

Report

MR Imaging and Clinical Course in Transverse Sinus Thrombosis

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Transverse sinus thrombosis was detected by MRI in two patients. They reported headache but no neurological deficits, and T1-weighted spin echo (T1SE) MRI showed hyper-intense lesions on the outside of the cerebellum. Clinical features of the headache in one case were similar to those of a cluster headache, while the other patient reported a throbbing morning headache associated with neck pain. In both cases, thrombus remained following anticoagulant therapy, but their headaches improved and abnormal lesions disappeared on T1SE MRI. In these cases it was difficult to diagnose transverse sinus thrombosis because patients only had a headache.

It is probable that the symptoms of the transverse sinus thrombosis were not always so severe and that if the patients could not have been diagnosed immediately their headaches would have improved after anticoagulant therapy despite the thrombus remaining.

Key Words: transverse sinus, thrombosis, MRI, T1, headache

Introduction

Headaches are the most common symptom of cerebral venous thrombosis (CVT), and its clinical outcomes are varied and sometimes severe or even fatal. On the other hand, a few CVT cases only have headaches without any neurological deficits¹⁾. In such cases CVT involved the lateral sinus¹⁾, and Echo-planar T2* susceptibility-weighted imaging (T2*SW) SE MRI is useful for the diagnosis of CVT^{2,3)}.

We report two cases of lateral sinus thrombosis with only headache and no neurological deficits, where thrombus could be detected using T1-weighted spin echo (T1SE), T2SE and fluid-attenuated inversion recovery (FLAIR) MRI. However the thrombus remained on MRV in both cases, their headaches improved after anticoagulant therapy and thrombus disappeared on MRI.

Case Report

Case 1

A 61-year-old female came to our hospital because of a throbbing, painful headache with dacryorrhea in the left periorbital region. There was no

papilloedema, the brain CT was normal and rizatriptan and acetaminophen were slightly effective for the headache. Her previous medical history included deep vein thrombosis of the lower extremities. Her headache worsened when she bowed her head, and symptoms were accompanied by vomiting and palpitations. One month later, brain T1SE (TR, 386 ms; TE, 10 ms), T2SE (TR, 4,000 ms; TE, 92 ms) MR and T2* (TR, 522 ms; TE, 20 ms) images showed an abnormal lesion outside of the left cerebellum (Fig. 1). FLAIR (TR, 9,000 ms; TE, 97 ms) MR images were normal, however MR venography (MRV: TR, 17 ms; TE, 7.2 ms) showed an occlusion of the left transverse sinus. She also had a pulmonary embolism. After the initiation of antithrombotic therapy with heparin, the headache was relieved. After 3 months, the transverse sinus was still occluded, although the thrombus could not be detected on T1, T2SE MRI, and arterial venous fistula (AVF) was not detected on MR angiography.

Case 2

A 41-year-old female was admitted to our hospital because of emotional incontinence and state of con-

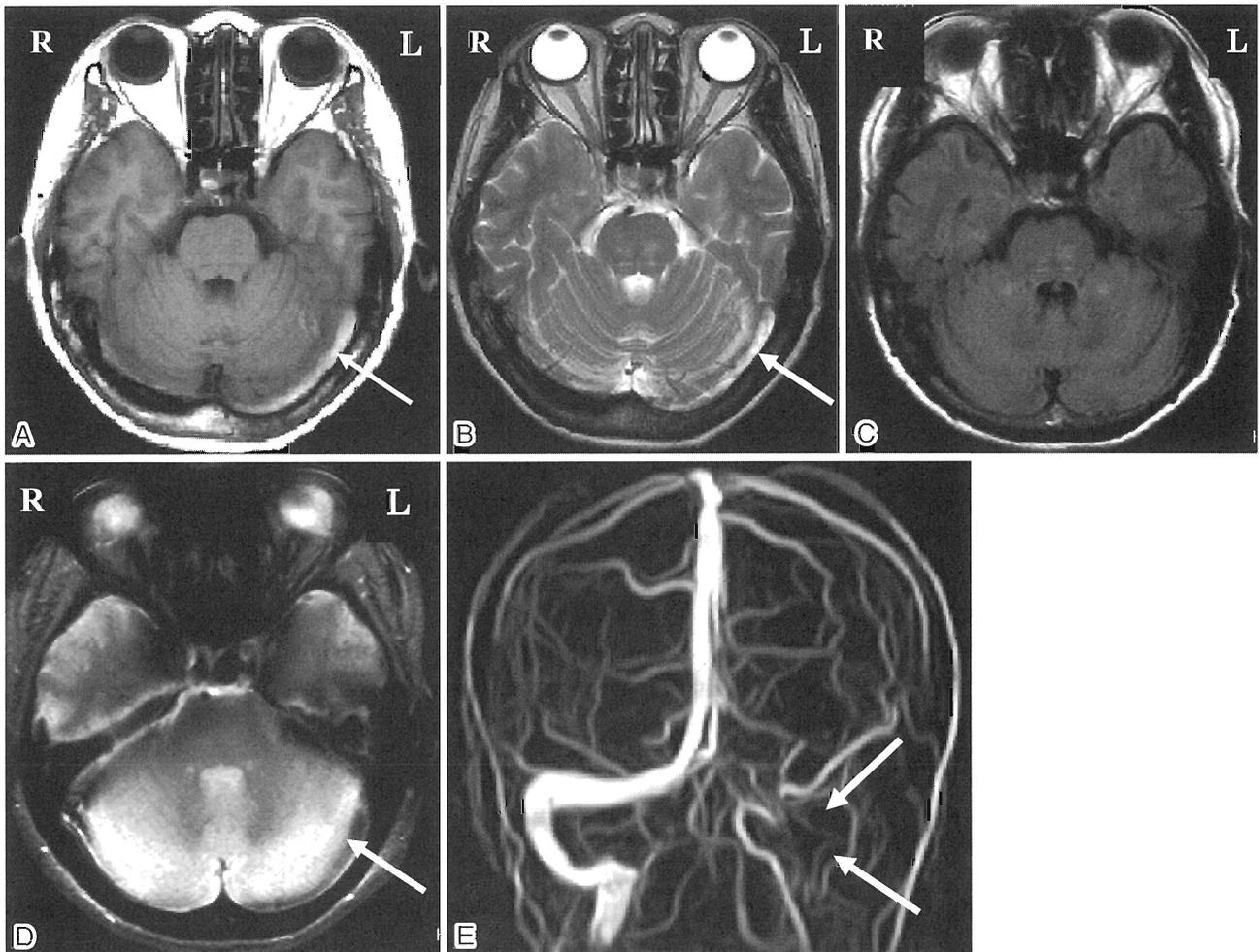


Fig. 1 Case 1

T1SE (A: arrow) and T2SE (B: arrow) MR image showed a high intensity lesion outside of the cerebellum. FLAIR (C) MR image was normal. T2* MR images showed a low intensity lesion outside of the cerebellum (D). The left transverse sinus disappeared on MR venography (E: arrow).

fusion. Brain FLAIR MRI showed multiple high intensity lesions in the subcortical white matter. Anticardiolipin IgM antibody was 55 U/ml (normal < 8 U/ml), and analysis of cerebrospinal fluid revealed a normal protein level of 40 mg/dl and a slightly increased cell count of 10 ($N : L = 1 : 14$) per microliter. She was treated with prednisolone under the diagnosis of encephalitis associated with antiphospholipid syndrome. After the treatment, the psychiatric disturbance improved. One month after beginning steroid therapy, she had a severe morning headache reported as throbbing and associated with neck pain. Eleven days after the headache appeared, brain T1SE (TR, 450 ms; TE, 12 ms) and FLAIR (TR, 9,000 ms; TE, 119 ms) MR images

showed a hyperintense lesion outside of the cerebellum (Fig. 2), T2SE (TR, 4,000 ms; TE, 96.0 ms) images showed an isointense lesion, and MRV showed a transverse sinus occlusion. After treatment with warfarin, her headache improved. However, after 1 year, transverse sinus was still occluded on MRV. The thrombus could not be detected on T1SE and FLAIR MRI, and AVF was not detected on MR angiography.

Discussion

According to recent reports, T2*SW MRI is useful for the diagnosis of CVT²³⁾. Few CVT cases have only headache without any neurological deficits. In such cases, CVT involves the lateral sinus, and the headache is usually throbbing and ipsilateral to the

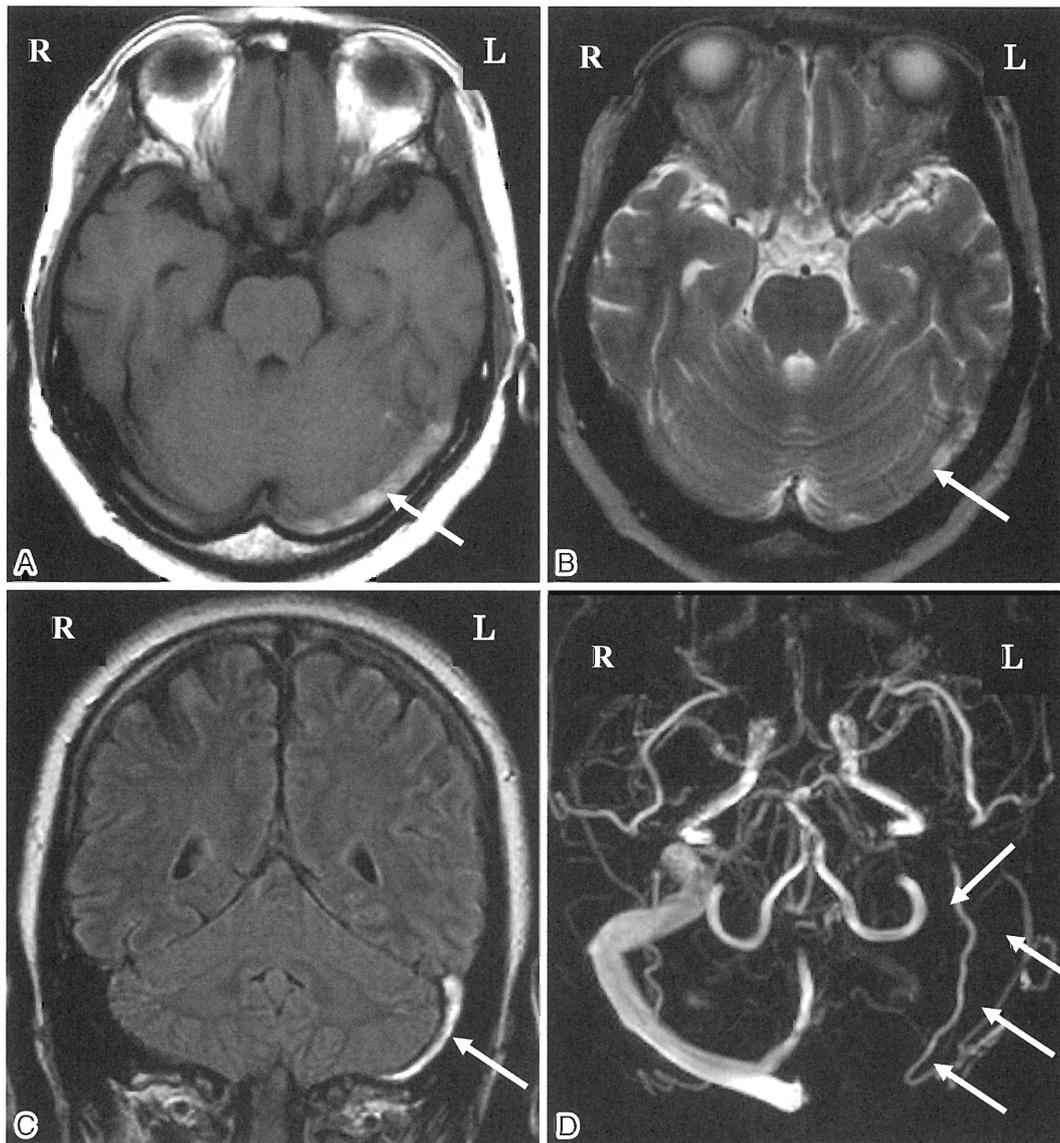


Fig. 2 Case 2

T1SE (A: arrow) and FLAIR (C: arrow) MR images showed a hyperintense lesion outside of the cerebellum, T2SE (B: arrow) MRI images showed an isointense lesion. MR venography (D: arrow) confirmed the occlusion of the left transverse sinus.

thrombus³¹. Timóteo et al reported that there is no typical pattern of headache in CVT. Examples include recent persistent headache, thunderclap headache or pain worsening with straining, sleep/lying down or Valsalva maneuvers even in the absence of papilloedema or focal signs³¹. Our Case #1 had a throbbing headache with dacryorrhea in the left periorbital region, and ipsilateral transverse sinus thrombosis was identified. At first, cluster headaches were suspected from the clinical features, and rizatriptan was slightly effective. However, CVT was doubted because the headache increased pro-

gressively and worsened when she bowed her head.

Transverse sinus thrombosis was found in T1, T2SE and T2*SW weighted MRI. Our Case #2 had severe morning headaches every day, and transverse sinus thrombosis was found in FLAIR and T1 SE weighted MRI. Finally, they were diagnosed as having transverse sinus thrombosis with MRV.

Until recently, conventional angiography has been the best diagnostic tool⁴. Recently however, T2*SW MRI has been reported to be useful for the diagnosis of CVT²³). Ability to detect the thrombus were high on T1SE (97%) and T2*SW MRI (78%),

while those on FLAIR and T2SE were under 40%³⁾. In the first few days, thrombus shows an isointense signal on T1SE, and a hypointense signal on T2SE⁶⁾. A few days later, the diagnosis becomes obvious, and the signal intensity increases on T2- and T1SE. Four months after clinical onset, the thrombus could not be detected on T1SE or DWI, in contrast to what could be seen on T2SE (20%), FLAIR (54%) and T2*SW (over 30%). However, transverse sinus thrombus remained on MRV with our two cases for 3 months after the clinical onset, headache improved and thrombus could not be detected on T1, T2 MRI because of hemoglobin changing to hemosiderin.

Dural sinus thrombosis has been described as a precipitating cause of dural AVF's. Furthermore, venous hypertension causes the development of acquired AVF⁷⁾. Because of the lack of dural AVF in our cases, it was supposed that their symptoms were mild due to mild venous hypertension.

In conclusion, cerebral venous thrombosis should be doubted if severe headache is accompanied by nausea and vomiting such as in cases where intracranial hypertension continues for more than ten days. Transverse sinus thrombosis may cause only

a headache without any neurological deficits, but even in such cases T1SE could detect the thrombus, and T2SE and FLAIR MRI were also useful as additional imaging techniques, whereas T2*SE was not always necessary for diagnosis.

References

- 1) **Cumurciuc R, Crassard I, Sarov M et al:** Headache as the only neurological sign of cerebral venous thrombosis: a series of 17 cases. *J Neurol Neurosurg Psychiatry* **76:** 1084-1087, 2005
- 2) **Fellner FA, Fellner C, Aichner FT et al:** Importance of T2*-weighted gradient-echo MRI for diagnosis of cortical vein thrombosis. *Eur J Radiol* **56:** 235-239, 2005
- 3) **Idbaih A, Boukobza M, Crassard I et al:** MRI of clot in cerebral venous thrombosis: high diagnostic value of susceptibility-weighted images. *Stroke* **37:** 991-995, 2006
- 4) **Bousser MG, Chiras J, Bories J et al:** Cerebral venous thrombosis—A review of 38 cases. *Stroke* **16:** 199-213, 1985
- 5) **Timóteo A, Inácio N, Machado S et al:** Headache as the sole presentation of cerebral venous thrombosis: a prospective study. *J Headache Pain* **13:** 487-490, 2012
- 6) **Bousser MG:** Cerebral venous thrombosis: diagnosis and management. *J Neurol* **247:** 252-258, 2000
- 7) **Terada T, Higashida RT, Halbach VV et al:** Development of acquired arteriovenous fistulas in rats due to venous hypertension. *J Neurosurg* **80:** 884-889, 1994

横静脈洞血栓症のMRI所見と臨床症状

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横静脈洞血栓症をMRIにて2症例認めた。2例とも頭痛のみ認め神経学的異常なく、MRIではT1強調画像で小脳外側に高信号領域を認めた。頭痛の性状は、1例では群発頭痛様で、もう1例では頸部痛をともなう起床時の拍動性頭痛だった。抗凝固療法開始後、頭痛は改善し、T1強調画像での異常信号は消失したが、血栓は残存した。本2症例は症状が頭痛のみのため、診断が困難だった。

横静脈血栓症の臨床症状は比較的軽度で、もし迅速な診断が遅れても、抗凝固療法開始後、血栓が残存しても症状が改善する可能性があると考えられた。