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The risk factors and the treatment course of cerebral venous thrombosis: an experience of 41 cases

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Abstract

Background: The present study was designed to describe the characteristics, risk factors and prognosis of patients diagnosed with CVT in our center.

Method: The present retrospective cross-sectional study was conducted on patients diagnosed with cerebral vein or sinus thrombosis based on the patients' clinical presentation and the findings of the imaging studies between 2003 and 2008. The patients were studied for possible risk factors and the resultant outcome after terminating the therapeutic course.

Results: Headache, the most common symptom reported in 80% of the cases, was considered the first symptom in only 46% of these patients. Coma, focal motor deficit at presentation, hemorrhagic conversion of infarction and thrombosis in more than one sinus were factors associated with unfavorable outcome in these patients.

Conclusion: Physicians should always have CVT in mind while examining patients particularly women on pills who complain about headache. More studies however are needed to point out more specific presentations which would lead to the early diagnosis of CVT in the patients.

Keywords: Cerebral venous thrombosis; brain; risk factor.

Introduction

Cerebral venous thrombosis (CVT), an uncommon cerebrovascular disease, is characterized by a variety of symptoms, mimicking other neurological disorders and is therefore commonly misdiagnosed or diagnosed with a delay (1).

CVT, a multi-factorial condition which accounts for approximately 0.5% of the strokes, usually affects all age groups (2, 3). Certain drugs, pregnancy, infection, systemic inflammation, cancer and genetic disorders are among the main factors contributing to the condition. The diagnosis is based on the identification of the occluded vessels using magnetic resonance imaging (MRI) and venography (MRV) (4).

Its outcome is generally favorable as more than 80% of the patients recover from the condition completely; some 8-14% of them, however, may die secondary to its complications (5).

The present study was designed to describe the characteristics, risk factors and prognosis of patients diagnosed with CVT in our center.

Methods

The present retrospective cross-sectional study was conducted on patients diagnosed with cerebral vein or sinus thrombosis in our hospital, a center affiliated to Tehran University of Medical Sciences (TUMS), between 2003 and 2008. The study was approved by the Ethical Board Committee of TUMS. The diagnosis was made based on the clinical presentation of the patients along with the positive findings in their CT, MRI or MR venography. Non-contrast cerebral CT scan was usually performed as the first approach in patients with a recent onset or persisting headache. Since our hospital is a neurology referral center, MRI was also performed in all of our patients in order to gather more information regarding the characteristic of the headache. Follow up with MRI, however, was not performed in none of the patients who had hemorrhagic deterioration on anticoagulant therapy.

Information on demographic data, initial symptoms, the interval between the initiation of the symptoms and the diagnosis, findings of CT, MRI,

or MR angiography, the location of the thrombus, the number of the occluded sinuses, the consciousness level at the admission time, possible risk factors, hospitalization period, admission to the intensive care unit, and the outcome were recorded.

Heparin was the anticoagulative agent prescribed in all of the studied patients, after the diagnosis when they were hospitalized in the intensive care unit. They were all carefully monitored for any possible complication during the study period.

The gathered data were analyzed using SPSS ver. 13. Mean ± SD was used to present quantitative data.

Results

Some 41 patients with the mean age of 37.2 ± 12.8 years, ranging from 15 to 75 years, were enrolled in the study; from among them 31 cases were female. The demographic data of the studied patients along with their signs and symptoms are outlined in Table 1. Headache was the most common symptom reported in 80% of the cases; it was considered the first symptom presenting in early stages of the disease in only 46% of them. Headache was progressive in 68% and acute in 12% of the patients. About 60% of the patients reported a continuous pattern for their headache.

While headache was generalized in 28 of the patients, five individuals reported unilateral headache predominantly located in frontotemporal area. Lateral sinus involvement was reported in one of the patients with isolated unilateral headache.

Mild intracranial hypertension, headache and vomiting along with the signs of papilledema were reported in some 9.7% of the patients. Focal neurologic signs, mainly as the consequence of lesions localized in a specific functional area, were reported in 12.2% of the studied patients. General tonic and colonic seizures were reported in 24.4% of cases, seven of them had cortical hemorrhage. The mean duration between the onset of the symptoms and the diagnosis was 16.2 days, ranging from 3 to 60 days. Mean hospitalization time was 14.8 days (range: 3 to 42 days).

The results of the brain imaging confirmed the diagnosis in many cases (Table 2). While positive MRI with/without contrast was reported in 70% and 43% of the cases, brain CT scan was in favor of CVT in some 48% of the patients. Localized and subarachnoid hemorrhage were the main findings found in twenty (48.7%) and four (9.7%) of the patients.

Single sinus affection was reported in 36% of the patients. Superior sagital followed by transverse and sigmoid sinuses were the main sinuses involved in the course of the disease.

Some 25 of these patients were admitted to the intensive care unit due to consciousness problems; these patients received heparin infusions as anticoagulative therapy in order to maintain their PTT levels near 1.5 times of normal base. Thrombolytics were not administered in none of the cases. Antibiotic and antifungal agents were prescribed in three patients (7.3%) after they developed ear and nose infection. One of these cases died during the hospital stay.

Table 3 outlines the possible risk factors contributing to the condition in the studied patients. From among the studied females, two were on the

Table 1
Demographic and clinical data of patients

Characters	**Frequency**	**percent**
Sex (Female)	31	75.6%
Symptoms and signs		
Headache	33	80 %
Visual disorders	12	29.2%
Papilledema	4	9.75%
Diplopia	9	21%
Stupor or coma	8	19.5%
Hemi paresis	5	12.2%
focal motor deficit	16	39%
Seizure	10	24.4%
Alive	36	87.8%
Dead	5	12.2%

Table 2
Imaging data of patients

Characters	**Frequency**	**percent**
Normal CT	7	17%
CT/MRI hemorrhage	20	48.7%
Left hemisphere	7	17%
Right hemisphere	6	14.6%
Post fossa	3	7.3%
SAH	4	9.7%
Superior sagital sinus thrombosis	11	26.8%
Occluded sinus/vein	21	51.2%
Transverse	6	14.6%
Lateral sinus	3	7.3%
Cavernous	1	2.4%

Table 3
Risk factor identified in patients

Characters	Frequency	percent
OCP	20	49%
Hormone replacement therapy	2	4.9%
Pregnancy	3	7.3%
Infection	3	7.3%
Cranial trauma	2	4.9%
Malignancy	3	7.3%

hormone replacement therapy. Oral contraceptives (OCPs) were taken in some 20 females; 6 of them had used OCP for the first time to prevent the menstrual bleeding during the hajj ceremony. Infectious disease affecting the central nervous system was also reported in 7.3% of our patients.

The mortality rate was 12%. During the study period, five females (12%) died; all of them had more than one sinus involvement along with deep cerebral venous system problems. Three of these patients were on contraceptives and died early after being hospitalized. One patient died because of infection secondary to cavernous sinus thrombosis, whereas malignancy was the cause of death in the other patient. Seizures resistant to antiepileptic therapy were not reported in either of the cases.

Significant functional disability was reported in some 21 patients at the time of discharge; coma, focal motor deficit at presentation, hemorrhagic conversion of infarction and thrombosis in more than one sinus were the factors associated with unfavorable outcome in these patients. Follow-up was available for 25(69%) patients in a median of 3 months; from among them twelve patients became independent in daily activities after some time, while others remained significantly disabled.

Discussion

Early diagnosis of CVT is crucial as it can considerably improve the recovery process, particularly in case adequate therapeutic measures are taken in the early hours (6). However, in view of the fact that CVT may presents with various signs and symptoms, ranging from headache to altered consciousness to focal neurological deficits, it is sometimes hard to detect these patients (7).

In line with previous studies, headache was the first and the most common symptom in the majority of our patients (8). However, in view of the fact that headache was the only complaint in many of these patients, the definite diagnosis was not made until the identification of other signs in the neuroimagings. Previous studies had reported a heterogeneous risk of experiencing seizure particularly at the early stages of the disease (9). While the risk of experiencing generalized tonic, and clonic seizures were higher in patients with supratentorial parenchymal lesions, patients with positive history of seizures were at a higher risk of developing early seizures.

Patients with cortical and deep venous thrombosis presented various degrees of impaired consciousness (19.5%). The occlusion of a cerebral vein may cause localized brain edema, ischemic neuronal damage, cytotoxic and vasogenic edema, and intracranial hypertension and therefore is more serious than that of a deep vein which may only present with coma, delirium and bilateral motor deficit (10, 11).

Previous studies had considered the absence of specific presentations in the majority of the cases as the main reason contributing to difficulties and delays in diagnosing the affected individuals. The mean time between the onset of the symptoms and achieving the final diagnosis was 16.2 days in our study. The fact that our patients only visit specialists when the disease has entered its late stages is the main reason explaining the longer duration in our study compared to that reported by ISCVT (9).

Three of the females enrolled in the present study had postpartum CVT (9.7%); this finding is comparable to that of previous studies reporting the low prevalence of the condition (12). Oral contraceptives, reported as a major risk factor responsible for 54 to 71% of CVT cases, were used by some 64.5% of the women in our study (13). Corroborating with ISCVT study in which infection was the main factor contributing to CVT in 2% of the cases, infectious diseases were reported in 7.3% of our patients (9).

Hemorrhagic infarctions and focal motor deficit, presenting as severe headache, stupor and coma in some cases, were the main predictors of unfavorable outcome (9). In the present study, patients with more than one sinus involvement and deep cerebral sinus thrombosis had the worst outcome. The mortality rate in our study was comparable to that reported by Stolz et al; the discrepancy between the risk factors contributing to the condition in these studies can explain these differences (14).

It could be concluded that physicians should always have CVT in mind while examining patients particularly women on pills complaining about headache. More studies however are needed to point out more specific presentations which would guide physicians to the early diagnosis of CVT in these patients.

REFERENCES

1. Daif A, Awada A, Al-Rajeh S. *et al*. Cerebral venous thrombosis in adults. Stroke. 1995;26:1193-5.
2. Stam J. Cerebral venous and sinus thrombosis: incidence and causes. Adv Neurol. 2003;92:225-32.
3. Bousser MG, Ferro JM. Cerebral venous thrombosis: an update. Lancet Neurol. 2007; 6:162-70.
4. Duncan IC, Fourie PA .imaging of cerebral isolated cortical vein thrombosis. AJR Am J Roentgenol. 2005;184:1317-9.
5. Dentali F, Gianni M, Crowther MK. Natural history of cerebral vein thrombosis: a systematic review. Blood. 2006;108:1129-34.
6. Ferro JM, Correira M, Pontes C, Baptista MV, Pita F, for the Cerebral Venous Thrombosis Portuguese Collaborative Study Group (Venoport). Cerebral vein and dural sinus thrombosis in Portugal: 1880-1998. Cerebrovasc Dis. 2001;11:177-82.
7. Janghorbani M., Zare M. Saadatnia M. Mousavi SA, Mojarrad M. Cerebral vein and dural sinus thrombosis in adults in Isfahan, Iran: frequency and seasonal variation. Acta Neurol Scand. 2008;117:117-21.
8. Iurlaro S, Beghi E, Massetto N, Guccione A, Autunno M, Colombo B, Di Monda T, Gionco M, Cortelli P, Perini F, D'Onofrio F, Agostoni E. Does headache represent a clinical marker in early diagnosis of cerebral venous thrombosis? A prospective multicentric study. Neurol Sci. 2004;25:S298-S299.
9. Ferro JM, Canhao P, Stam J, Bousser MG, Barinagarrementeria FISCVT Investigators. Prognosis of cerebral vein and dural sinus thrombosis: results of the International Study on Cerebral Vein and Dural Sinus Thrombosis (ISCVT). Stroke. 2004;35:664-70.
10. Ferro JM, Canhao P, Stam J, Bousser MG, Barinagarrementeria FISCVT Investigators. Early Seizures in Cerebral Vein and Dural Sinus Thrombosis. Risk Factors and Role of Antiepileptics Stroke. 2008;39:1152.
11. Leys D, Cordonnier C. Cerebral venous thrombosis: Update on clinical manifestations, diagnosis and management, Annals of Indian Academy of Neurology. 2008;11:79-87.
12. Douglas JL, Richard JK. Risk factors for peripartum and postpartum stroke and intracranial venous thrombosis. Stroke. 2000;31:1274-82.
13. Saadatnia M, Tajmirriahi M. Hormonal contraceptives as a risk factor for cerebral venous and sinus thrombosis Acta Neurol Scand. 2007;115:295-300.
14 . Stolz E, Rahimi A, Gerriets T, Kraus J, Kaps M. Cerebral venous thrombosis: an all or nothing disease? Prognostic factors and long term outcome. Clin Neurol Neurosurg. 2005;107:99-107.

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