Journal of Medical and Health Studies
ISSN: 2710-1452
DOI: 10.32996/jmhs
Journal Homepage: www.al-kindipublisher.com/index.php/jmhs

JMHS
AL-KINDI CENTER FOR RESEARCH AND DEVELOPMENT

| RESEARCH ARTICLE

Cerebral Venous Thrombosis in a Young Adult: A Case Report Highlighting Thrombophilia and Epilepsy Management

Ali H. AlSaffar[1] ✉ Abdulla I. Abuhamaid[2], Ali A. Ali[3], Ali J. Mohamed[4] and Ashraf El-Mitwalli[5]

[1]MBBCh, College of Medicine, Medical City King Saud University, King Khalid University Hospital, Riyadh, Saudi Arabia

[23]MBBCh, College of Medicine, Mansoura University, Mansoura, Egypt

[4]MBBCh, Eastern Health Cluster, Saudi Arabia

[5]Department of Neurology, Mansoura University Hospitals, Mansoura, Egypt

Corresponding Author: Ali H. AlSaffar, **E-mail**: dralialsaffar123@gmail.com

| ABSTRACT

Cerebral venous thrombosis (CVT) is a rare but serious condition that can lead to significant neurological complications if not promptly diagnosed and treated. This case report describes a 23-year-old male with a history of epilepsy, managed with sodium valproate, who presented with a sudden, severe headache and visual disturbances. Imaging revealed a linear filling defect in the straight sinus, consistent with CVT. Further investigation uncovered deficiencies in protein S and C, indicating an underlying thrombophilic condition. The patient was successfully treated with anticoagulation therapy, initially with enoxaparin followed by oral apixaban, resulting in the complete resolution of symptoms. This case shows the importance of considering thrombophilia in patients with CVT, especially those with a history of epilepsy, and demonstrates the effectiveness of early intervention with anticoagulants in achieving positive outcomes.

| KEYWORDS

Cerebral venous thrombosis, epilepsy, protein c, protein s, thrombophilia

| ARTICLE INFORMATION

ACCEPTED: 01 October 2024 **PUBLISHED:** 16 October 2024 **DOI:** 10.32996/jmhs.2024.5.4.5

1. Introduction

Cerebral venous thrombosis (CVT) is a rare but serious condition that occurs when a blood clot forms in the venous sinuses of the brain, leading to increased intracranial pressure and potentially severe neurological complications. Although it accounts for less than 1% of all strokes, CVT can have devastating consequences if not promptly diagnosed and treated [Christopher, 2018]. The condition is more common in young adults and women, with various risk factors including genetic predisposition, infections, inflammatory diseases, and certain medications [Coutinho, 2015]. However, in many cases, the exact cause remains unknown.

Epilepsy has been associated with an increased risk of thromboembolic events, although the underlying mechanisms are not fully understood [Sirven, 2015]. It can get complicated by deficiencies in protein S and C, which are natural anticoagulants in the body. These deficiencies likely contributed to the development of the thrombosis [Oktar, 2008]. Understanding the interplay between these factors is crucial for improving patient outcomes.

Research has shown that individuals with inherited or acquired thrombophilic conditions, such as protein S and C deficiencies, are at a higher risk of developing cerebral venous thrombosis [Dicks, 2024]. Additionally, the management of CVT often involves the use of anticoagulants, which must be carefully balanced to avoid the risk of recurrent thrombosis while minimizing the potential for hemorrhage, particularly in patients with other predisposing conditions like epilepsy.

The literature also highlights the complexity of diagnosing CVT due to its variable and nonspecific presentation, ranging from headaches and visual disturbances to seizures and altered mental status [Luo, 2018]. Imaging techniques, such as Computed Tomography venography (CTV) and Magnetic Resonance Imaging (MRI), are essential tools for confirming the diagnosis. Despite advances in medical imaging and treatment, there remains significant variability in patient outcomes, emphasizing the need for more research to identify the most effective management strategies for patients with concurrent conditions such as epilepsy and thrombophilia.

However, there are still gaps in the literature regarding the optimal management of CVT in patients with epilepsy and thrombophilia. Most studies have focused on either epilepsy or thrombophilia independently, with limited research addressing the intersection of these conditions in the context of CVT. The rarity of CVT poses challenges in gathering large, statistically significant data sets, which limits the generalizability of findings. This case report aims to contribute to the existing knowledge by providing detailed clinical insights into the management of CVT in a young adult with epilepsy and thrombophilia, potentially guiding future research and improving clinical practice.

2. Case presentation

2.1 Patient Information

The patient is a 23-year-old male with a medical history significant for epilepsy, for which he is taking 1000 mg of sodium valproate daily. He also has a history of asthma, managed with prescribed as needed Ventolin.

2.2 Presenting Complaint

The patient was referred from a private center due to the acute onset of a severe fronto-occipital positional headache lasting one day. The headache was associated with mild dizziness and loss of vision in his left eye, described as blurring and diplopia. The pain did not respond to paracetamol and was rated as 10/10 in severity. The patient denied any associated symptoms such as nausea, vomiting, recent illness, neck rigidity, recent travel, contact with sick individuals, morning vomiting, new onset of weakness or numbness, facial asymmetry, bulbar symptoms, slurred speech, or head trauma. There was no history of recent surgery or deep vein thrombosis (DVT). Notably, his mother had a history of recurrent miscarriages, with the patient being her only surviving child.

2.3 Clinical Examination

Upon examination, the patient was alert, conscious, oriented, and in good spirits, with no new complaints or seizures. Vital signs were stable: temperature 37°C, blood pressure 113/75 mmHg, heart rate 73 bpm, and oxygen saturation 98%. The Glasgow Coma Scale (GCS) score was 15/15. Neurological examination revealed no abnormalities, including no nystagmus, facial asymmetry, or speech difficulties. Pupils were round and reactive, and extraocular movements were intact. Muscle power, sensation, and gait were normal. Reflexes were not assessed.

2.4 Laboratory investigations

Laboratory investigations revealed a white blood cell count of 9.5 x109/L, a red blood cell count of 5.9 x1012/L, and a hemoglobin level of 15.2 g/dL. The hematocrit was 44.3%, with a mean corpuscular volume (MCV) of 75.6 fL and a mean corpuscular hemoglobin (MCH) of 24.4 pg. Platelet count was within the normal range at 222 x109/L. Coagulation studies showed a prothrombin time (PT) of 11.7 seconds, a partial thromboplastin time (PTT) of 32 seconds, and an international normalized ratio (INR) of 1.04. The creatine kinase (CK) level was 78 U/L. Arterial blood gas (ABG) analysis showed a pH of 7.4, partial pressure of carbon dioxide (pCO2) at 45 mmHg, bicarbonate (HCO3) at 26 mmol/L, lactate at 1.1 mmol/L, and blood glucose at 86 mg/dL. Renal function tests indicated a creatinine level of 75 µmol/L and urea at 2.3 mmol/L. Liver function tests were within normal limits, with alanine aminotransferase (ALT) at 11 U/L, aspartate aminotransferase (AST) at 17 U/L, gamma-glutamyl transferase (GGT) at 16 U/L, alkaline phosphatase (ALP) at 63 U/L, albumin at 42 g/L, and total bilirubin at 10 µmol/L. Electrolyte analysis showed potassium at 3.9 mmol/L, sodium at 133 mmol/L, and chloride at 109 mmol/L.

2.5 Imaging and Diagnosis

A contrast-enhanced CTV of the brain revealed a linear filling defect in the straight sinus, suggestive of CVT. Other intracranial venous sinuses were well opacified, and no arteriovenous malformation (AVM) or aneurysm was detected (Figure 1).

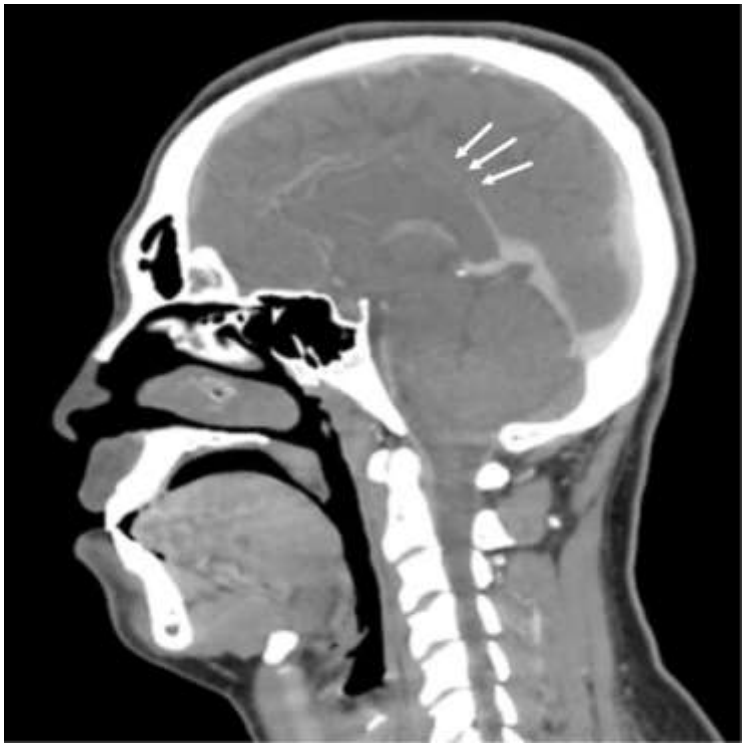

Figure 1. Sagittal view of CTV showing linear filling defect in straight sinus suggestive of thrombosis.

A plain CT head scan was unremarkable with no signs of ischemia, hemorrhage, or mass effect, and normal midline structures (Figure 2).

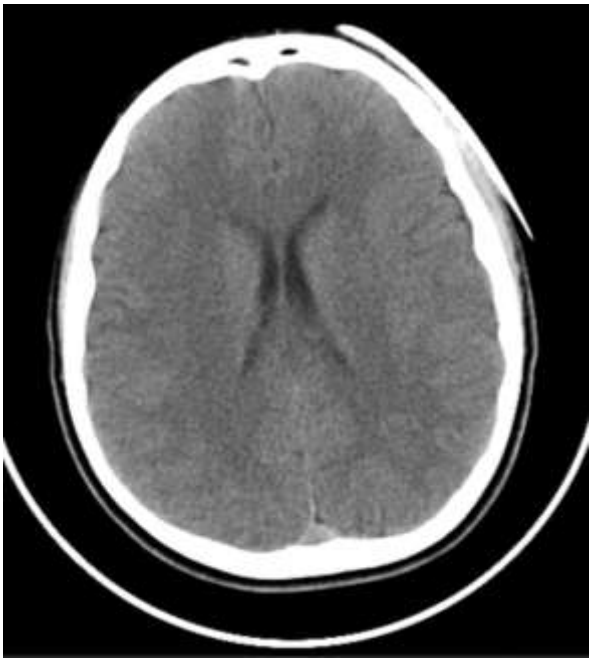

Figure 2. A normal brain CT, ruling out any acute brain insult as hemorrhage or ischemia.

The diagnosis of CVT was established, and the patient was initially managed with subcutaneous enoxaparin at a dose of 1 mg/kg every 12 hours. Subsequently, oral apixaban 5 mg twice daily was prescribed for a duration of six months, considering the thrombosis to be provoked.

2.6 Follow-up and Outcome

The patient's headache resolved completely, and there were no new neurological events or complaints during follow-up. Further workup for thrombophilia revealed deficiencies in protein S and C, prompting additional laboratory investigations for lupus anticoagulant, anticardiolipin antibodies, anti-beta-2 glycoprotein 1, antithrombin 3, C3, C4, anti-Smith, anti-DNA, RF, anti-Ro, and anti-La antibodies.

The patient remained in stable condition with no further episodes of seizures or thrombotic events. The final impression was an improved case of CVT, managed successfully with anticoagulation therapy.

3. Discussion

CVT is a complex condition that requires careful clinical evaluation, especially in patients with coexisting risk factors such as thrombophilia and epilepsy. In this case, the patient's presentation with a severe headache and visual disturbances, combined with imaging findings, led to the diagnosis of CVT.

The initial presentation of a sudden, severe headache is a common but nonspecific symptom of CVT, as reported in several studies [7,8]. In this case, the patient experienced a fronto-occipital headache that was positional and associated with visual disturbances, including blurring and diplopia. These symptoms align with the typical manifestations of CVT, where the location of the thrombosis often correlates with specific neurological deficits [Botta, 2017]. For example, the involvement of the straight sinus, as seen in this patient, is frequently associated with symptoms of increased intracranial pressure, such as severe headaches and visual changes.

The Imaging findings were crucial in confirming the diagnosis. A contrast-enhanced CTV revealed a linear filling defect in the straight sinus, which is indicative of thrombosis. This is consistent with the diagnostic criteria for CVT, where the presence of a filling defect on imaging is a hallmark feature [Chiewvit, 2011]. Similar findings have been documented in other cases of CVT, where CTV and MRI venography are the preferred imaging modalities for detecting venous sinus thrombosis [Digge, 2018]. The absence of other intracranial abnormalities, such as hemorrhage or infarction, in this case, suggests that the thrombosis was identified early, which is critical for preventing severe complications.

The patient's history of epilepsy and the use of antiepileptic drugs added complexity to the case. Epilepsy itself is a known risk factor for thromboembolic events, possibly due to the prothrombotic effects of certain antiepileptic drugs or the underlying neurological condition [Lee-Lane, 2021]. In this case, the patient was on sodium valproate, which has been associated with an increased risk of thrombosis in some studies [Koenig, 2008]. However, the exact mechanism by which epilepsy and its treatment contribute to CVT remains unclear.

Thrombophilia, particularly protein S and C deficiencies, played a significant role in the pathogenesis of CVT in this patient. The diagnosis of protein S and C deficiencies in this patient underscores the importance of conducting a thorough thrombophilia workup in individuals presenting with CVT, especially when there is no obvious precipitating factor. Similar findings have been reported in other studies, where inherited thrombophilias were identified as significant risk factors for CVT [Wang, 2024].

The management of this case involved the use of anticoagulation therapy, which is the standard treatment for CVT. The patient was initially treated with enoxaparin, a low molecular weight heparin, followed by oral apixaban. This approach is consistent with current guidelines, which recommend anticoagulation to prevent the extension of the thrombus and to reduce the risk of recurrence [Kim, 2017]. The use of apixaban, a direct oral anticoagulant, is supported by emerging evidence suggesting that direct oral anticoagulants are as effective as traditional anticoagulants like warfarin, with a lower risk of bleeding [Julia, 2017].

The patient's positive response to anticoagulation therapy, with complete resolution of symptoms and no new neurological events, highlights the effectiveness of early intervention in CVT. This outcome is in line with findings from other studies that emphasize the importance of early diagnosis and treatment in improving the prognosis of CVT [Guenther, 2011]. However, it is important to note that the long-term management of such patients requires careful monitoring for potential complications, including bleeding, especially given the underlying thrombophilic condition.

Despite the successful outcome, this case illustrates some of the challenges in managing CVT in patients with complex medical histories. The link between epilepsy, thrombophilia, and the risk of recurrent thrombosis requires a multidisciplinary approach to care. As highlighted in the literature, the management of CVT in patients with multiple risk factors needs to be individualized, taking into account the patient's overall risk profile and the potential for adverse events related to anticoagulation.

By documenting a successful case of early diagnosis and management, our study emphasizes the importance of early and comprehensive treatment strategies, particularly in patients with multiple risk factors. Future research should focus on elucidating

the mechanisms linking epilepsy and thrombotic events, optimizing anticoagulation protocols in this population, and exploring preventive measures to reduce the risk of CVT in individuals with underlying thrombophilia.

4. Conclusion

Early recognition and treatment of CVT in patients with coexisting conditions like epilepsy and thrombophilia are crucial for preventing severe complications. This case underlines the importance of a comprehensive approach, including detailed thrombophilia workups and appropriate anticoagulation therapy, in managing such complex cases. The successful outcome in this patient, with complete symptom resolution and no recurrence, reinforces the effectiveness of anticoagulants in treating CVT. However, the link between epilepsy, antiepileptic drugs, and thrombophilia remains an area requiring further exploration. Future studies should focus on optimizing treatment protocols and understanding the mechanisms linking these conditions to improve outcomes for similar patients.

Funding: This research received no external funding
Conflicts of Interest: The authors declare no conflict of interest
ORCID iD: https://orcid.org/0009-0002-8073-0224

References

[1] Botta R, Donirpathi S, Yadav R, Kulkarni GB, Kumar MV, Nagaraja D. (2017). Headache Patterns in Cerebral Venous Sinus Thrombosis. J Neurosci Rural Pract. 8:72-77. 10.4103/jnrp.jnrp_339_16
[2] Chiewvit P, Piyapittayanan S, Poungvarin N. (2011). Cerebral venous thrombosis: diagnosis dilemma. Neurol Int., 3:13. 10.4081/ni.2011.e13
[3] Christopher AS, John WC. (2018). Cerebral Venous Thrombosis: A Clinical Overview. Ischemic Stroke of Brain. Pratap, S. (ed): IntechOpen, Rijeka, 2018. 2:10.5772/intechopen.79049
[4] Coutinho JM. (2015). Cerebral venous thrombosis. *Journal of Thrombosis and Haemostasis.* 13:238-244. 10.1111/jth.12945
[5] Dicks AB, Moussallem E, Stanbro M, Walls J, Gandhi S, Gray BH. (2024). A Comprehensive Review of Risk Factors and Thrombophilia Evaluation in Venous Thromboembolism. *Journal of Clinical Medicine*, 13:362. 10.3390/jcm13020362
[6] Digge P, Prakashini K, Bharath KV. (2018). Plain CT vs MR venography in acute cerebral venous sinus thrombosis: Triumphant dark horse. Indian J Radiol Imaging. 2018, 28:280-284. 10.4103/ijri.IJRI_328_17
[7] Friedman BW, Lipton RB. (2012). Headache Emergencies: Diagnosis and Management. *Neurologic Clinics, 30*:43-59.
[8] Guenther G, Arauz A. (2011). Cerebral venous thrombosis: A diagnostic and treatment update. Neurología (English Edition. 2011, 26:488-498.
[9] Julia S, James U. (2017). Direct Oral Anticoagulants: A Quick Guide. Eur Cardiol., 2017:11-2. 10.15420%2Fecr.2017%3A11%3A2
[10] Kim J, Martinez C, Sirotkin I. (2017). Cerebral Venous Thrombosis. Fed Pract., 34:33-37.
[11] Koenig S, Gerstner T, Keller A, Teich M, Longin E, Dempfle CE. (2008). High incidence of vaproate-induced coagulation disorders in children receiving valproic acid: a prospective study. Blood Coagul Fibrinolysis., 19:375-382. 10.1097/MBC.0b013e3282f3f9ec
[12] Lee-Lane E, Torabi F, Lacey A. (2021). Epilepsy, antiepileptic drugs, and the risk of major cardiovascular events. Epilepsia. 2021, 62:1604-1616. 10.1111/epi.16930
[13] Luo Y, Tian X, Wang X. (2018). Diagnosis and Treatment of Cerebral Venous Thrombosis: A Review. Front Aging Neurosci., 10:2. 10.3389/fnagi.2018.00002
[14] Oktar N, Dalbasti T. (2008). Protein S: deficiency, epileptic seizures, sagittal sinus thrombosis and hemorrhagic infarction after ingestion of dimenhydrinate. Turk Neurosurg., 18:85-88.
[15] Sirven JI. (2015). Epilepsy: A Spectrum Disorder. Cold Spring Harb Perspect Med., 5:022848. 10.1101/cshperspect.a022848
[16] Timóteo Â, Inácio N, Machado S, Pinto AA, Parreira E. (2012). Headache as the sole presentation of cerebral venous thrombosis: a prospective study. J Headache Pain., 13:487-490. 10.1007/s10194-012-0456-3
[17] Wang S, Yao M, Yang X, Zhu Y, Peng B. (2024). The genetic risk factors for cerebral venous thrombosis: a case-control study in a Chinese national comprehensive hospital. *Thrombosis Journal*, 22:50. 10.1186/s12959-024-00621-8