

Case Report

Transverse Sinus Thrombosis: An Unusual Cause of Headache

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A 24-year-old woman presented with headache of 6 days' duration, described as throbbing pain in the right periorbital region radiating to her right ear and neck. The pain was unresponsive to oral analgesics. She had no speech or hearing difficulties, no previous history of migraines, and no family history of neurologic disease. Her medications included oral contraceptives for 8 months' duration. This report describes the salient features of dural sinus thrombosis and recent advances in diagnostic and therapeutic procedures. The relationship between oral contraceptives and protein S levels is also discussed. Cerebral dural sinus thrombosis should be considered in the differential of new onset of headaches, seizures, or focal neurological deficits.

Key words: transverse sinus thrombosis, headache, oral contraceptives, protein S

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Headache is one of the most common presenting complaints seen in the outpatient setting. Although most headaches are benign, a careful history and physical exam along with appropriate imaging studies may be necessary to differentiate less serious causes from more serious causes of headache. Cerebral dural sinus thrombosis is an unusual cause for severe headache. This case report describes the salient features of dural sinus thrombosis, as well as the most recent advances in diagnostic and therapeutic procedures.

CASE HISTORY

A 24-year-old woman presented to the emergency department complaining of a headache. Her headache had begun 6 days previously and was described as throbbing pain located in the right periorbital region radiating to her right ear and down her neck. The pain was unresponsive to oral analgesics. She denied fever, chills, sinus disease, and visual difficulty. She had no speech or hearing difficulties and no previous history of migraines. Her medications included oral contraceptives for 8 months' duration. Her family history was negative for neurologic disease. She was employed as a nurse and did not smoke, or drink alcohol.

On examination, she was afebrile with a blood pressure of 130/60, a pulse rate of 92 beats per minute, and respirations were 12 per minute. Her right conjunctiva was slightly injected. There was no papilledema or sinus tenderness. Her neck was supple, and no adenopathy was found. Her cardiopulmonary and abdominal examinations were benign. A complete neurological exam revealed no abnormalities. The results of diagnostic tests revealed a normal blood count, chemistry profile, and antinuclear antibody (ANA) titer. Her coagulation profile was within normal limits with the exception of a protein S level of 46% (normal 66% to 130%). An MRI with MR angiography revealed thrombosis of the right sigmoid and transverse sinuses with extension into the right jugular vein (Figure).

[Fig]



Intracranial MR angiogram with no visible evidence of flow in the right transverse and sigmoid sinuses.

Hospital Course and Follow-up.—The patient was initially admitted to the hospital and treated with intravenous heparin to keep the partial thromboplastin time at 1.5 times the control. After 7 days, she was discharged on warfarin to maintain an international normalized ratio (INR) of 2 to 3. At discharge, her neurologic examination was normal. She had a persistent headache for the first week which was treated with oral narcotic analgesics. A repeat MRI 6 months later revealed recanalization of the sigmoid and transverse sinuses. Her protein S level, without being on anticoagulation, was 95%. Laboratory test results at the time of admission and 5 months postdischarge are shown in the Table

COMMENTS

Cerebral dural sinus thrombosis was described as early as the 1800s. In 1825, Ribes described a case of a 45-year-old man with 6 months of headache, epilepsy, and delirium. Examination at autopsy revealed thrombosis of the superior sagittal sinus, left lateral sinus, and cortical veins.¹ Cerebral dural sinus thrombosis should be considered in the differential of new onset of headaches, seizures, or focal neurological deficits. Presentation may be variable but, from a review of 38 cases, the earliest and most common neurologic symptom found was headache (74%). Papilledema was seen in 45% of patients. Focal deficits, seizures, and coma were seen in 25% to 35%.²

The true incidence of cerebral dural thrombosis is not known. In an autopsy series, Ehlers and Courville found only 16 sinus thromboses in a series of 12500 autopsies.³ The etiology of cerebral dural thrombosis includes infection, dehydration, rheumatologic diseases, local trauma, and hypercoagulable states. Cavernous sinus thrombosis can be seen after infection of the facial skin, maxillary, sphenoid, or ethmoid sinuses. Thrombosis secondary to severe dehydration is usually seen in the pediatric population. Rheumatologic diseases that have been associated with thrombosis include systemic lupus erythematosus and Behcet's disease. Other conditions that have been associated with both hypercoagulability and cerebral dural thrombosis include nephrotic syndrome, anti-thrombin III deficiency, cancer, pregnancy (ie, postpartum period),⁴ and oral contraceptive use.^{5–8} Protein S is a cofactor for anticoagulant and fibrinolytic properties of activated protein C. Reduced protein S levels can be seen in nephrotic syndrome, pregnancy, and the use of oral contraceptives.^{9–11}

The diagnosis is based on history, physical examination, laboratory data, and imaging studies. An elevated sedimentation rate and neutrophil level may be present but are nonspecific. In 84% of cases, abnormalities in the cerebral spinal fluid included increased opening pressure, elevated protein, red cells, and pleocytosis.² The most common EEG findings are generalized slowing, more marked on one side, with frequent epileptic activity. A CT scan may be normal or have specific signs of cerebral dural sinus thrombosis such as "cord sign" representing thrombosis of the cortical vein, "dense triangle sign" representing thrombosis of the superior sagittal sinus, and the "empty delta sign" representing injection of the collateral veins in the superior sagittal sinus wall contrasting with noninjection of the clot inside the sinus.^{5,12}

Angiography had been the accepted standard for diagnosis; however, more recently, MRI with MR angiography has been suggested as the imaging procedure of choice.¹³ Findings on MR may be variable and are usually related to the age and evolution of the thrombosis. At times, there is an initial absence of a flow void and, within a few days, a hyperintense thrombus may

	Laboratory Results		
	Normal Range	At Admission	5 Months Postdischarge
Prothrombin time, sec	11.3–12.9	13.6	11.4
Prothrombin time (INR)		1.3	1.0
Partial thromboplastin time, sec	21.5–33.5	27.5	26.5
Platelets, $\times 10^9/L$	150–400	248	Not done
Anticardiolipin IgG, GPL U/mL	<24	7.3	10.4
Anticardiolipin IgM, MPL U/mL	<12	5.7	5.1
Antithrombin III, %	71.2–134.4	127.1	90.8
Plasminogen, %	67.3–126.1	Not done	106.8
Protein C, % activity	66.0–154	109.4	102.0
Protein S, % activity	66.0–130	46.0	95.0
Thrombin time, sec	0–18	13.3	13.3
Lupus anticoagulant		Negative	Negative

be seen. Later, vascular recanalization may be demonstrated with resumption of a flow void.⁵ Magnetic resonance angiography and venous transcranial Doppler ultrasound have been suggested for both monitoring and follow-up of patients.¹⁴ Due to the low incidence and multiple etiologies of dural sinus thrombosis, treatment has remained controversial. One randomized study¹⁵ and several case reports^{16,17} have shown the benefit of high-dose heparin therapy.⁵ More recently, however, thrombolytics using selective catheterization and urokinase have been successful.¹⁸

CONCLUSION

When a patient presents with a new or atypical headache, dural sinus thrombosis should be considered. Oral contraceptives have been associated with a reduced protein S level and hypercoagulability. Magnetic resonance imaging with MR angiography has been useful in the evaluation and follow-up of dural sinus thrombosis patients. Anticoagulation and thrombolysis should be part of the treatment regimen.

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