **Accepted:** 03-02-2025

*Creative commons non-commercial CC BY-NC: This article is distributed under the terms of the creative commons attribution non-commercial 4.0 License (http://www.creativecommons.org/licenses/by-nc/4.0/) which permits non-commercial use, reproduction and distribution of the work without further permission provided the original work is attributed as specified on the Red Flower Publication and Open Access pages (https://www.rfppl.co.in)*

## INTRODUCTION

Cerebral venous thrombosis (CVT) occurs when a thrombus forms within the cerebral venous sinuses and/or cortical veins, impairing venous drainage of the brain[1]. This condition is rare but can lead to severe complications, such as intracranial hypertension, seizures, and focal neurological deficits. CVT can be caused by a variety of factors, including genetic predisposition, infections, and hypercoagulable states. The standard treatment for CVT is anticoagulation therapy, which aims to prevent clot extension and allow for the natural resolution of the thrombus.[2] However, in a minority of cases, CVT proves refractory to anticoagulation therapy, leading to continued neurological deterioration despite appropriate medical management. When this occurs, mechanical thrombectomy (MT), a procedure commonly used in acute ischemic stroke for the removal of large vessel clots, may offer an alternative approach.[3] The aim of this case series is to explore the safety, feasibility, and outcomes of mechanical thrombectomy for medically refractory CVT.

## METHODS

**Patient Selection:** This retrospective case series includes patients diagnosed with CVT who were treated at our institution between September 2023 and November 2024. Inclusion criteria included:A confirmed diagnosis of CVT via neuroimaging (CT venography or MR venography).

1. Medically refractory CVT, defined as persistent or worsening neurological deficits and/or increased intracranial pressure despite adequate anticoagulation therapy.
2. Consent for mechanical thrombectomy after discussing risks, benefits, and alternative treatment options.

**Clinical and Imaging Assessment:** Patients were assessed clinically with a detailed neurological examination, and imaging studies were performed at baseline and post-procedure to evaluate the extent of venous thrombosis and treatment outcomes.[4] Neuroimaging included contrast-enhanced CT venography, MR venography, and, where applicable, pre-procedural CT or MR angiography.

**Mechanical Thrombectomy Procedure:** Mechanical thrombectomy was performed using standard endovascular techniques, with the goal of removing the thrombus from the affected venous sinus or vein. The thrombectomy was performed using aspiration-based thrombectomy system.[5] The decision on the device used was based on the location and size of the clot.

**Outcomes:** The primary outcome was improvement in the modified Rankin Scale (mRS) score at three months following thrombectomy. Secondary outcomes included procedure-related complications, mortality, and changes in neuroimaging findings post-procedure.

## RESULTS

**Patient Demographics and Clinical Characteristics:** A total of six patients (one females, five males) met the inclusion criteria for this study. The patient's ages ranged from 29 to 81 years, and all had significant risk factors for CVT, including oral contraceptive use (1 patient), protein C deficiency (1 patient), and a history of prior venous thromboembolism (1 patient), protein S deficiency (3 patient), Hyperhomocysteinemia (1 patient)

**Clinical Course and Treatment:** At presentation, all patients had symptoms of increased intracranial pressure, including headaches, nausea, vomiting, and altered mental status. The median time from initial diagnosis to thrombectomy was 12 days (range: 8-22 days). Despite receiving appropriate anticoagulation therapy (unfractionated heparin or low molecular weight heparin), their condition continued to deteriorate.

## MECHANICAL THROMBECTOMY

The thrombectomy procedures were successfully completed in all six patients. In three patients, thrombectomy was performed in the superior sagittal sinus, and in three patients, thrombectomy was done in transverse and sigmoid sinus. The mean procedure duration was 60 minutes with no major complications such as arterial injury or haemorrhagic transformation noted during or immediately after the procedure.

**Outcomes:**

- **Neurological Improvement:** At three-month follow-up, four patients had an mRS score of 0, indicating no disability,

while two patients had a score of 3, representing moderate disability. All patients showed substantial improvement in their neurological status after the procedure, including resolution of symptoms such as headache and altered mental status.

- **Neuroimaging Outcomes:** Post-procedural imaging showed complete or near-complete resolution of the venous thrombosis in four of the six patients. two patients had partial resolution of the thrombus, but their symptoms improved markedly.
- **Complications:** There were no procedure-related deaths, and no patients developed intracranial haemorrhage or other serious complications.

## CASE STUDIES

**Case 1**: A 51-year-old male presented with headache. MRV showed complete thrombosis right transverse, sigmoid sinus. (Fig. 1) Post-procedure, the patient reported complete resolution of headache within 48 hours. Follow-up MRV showed patent sinuses with no recurrence. (Fig. 2)

**Case 2**: A 29-year-old male presented with headache, vomiting, drowsiness. MRV showed complete thrombosis of superior sagittal, bilateral transverse, sigmoid sinus. (Fig 3) Post-procedure, the patient reported partial resolution of headache within 48 hours. Follow-up MRV showed patent sinuses with no recurrence. (Fig 4)

**Case 3**: A81-year-old male presented with drowsiness. MRV showed complete thrombosis of left transversesinus. Aspiration thrombectomy done through jugular route. Post-procedure, the patient improved symptomatically.

**Case 4**: A 42-year-old female presented with headache. MRV showed complete thrombosis of superior sagittal, left transverse sinus. Post-procedure, the patient reported complete resolution of headache within 48 hours. Follow-up MRV showed patent sinuses with no recurrence.

**Case 5**: A 37-year-old male presented with headache, numbness and giddiness. MRV showed complete thrombosis of superior sagittal, right transverse, sigmoid sinus. Post-procedure, the patient reported complete resolution of headache within 48 hours. Follow-up MRV showed patent sinuses with no recurrence.

**Case 6**: A 36-year-old male presented with drowsiness. MRI showed parietotemporal bleed. MRV showed complete thrombosis left transverse, sigmoid sinus and IJV. Aspiration thrombectomy done through jugular route. Post-procedure, the patient was improved symptomatically.

## DISCUSSION

Mechanical thrombectomy for CVT is a novel and emerging approach, particularly for patients who do not respond to conventional anticoagulation. The case series demonstrates that thrombectomy can be performed safely and effectively in cases of medically refractory CVT, resulting in meaningful clinical improvement.[6] The successful removal of the thrombus directly contributes to the resolution of symptoms, including headaches, seizures, and neurological deficits. Unlike arterial stroke, where thrombectomy targets arterial clots leading to ischemia, CVT involves venous clots that impede normal venous drainage. Removing these clots restores venous flow, reducing intracranial pressure and preventing further neurological deterioration.[7] While reports of mechanical thrombectomy for CVT are limited, several small studies and case reports have highlighted its potential benefits. Most studies have focused on patients with large thrombus burden and deteriorating neurological function. Our series adds to this body of evidence, supporting thrombectomy as a viable option in patients with medically refractory CVT.

Indications for mechanical thrombectomy in CVT includes failure of anticoagulation therapy, massive CVT with elevated intracranial pressure, severe neurological symptoms or coma and haemorrhagic transformation. Benefits and outcomes include rapid clot removal, reduction in intracranial pressure and early restoration of venous circulation.[8] Risks and challenges are procedure-related complications, risk of haemorrhagic transformation and technical challenges.

Outcomes following thrombectomy can vary depending on the timing of the intervention, the extent of cerebral involvement, and the presence

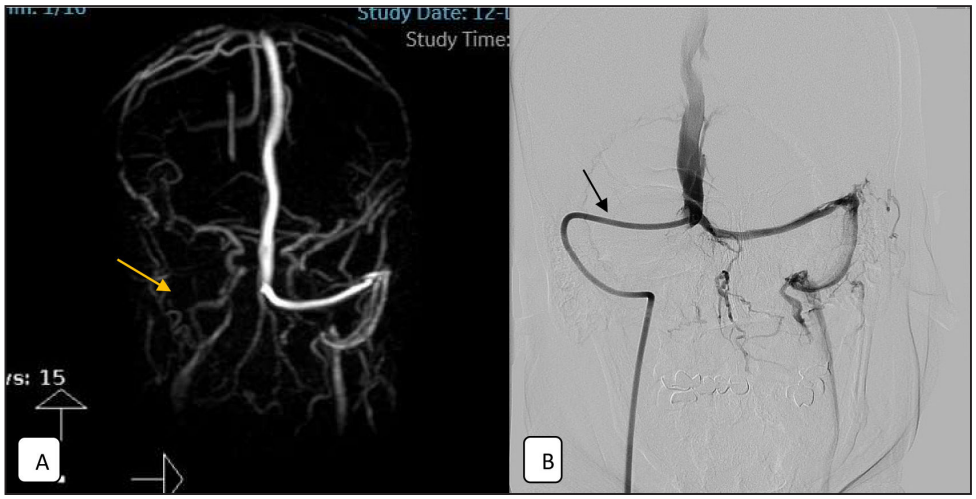



**Figure 1: (A)** MRV Figure shows no flow in right transverse and sigmoid sinus
**(B)** Venography Figure shows no flow in right transverse and sigmoid sinus

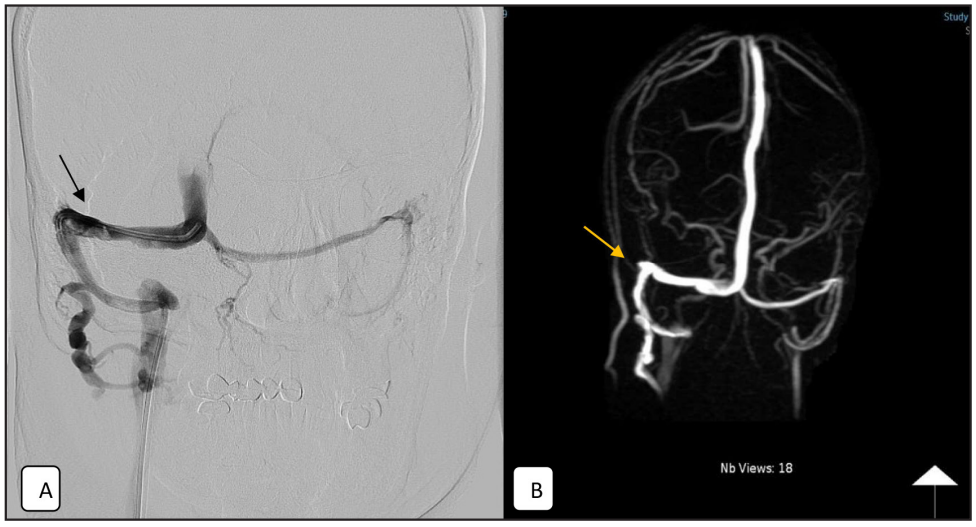



**Figure 2: (A)** Venography Figure shows good flow in right transverse and sigmoid sinus
**(B)** MRV Figure shows patent right transverse and sigmoid sinus

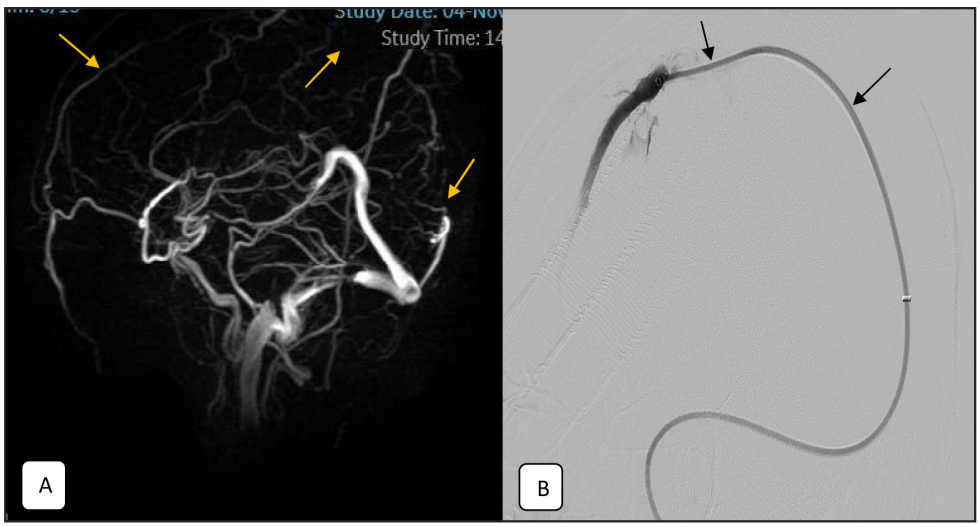



**Figure 3: (A)** MRV Figure shows no flow in superior sagittal and right transverse sinus
**(B)** Venography Figure shows aspiration catheter in superior sagittal sinus

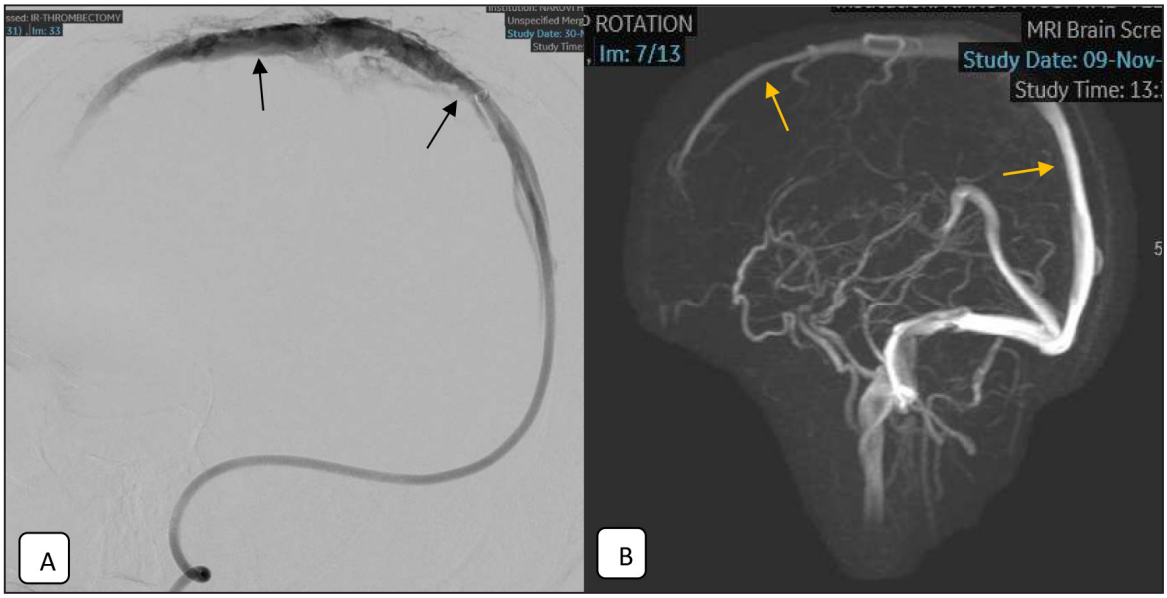



**Figure 4: (A)** Venography Figure shows good recanalization of superior sagittal sinus
**(B)** MRV Figure shows patent superior sagittal and right transverse sinus

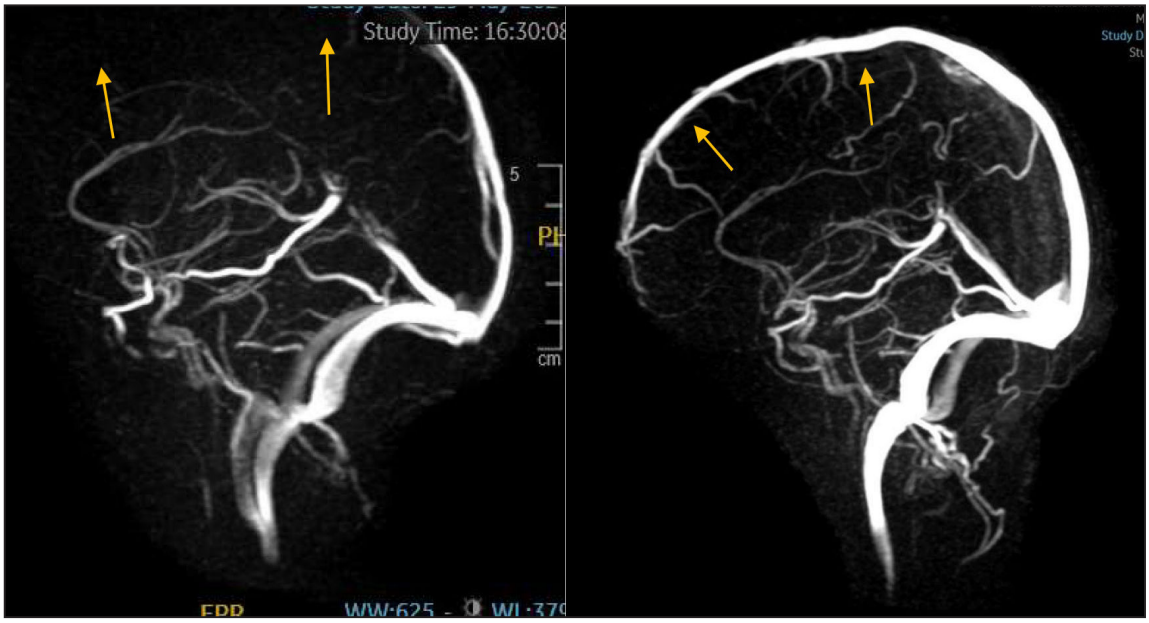



**Figure 5: (A)** MRV Figure shows no flow in anterior and mid superior sagittal sinus
**(B)** MRV Figure shows good flow in anterior and mid superior sagittal sinus

of other comorbidities. However, studies have demonstrated favourable outcomes, including improvement in neurological function and reduction in mortality, when thrombectomy is performed early in the disease course.[9]

## CONCLUSION

Mechanical thrombectomy for medically refractory CVT appears to be a safe and effective therapeutic option, offering substantial neurological recovery in most patients. Early recognition of refractory cases and prompt intervention with thrombectomy may improve outcomes significantly. Larger prospective studies are needed to better define the role of thrombectomy in CVT and to identify optimal patient selection criteria.[10] This case series provides valuable insight into the role of mechanical thrombectomy in the treatment of medically refractory cerebral venous thrombosis, highlighting the potential for significant improvements in patient outcomes when standard medical therapy fails.

## ACKNOWLEDGEMENT

Thanks to Department of Neurology for involving department of interventional radiology in the management of these patients.

**Conflicts of interest**

No Conflicts of Interest

## REFERENCES

1. Kashyap A.S., Anand K.P., Kashyap S. Thrombosis of the cerebral veins and sinuses. N Engl J Med 2005; 353: 314-315.
2. Coutinho J.M., Ferro J.M., Zuurbier S.M., Mink M.S., Canhão P., Crassard I., *et al.* Thrombolysis or anticoagulation for cerebral venous thrombosis: rationale and design of the TO-ACT trial. Int J Stroke 2013; 8: 135-140.
3. Siddiqui F.M., Dandapat S., Banerjee C., Zuurbier SM, Johnson M, Stam J, *et al.* Mechanical thrombectomy in cerebral venous thrombosis: systematic review of 185 cases. Stroke 2015; 46: 1263-1268.
4. Stam J., Majoie C.B., van Delden O.M., van Lienden K.P., Reekers J.A. Endovascular thrombectomy and thrombolysis for severe cerebral sinus thrombosis: a prospective study. Stroke 2008; 39: 1487-1490.
5. Jedi, Farzaneh, *et al.* "Mechanical thrombectomy in cerebral venous sinus thrombosis: reports of a retrospective single-center study." *Journal of Clinical Medicine* 11.21 (2022): 6381.
6. Kan, Yuan, *et al.* "Evolution and advances in endovascular mechanical thrombectomy of cerebral venous sinus thrombosis." *International Journal of Medical Sciences* 21.13 (2024): 2450.
7. Taniguchi S., Harada K., Kajihara M., Fukuyama K. Combined use of stent-retriever and aspiration thrombectomy for cerebral venous sinus thrombosis involving the straight sinus: a case report. Interv Neuroradiol 2017; 23: 605-608.
8. Omoto, Koji, *et al.* "Successful emergent endovascular mechanical thrombectomy for pediatric and young adult cerebral venous sinus thrombosis in coma." *World neurosurgery* 122 (2019): 203-208.
9. Daif A., Awada A., al-Rajeh S., Abduljabbar M., al Tahan A.R., Obeid T., *et al.* Cerebral venous thrombosis in adults. A study of 40 cases from Saudi Arabia. Stroke 1995; 26: 1193-1195.
10. Lee S.K., Mokin M., Hetts S.W., Fifi J.T., Bousser MG, Fraser J.F., Society of Neuro Interventional Surgery. Current endovascular strategies for cerebral venous thrombosis: report of the SNIS Standards and Guidelines Committee. J Neurointerv Surg 2018; 10: 803-810.