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Case Report

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A Case of Straight Sinus Combined with Large Cerebral Vein Thrombosis with Microcatheter Contact Thrombolysis and Literature Review

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Abstract

Background: The combination of straight sinus and large cerebral vein thrombosis is a rare form of cerebral vein thrombosis. The pathogenesis of cerebral venous thrombosis has not been fully elucidated, but pregnancy or the oral contraceptives are significant risk factors for this condition.

Case description: In this study, we report the case of a 31-year-old woman who experienced a sudden onset headache with vomiting. Intraoperative cerebral angiography confirmed straight sinus combined cerebral large vein thrombosis. The patient was revascularized using endovascular therapy through contact thrombolysis.

Conclusion: The microcatheter contact thrombolysis of rectus with cerebral venous thrombosis is effective and safe.

Keywords: Straight sinus; large cerebral veins; venous sinus thrombosis; endovascular therapy; contact thrombolysis.

Background

Cerebral venous sinus thrombosis is a relatively rare cerebrovascular disease among stroke types. It is also rarely reported in the literature, especially in such anatomical locations as the straight sinus and the large cerebral veins [1]. Headache is the most common clinical manifestation of cerebral venous sinus thrombosis, while clinical symptoms such as nausea, photophobia, and phonophobia may be present [1,2]. Cerebral large vein thrombosis has an insidious onset and severe symptoms and is easily mistaken for subarachnoid hemorrhage on CT examination alone. Currently, there are various pathogenic mechanisms for this disease, such as trauma, antiphospholipid syndrome, cancer, congenital thrombotic tendency, and protein S gene mutation [3,4] and for those who are pregnant, puerperal, or taking oral contraceptives in the clinic, this is worthy of attention [5,6,7]. In this article, we report the case of a cerebral venous sinus combined with large cerebral vein thrombosis recanalized by microcatheter contact thrombolysis and review the literature.

The Case

A 31-year-old healthy female was admitted to the hospital with a sudden onset of severe headache, vomiting, progressive impaired consciousness, and urinary incontinence for 2 days. There was a history of oral contraceptives before the onset of the disease. A brain CT showed a slightly increased density shadow in the posterior cisterna of the mediastinal fissure, and the possibility of subarachnoid hemorrhage was considered (Figure 1). The patient had drowsiness, stinging eye opening, and incomplete aphasia, but no significant neck resistance or negative signs of meningeal stimulation. D-dimer: 1.56 mg/L (normal reference value of 0-0.55 mg/L in our hospital), and other auxiliary examinations did not show any obvious abnormality. She was admitted to the hospital with an atypical subarachnoid hemorrhage and was given neutral treatment.

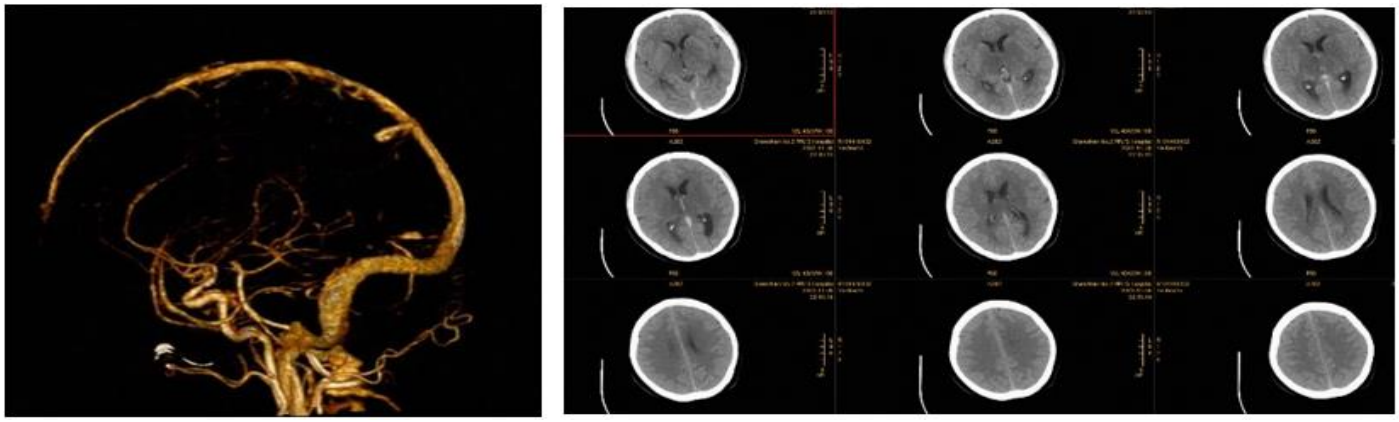

Figure 1: Left side: cranial CTA showed poor visualization of the straight sinus and large cerebral veins, suggesting intracranial venous sinus thrombosis.Right: cranial CTA showed that the posterior portion of the mediastinal fissure pool was slightly increased in density, and subarachnoid hemorrhage was possible.

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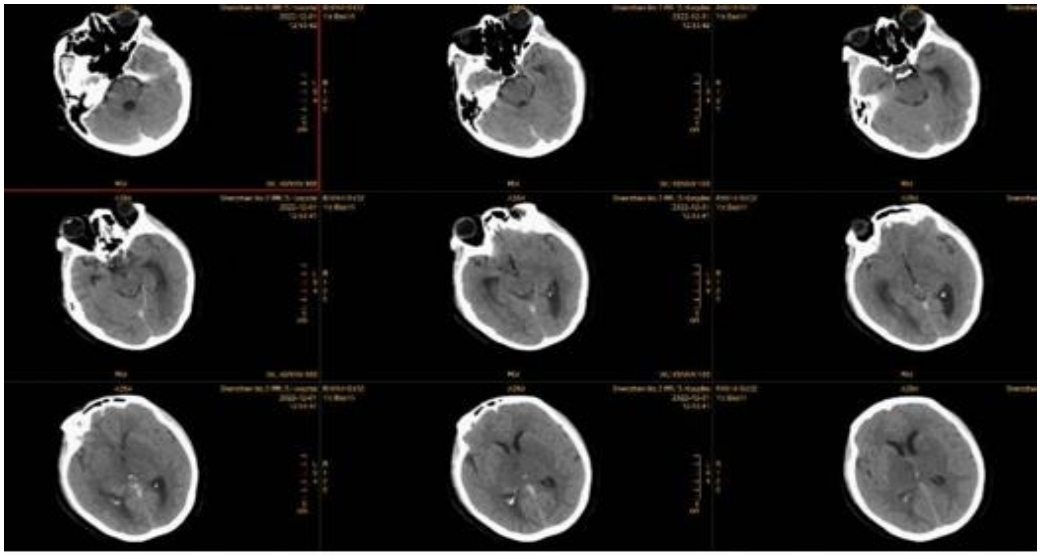

Figure 2: Cranial CT on day 3 showing no significant change in the density shadow of the posterior portion of the mediolateral fissure pool of the brain.

On the following day, the patient's consciousness disorder appeared to worsen, and cranial CT on the 3rd day of the onset of the disease showed that the density shadow of the posterior portion of the mediolateral cerebral fissure pool deviation had no significant change (Figure 2).CTA examination was performed to exclude intracranial aneurysm, and CTV showed incomplete visualization of the straight sinus and sparse visualization of the intracranial veins, which, combined with the medical history and clinical symptoms, was considered to be thrombosis of the straight sinus and the large cerebral vein. After general anesthesia, the patient underwent total cerebral angiography, and the straight sinus and large cerebral veins were not visualized, the right transverse sinus was slightly slender, and the remaining intracranial and extracranial arteries did not show any clear abnormality.

After the thrombosis of the straight sinus and the large cerebral vein was clarified, microcatheter superselective thrombolysis was proposed. The microcatheter was used to explore and find the opening of the straight sinus with the cooperation of microguide wire, and then urokinase 60,000u was injected into the straight sinus to thrombolyze the thrombus, and after waiting for 10min, the straight sinus was visualized throughout the whole process of microcatheterization, and then a microguide wire was used to explore and find the opening of the cerebral large vein with the cooperation of microcatheter, and then the microcatheter arrived at the cerebral large vein, and the cerebral large vein was confirmed to be located in the cerebral large vein at the head of microcatheter on the positive and lateral fluoroscopic examination, and then urokinase was injected into the cerebral large vein through the microcatheter. Urokinase was pumped through the microcatheter, and 100,000 u was used for thrombolysis. At the end of thrombolysis, the large cerebral vein was partially visualized and the straight sinus was visualized throughout the whole process, and no intracranial hemorrhage was seen (Figure 3). Subsequently, he received routine anticoagulation therapy with low-molecular-weight heparin and warfarin tablets. The patient gradually recovered. On the 14th day after thrombolysis, the cranial MRV examination showed that the middle and posterior portions of the inferior sagittal sinus, the straight sinus, and the large cerebral veins were not obviously visualized in the whole process. 6 months later, the patient was asymptomatic and had recovered well, and the re-examination suggested that the straight sinus was smooth, the cortical veins were increased, and the middle and posterior portions of the inferior sagittal sinus and the large cerebral veins were partially communicating with each other.

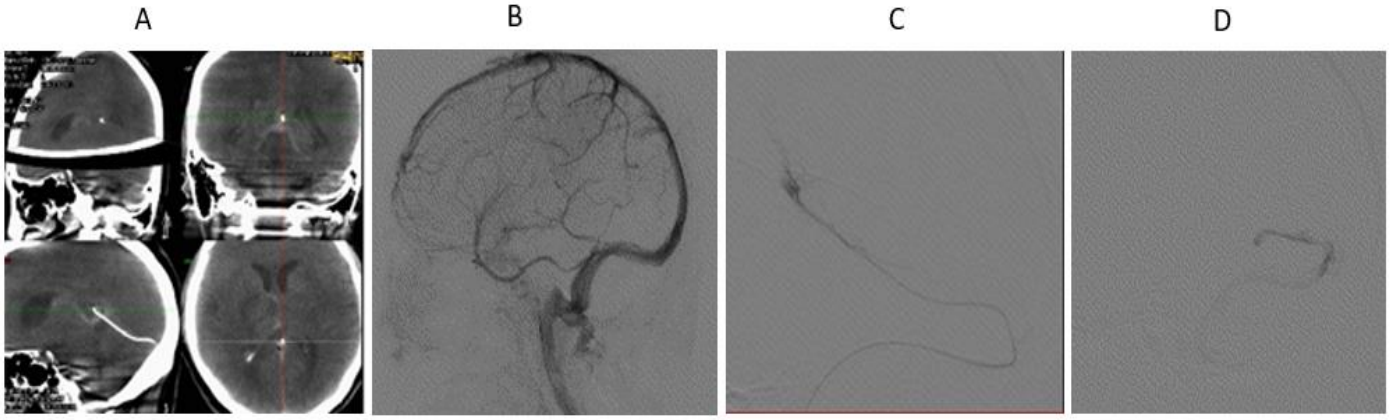

Figure 3: (A) Slightly high-density shadow is seen in the rectus sinus and large cerebral veins. **(B)** The rectus sinus and greater cerebral vein were not visualized in the lateral venous phase of DSA. **(C)** Intraoperatively, a microguidewire with a microcatheter was used to reach the straight sinus, and vasolysis was seen after injection of urokinase. **(D)** After probing with the microcatheter to find the opening of the large cerebral vein, the injection of urokinase was continued and the large cerebral vein was partially visualized.

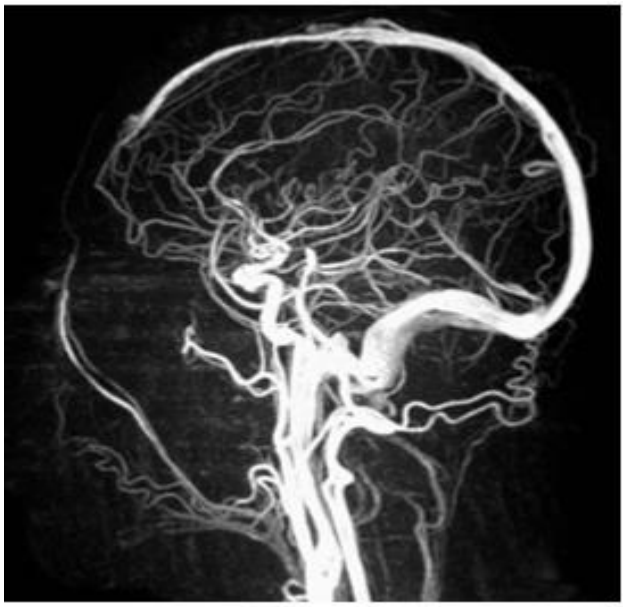

Figure 4: Cranial MRV at 6 months postoperatively showing patency of the straight sinus, increased cortical veins, and partial communication between the middle and posterior portions of the inferior sagittal sinus and the greater cerebral veins.

Discussion

The rare occurrence of thrombosis in the straight sinus and great cerebral vein is well-documented in clinical practice [1]. Venous sinus thrombosis typically presents with headaches, although additional symptoms may accompany the condition. Notably, this condition is characterized by an absence of specific diagnostic features [8]. In this case, the patient had a history of oral contraceptive use prior to symptom onset. This highlights the need for heightened vigilance among postpartum individuals and those with a history of oral contraceptive use. In this case, the patient had a history of oral contraceptive use prior to symptom onset. This highlights the need for heightened vigilance among postpartum individuals and those with a history of oral contraceptive use. The high-density was closely associated with the venous sinus and exhibited a relatively localized distribution, with no evidence of significant spread. During surgery, the presence of thrombosis in the straight sinus and great cerebral vein was confirmed. However, due to the deep-seated location of the thrombus within the brain, the exploration of the straight sinus and great cerebral vein posed significant challenges.

Current primary treatments for venous thrombosis include systemic anticoagulation, local thrombolysis, and stent thrombectomy, all of which are effective methods [10]. Due to its relative safety, anticoagulation therapy has become the predominant treatment for this disease. However, a recent prospective study showed discrepancies in results compared to previous studies, possibly due to selection bias and a small sample size [11]. In this study, most patients exhibited severe clinical symptoms, and the efficacy of anticoagulation therapy was suboptimal. Additionally, many patients exhibited hemorrhagic infarcts prior to treatment, increasing the risk of bleeding and resulting in generally poor patient outcomes. While anticoagulation therapy was actively used early in the treatment process, the mortality rate remained between 5% and 30%, highlighting certain limitations of anticoagulation therapy in managing this disease [12]. In a local thrombolysis study involving 19 patients, 14 patients had no or only minor neurological deficits. Among these patients, some experienced vision loss, which returned to normal within 1 to 4 days following thrombolysis. Conversely, 4 patients had poor outcomes, as these patients already had multiple deep hemorrhagic infarcts prior to thrombolysis. Therefore, early local thrombolysis may result in better patient outcomes [13].

In a meta-analysis of 185 patients treated with local thrombolysis and stent retrieved thrombectomy, approximately half of the patients were in a state of coma, while a significant number also presented with intracranial hemorrhage. Despite these challenges, 84% of the patients achieved favorable outcomes, while only 12% experienced mortality. This underscores the relative safety of mechanical thrombectomy in most cases [14]. Interestingly, advancements in new technologies have emerged. In a multi-center study focusing on patients with cerebral venous sinus thrombosis who were unresponsive to anticoagulation therapy, the use of large-bore aspiration catheters during surgery was found to be both safe and effective. This approach not only enhanced thrombectomy efficiency but also reduced operative time and blood loss. All nine patients in the study achieved good recanalization without major perioperative complications. However, due to the small sample size, further research is required to validate these findings [14]. Therefore, in cases where anticoagulation therapy proves ineffective, endovascular treatment serves as a valuable adjunctive therapy, particularly for patients presenting with coma, intracranial hemorrhage, and rapidly deteriorating conditions [15].

In this case, intraoperative confirmation of deep venous thrombosis in the brain was achieved, and the patient exhibited marked worsening of consciousness symptoms. Compared to systemic anticoagulation, early local thrombolysis typically offers greater targeted and immediate effects. Therefore, intraoperative endovascular intervention was performed to directly apply local thrombolysis. However, the unique anatomical relationship between the great cerebral vein and the straight sinus, which are often at a distinct acute angle, posed technical challenges during the procedure [9]. Ultimately, we successfully navigated a microcatheter to the orifice of the great cerebral vein for repeat thrombolysis. Following the procedure, the straight sinus was nearly completely recanalized, and partial recanalization was observed in other venous sinuses, including the great cerebral vein. The patient's symptoms improved significantly within a short time. A follow-up MRV examination after 6 months demonstrated satisfactory thrombolysis results, and the patient remained symptom-free thereafter. Therefore, in patients with progressive worsening of consciousness and deteriorating disease conditions, early endovascular intervention is highly recommended.

Conclusion

Straight sinus combined with large cerebral vein thrombosis is one of the rare types of cerebral vein thrombosis. Currently, there are very limited treatments for this disease, and this case suggests that local thrombolytic intervention may be an option for the treatment of deep cerebral venous thrombosis.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving humans were approved by the Ethics Committee of the First Affiliated Hospital of Shenzhen University. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required from the participants or the participants' legal guardians/next of kin in accordance with the national legislation and institutional requirements. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Author contributions

Zetao Wu: Resources, Writing–original draft. Jing Yao: Supervision, Writing–review & editing. Wancheng Lian: Writing – review & editing. XiaoYan Zhang: Writing – original draft. Xianfeng Rao: Writing – review & editing. Meng Zhang: Funding acquisition, Writing–review & editing, Conceptualization, Methodology, Supervision.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest

Ethics Statement

This study was approved by the Research Ethics Committee of the Second People's Hospital of Shenzhen, China.

Reference

1. Ulivi L, Squitieri M, Cohen H, Cowley P, Werring DJ (2020) Cerebral venous thrombosis: a practical guide. Pract Neurol 20: 356-367.
2. Sparaco M, Feleppa M, Bigal ME (2015) Cerebral Venous Thrombosis and Headache--A Case-Series. Headache 55: 06-814.
3. Saposnik G, Barinagarrementeria F, Brown RD, Bushnell CD, Cucchiara B, Cushman M, et al (2011) Diagnosis and Management of Cerebral Venous Thrombosis: A Statement for Healthcare Professionals from the American Heart ssociation/American Stroke Association. Stroke 42: 1158-1192.
4. Shindo A, Wada H, Ishikawa H, Ito A, Asahi M, Ii Y, et al (2014) Clinical features and underlying causes of cerebral venous thrombosis in Japanese patients. Int J Hematol 99: 437-440. https://doi.org/10.1007/s12185-014-1550-x.
5. Honda M, Kaminogo M, Nagata I, Morikawa M (2004) [Deep cerebral venous thrombosis: a report of three cases and review of the literature]. No to Shinkei 56: 689-694.
6. Lanska DJ, Kryscio RJ (2000) Risk factors for peripartum and postpartum stroke and intracranial venous thrombosis. Stroke 31: 1274-1282.
7. Krenz I, Power KJ (1990) Postpartum thrombosis of the great vein of Galen. Anaesthesia 45: 643-645.
8. Einhäupl K, Stam J, Bousser M-G, De Bruijn SFTM, Ferro JM, Martinelli I, et al (2010) EFNS guideline on the treatment of cerebral venous and sinus thrombosis in adult patients. Eur J Neurol 17: 1229-1235.
9. Ono M, Rhoton AL, Peace D, Rodriguez RJ (1984) Microsurgical Anatomy of the Deep Venous System of the Brain. Neurosurgery 15: 621-657.
10. Lee S-K, Mokin M, Hetts SW, Fifi JT, Bousser M-G, Fraser JF (2018) Current endovascular strategies for cerebral venous thrombosis: report of the SNIS Standards and Guidelines Committee. J NeuroIntervent Surg 10: 803-810.
11. Stam J, Majoie CBLM, Van Delden OM, Van Lienden KP, Reekers JA (2008) Endovascular Thrombectomy and Thrombolysis for Severe Cerebral Sinus Thrombosis: A Prospective Study. Stroke 39: 1487-1490.
12. Canhão P, Ferro JM, Lindgren AG, Bousser M-G, Stam J, Barinagarrementeria F (2005) Causes and Predictors of Death in Cerebral Venous Thrombosis. Stroke 36: 1720-1725.
13. Kumar S, Rajshekher G, Reddy C, Venkateswarlu J, Prabhakar S (2010) Intrasinus thrombolysis in cerebral venous sinus thrombosis: Single-center experience in 19 patients. Neurol India 58: 225.
14. Dandapat S, Samaniego EA, Szeder V, Siddiqui FM, Duckwiler GR, Kiddy U, et al (2020) Safety and efficacy of the use of large bore intermediate suction catheters alone or in combination for the treatment of acute cerebral venous sinus thrombosis: A multicenter experience. Interv Neuroradiol 26: 26-32.
15. Siddiqui FM, Dandapat S, Banerjee C, Zuurbier SM, Johnson M, Stam J, et al (2015) Mechanical Thrombectomy in Cerebral Venous Thrombosis: Systematic Review of 185 Cases. Stroke 46: 1263-1268.