

Chapter 1

Cortical Vein Thrombosis with Normal CT Venogram Leading to Acute Symptomatic Seizures

ABSTRACT

Background: Cerebral venous thrombosis involving isolated cortical veins, without dural sinus involvement, is rare and easily missed because CT venography – the standard first-line investigation – often appears normal. MR venography, particularly when combined with susceptibility-weighted imaging, is more sensitive for detecting small cortical vein thrombosis.

Case Summary: A 28-year-old previously healthy male with a history of alcohol and cannabis use presented after two generalized tonic-clonic seizures occurring 15–20 minutes apart following a night of binge alcohol consumption and poor fluid intake. He was drowsy with right-sided hemiparesis. Non-contrast CT head showed left occipito-parietal hypodensity

with mild hemorrhagic change suggesting venous infarction, but CT venography was normal. MRI brain with MR venography revealed thrombosis of small cortical veins over the left occipito-parietal region with an associated venous infarct and mass effect, while the superior sagittal and sigmoid sinuses remained patent. Thrombophilia workup and routine blood investigations were unremarkable. He was treated with low molecular weight heparin and intravenous hydration, with neurosurgical consultation for midline shift managed conservatively, followed by transition to oral acenocoumarol. He improved neurologically, remained seizure-free, and was discharged on six months of anticoagulation with advice to avoid dehydration and substance use.

Conclusion: Isolated cortical vein thrombosis should be suspected in young patients presenting with new-onset seizures and focal deficits suggestive of venous infarction even when CT venography is normal. MR venography is essential for diagnosis in such cases, and prompt anticoagulation combined with mitigation of reversible risk factors such as dehydration, alcohol, and cannabis use supports favorable recovery and helps prevent recurrence.

Keywords: Cortical Vein Thrombosis; Cerebral Venous Thrombosis; MR Venography; Susceptibility-Weighted Imaging; Seizures; Venous Infarct.

INTRODUCTION

Cortical vein thrombosis constitutes a rare form of cerebral venous thrombosis and may be easily overlooked due to subtle radiological findings. While contrast-enhanced CT venography is commonly used for diagnosis, small cortical vein involvement may only be evident on MR venography. This case highlights the diagnostic challenge and clinical outcome of an isolated cortical vein thrombosis in a previously healthy young male.

CASE PRESENTATION

A 28-year-old left-handed male decorator with a history of alcohol and cannabis use presented with two consecutive episodes of generalized tonic-clonic seizures within an interval of 15–20 minutes on a night when he along with his friends had taken binge alcohol. The first episode was witnessed in the morning by his friend, who recorded a video showing generalized abnormal limb movements with frothing at the mouth, lasting about 1–5 minutes. Post-ictal altered sensorium was noted which lasted for about 15 minutes. Later, he was noted to have developed weakness of his right upper and lower limbs.

He had no prior history of seizures, hypertension, diabetes, or endocrine disorders. Family history was non-contributory. The patient reported using cannabis the previous night with friends and had consumed alcohol, followed by poor fluid intake. On admission, he was drowsy with right-sided hemiparesis. Other systemic examinations were unremarkable.

Investigations

Non-contrast CT (NCCT)
Head: Revealed left occipitoparietal hypodensity with

mild hemorrhagic changes, suggesting possible venous infarction.

CT Venography: Normal

MRI Brain with MR Venography

Demonstrated thrombosis of small cortical veins over the left occipito-parietal region with associated venous infarct and mass effect. Superior sagittal and sigmoid sinuses were patent.

Routine blood investigations including complete blood count, renal, thyroid, and coagulation profiles were within normal limits. No evidence of thrombophilia was identified.

DIAGNOSIS

Acute symptomatic seizures with right hemiparesis secondary to left occipito-parietal venous infarct due to cortical vein thrombosis.

MANAGEMENT

The patient was started on low molecular weight heparin (LMWH) and intravenous hydration. Neurosurgical consultation was sought in view of midline shift and reduced consciousness; conservative management was advised.

Gradual improvement in sensorium and motor deficits was noted over the subsequent days. He was transitioned to oral anticoagulation with acenocoumarol (Acitrom) after stabilization.

OUTCOME

By the time of discharge, the patient had recovered neurologically and remained seizure-free. He was advised to continue oral anticoagulation for 6 months with periodic INR monitoring and avoid dehydration and substance use.

DISCUSSION

Cortical vein thrombosis can present solely with seizures and focal deficits, sometimes mimicking arterial infarction, which was unusual for posterior circulation stroke so we suspected further and ordered MR imaging to find out the cause of non territorial infarct. The absence of sinus involvement made the diagnosis elusive on routine CT venography. We searched for the evidence of hemorrhage in SWI sequence, which is standard for picking up small hemorrhages¹, but that too was negative. Cortical veins were found to be thrombosed on MR venography which is more sensitive for confirming

isolated small vein thrombosis when supplemented with SWI sequences².

S u b s t a n c e - i n d u c e d dehydration, along with cannabis and alcohol intake, may act synergistically to precipitate a hypercoagulable state leading to cortical vein thrombosis³. Timely recognition and initiation of anticoagulation are key to favorable outcomes.

This case underscores the importance of considering cortical vein thrombosis in young patients presenting with new-onset seizures and focal neurological deficits, even when initial CT or CT venography findings are unremarkable.

CONCLUSION

Isolated cortical vein thrombosis should be suspected when clinical findings suggest venous infarction but CT venography is normal. MR venography plays a crucial role in diagnosis. Early anticoagulation leads to good recovery. Identification and mitigation of reversible risk factors such as dehydration and cannabis/alcohol use are essential to prevent recurrence.

REFERENCES

1. Weerink L.B., Appelman A.P., Kloet R.W., Van der Hoorn A. Susceptibility-weighted imaging in intracranial hemorrhage: not all bleeds are black. *Br J Radiol.* 2023 Aug; 96(1148): 20220304. doi: 10.1259/bjr.20220304. Epub 2022 Jul 12. PMID: 35766940; PMCID: PMC10392652
2. Boukerche F., Balakrishnan S., Kalapos P., Thamburaj K. Detection of cerebral cortical vein thrombosis with high-resolution susceptibility weighted imaging - A comparison with MR venography and standard MR sequences. *Neuroradiology.* 2023 May; 65(5): 885-892. doi: 10.1007/s00234-023-03123-y. Epub 2023 Feb 1. PMID: 36720750; PMCID: PMC9889237
3. Rizk HI, Magdy R, Emam K, Mohammed MS, Aboufotouh AM. Substance use disorder in young adults with stroke: clinical characteristics and outcome. *Acta Neurol Belg.* 2024 Feb; 124(1): 65-72. doi: 10.1007/s13760-023-02317-8. Epub 2023 Jul 15. PMID: 37454034; PMCID: PMC10874343.