

**ORIGINAL ARTICLE**

**ARAŞTIRMA YAZISI**

**EVALUATION OF PATIENTS WITH CEREBRAL VENOUS SINUS THROMBOSIS**

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**ABSTRACT**

**OBJECTIVE:** The aim of this article is to point out the etiology, risk factors, the rate of recanalization and mortality of cerebral venous sinus thrombosis patients.

**MATERIAL and METHODS:** The current study was planned as retrospectively and fifty patients were included. All the patients were analyzed according to the clinical presentation, etiologic causes, risk factors, presence of MR lesion, the involvement of anatomic localization, recanalization and mortality.

**RESULTS:** The most frequent risk factors of the cases were prothrombotic conditions (34%), pregnancy (14%) and puerperium (8%). The most frequent involvement was transverse sinus and secondly more than one sinus thrombosis. As clinical application symptoms we detected headache (68%) and then focal neurologic deficiency (30%). On the other hand, at least 3 month's incidence rate of recanalization in the patients was 70.7%. Except for 2 cases that ended with death, the mortality of the cases was low. We could not find a significant association between risk factors and the presence of cerebral MR lesion or not ( $p=0.42$ ) and also the presence of recanalization or not in the follow-up MR venography ( $p=0.625$ ).

**CONCLUSION:** We have concluded that, in the diagnosis and follow-up of cerebral venous sinus thrombosis, MR venography is the best method; through early diagnosis and proper treatment, the rate of recanalization will be fairly high and mortality will be low. In etiology, besides trombotic conditions, pregnancy and puerperium must be considered as one of the frequent risk factors.

**Key Words:** Cerebral venous sinus thrombosis, venography, risk factors, mortality, recanalization.

**SEREBRAL VENÖZ TROMBOZLU HASTALARIN DEĞERLENDİRİLMESİ**

**ÖZET**

**AMAÇ:** Bu çalışmanın amacı serebral venöz tromboz olgularındaki etyoloji, risk faktörleri, rekanalizasyon ve mortalite oranını belirlemektir.

**GEREÇ ve YÖNTEM:** Retrospektif olarak planlanan bu çalışmaya 50 hasta dahil edildi. Tüm hastalar klinik prezentasyon, etyolojik nedenler, risk faktörleri, beyin MR lezyon varlığı, tutulan anatomik lokalizasyon, rekanalizasyon ve mortalite açısından analiz edildi.

**BULGULAR:** Olgulardaki en sık görülen risk faktörleri protrombotik durumlar (%34 ), gebelik (%14) ve puerperyumdu (%8). En sık görülen tutulum transvers sinüs ve ikinci sıklıkta birden fazla sinüs tutulumu şeklindeydi. Klinik başvuru semptomu olarak baş ağrısı (% 68), focal nörolojik defisiti (% 30) saptadık. Diğer taraftan, en az 3 ay sonraki hastaların rekanalizasyon oranı %70.7 olarak bulundu. Eksitus olan 2 olgu dışında olgularımızın mortalitesi düşüktü. Risk faktörleri ile beyin MR lezyon varlığı veya yokluğu ( $p=0.42$ ) ve takip MR anjiyografideki rekanalizasyon varlığı veya yokluğu arasında anlamlı ilişki bulunamadı ( $p=0.625$ ).

**SONUÇ:** Biz, serebral venöz tromboz tanısında ve takibinde MR venografinin en iyi yöntem olduğu; erken tanı ve uygun tedavi ile rekanalizasyon oranının oldukça yüksek ve mortalitenin düşük olacağı kanısına vardık. Etiyolojide trombotik durumların yanısıra gebelik ve puerperyumunda sık görülen risk faktörlerinden biri olabileceği düşünülmelidir.

**Anahtar Sözcükler:** Serebral venöz sinüs trombusu, venografi, risk faktörleri, mortalite, rekanalizasyon.

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## INTRODUCTION

Although in the years Cerebral Venous Sinus Thrombosis (CVST) was first diagnosed as a rarely encountered disease with fatal course, nowadays, thanks to the developments in the neuro-imaging techniques, it is observed that it may display diverse clinical courses (1). Though in the first angiographical series, it was recorded that the mortality rate of the disease was 30% - 50%, in the recent studies this rate was recorded as below 10%. The poor prognostic factors are advanced old age, coma, deep venous system involvement, intracranial high pressure, being secondary to malignancy, detection of hemorrhagic infarction, uncontrolled epileptic seizure and pulmonary embolism complications (2).

In the present study, our objective was to evaluate risk factors, clinical symptoms, the presence of lesion in cerebral magnetic resonance imaging (MRI), the involvement of anatomic locations, recanalization and mortality rate in CVST cases.

## MATERIAL AND METHODS

This retrospective study included fifty CVST patients (43 women and 7 men) who were diagnosed by using cerebral MRI and MR venography. We classified the patients into age groups as 20-40, 40-60 and over 60 ages. Routine neurological examinations, hematological and biochemical parameters were assessed. We sought out if there were etiological causes giving rise to thrombosis. In order to eliminate prothrombotic conditions and systemic vasculitic diseases, we checked out levels of protein C, protein S, anti-thrombin III, activated protein C resistance, prothrombin mutation, homocysteinemia, methylene-tetra-hydro-folate reductase, anti-phospholipid antibodies, anti-cardiolipin Ig M and G, anti-nuclear antibodies, anti-dsDNA. Then, we reviewed their clinical presentations, any lesion in their cerebral MRI, risk factors, recanalization and mortality rate.

The prognostic evaluations were conducted by checking on if there were recanalization in control MR venography in the following 3 months. Nine patients whose control venographies could not be taken or obtained were not included in the evaluation of recanalization. The results of cerebral MRI and MR venography were evaluated by an experienced radiologist in the department of

neuro-radiology. The variations or hypoplasies in the venous system were excluded. For the evaluation of recanalization, we carried out a statistical analysis on the 41 patients who had control MR venography after 3 months.

## Statistical Analysis

We carried out statistical analyses by using SPSS package programme, and the categorical variables of the specialities were recorded in numbers and percentages. We did Fisher mathematical probability test to find out the relation between the risk groups and imaging techniques. The level of  $p \leq 0.05$  was statistically significant.

## RESULTS

Seven of the patients (14%) were male and 43 (86%) were females. We observed that 66% of the patients were in the 20-40 age group, 26% were in the 40-60 age group and the remaining 8% were in the over 60 age group. We also divided the clinical presentations of the patients as headaches, focal neurological deficits, epileptic seizures and other neurological symptoms. The summary of these clinical presentations were summarized in Table 1.

**Table 1.** Distribution of clinical presentations in cerebral venous sinus thrombosis patients.

Clinical presentations	Number of patients	%
Headache	31	62,0
Headache + focal neurological deficits	3	6,0
Epileptic seizure	2	4,0
Epileptic seizure+ focal neurological defisits	1	2,0
Focal neurological defisits	11	22,0
Others	2	4,0
Total	50	100,0

Sixty-eight percent of the patients had headache symptom. 62% of them had isolated headache. Although 3 patients were presented with epileptic seizure, 2 patients came with only epileptic seizure symptom (4%). 15 patients (30%) applied with focal neurological deficit. There was not additional neurological symptom in the 22% of the patients with focal neurological

deficit.

In the analysis of risk factors, we ascertained that 17 (34%) patients had prothrombotic conditions. There was abnormality were in the vasculitis markers of 5 patients (10%). Seven patients (14%) were pregnant and 4 patients (8%) were in puerperium period. Moreover, from the medical histories of 2 patients (4%) we learned that they had used oral contraceptives.

We classified the cerebral MRI results according to the presence or absence of the lesion. There were 24 (48%) patients who had lesions in their cerebral MRIs. The thrombosed sinuses of the patients on whom we studied were summarized in Table 2 according to their anatomic localizations. The left transverse sinuses of the 28 (56%) patients were thrombosed. There were 12 (24%) patients whose left sigmoid sinus was thrombosed, and only 1 patient's straight sinus was thrombosed. 16 (32%) patients were found to have had right sinus thrombosis. We discovered that 4 (8%) patients had superior sagittal sinus (SSS) thrombosis, 1 patient had right sigmoid thrombosis and 2 patients (4%) had deep vein involvement.

**Table 2.** Distribution of anatomic localizations of thrombosed sinuses in magnetic resonance venography.

Anatomic localizations	Number of patients	%
Left transverse sinus	15	30,0
Left transverse +left sigmoid+ straight sinuses	1	2,0
Bilateral transverse sinuses+left sigmoid sinus	1	2,0
Left transverse+ left sigmoid sinuses	10	20,0
Bilateral transverse sinuses	1	2,0
Right transverse sinus	15	30,0
Superior sagittal sinus	4	8,0
Right sigmoid sinus	1	2,0
Deep vein thrombosis	2	4,0
Total	50	100,0

We started the treatment of the patients in acute period with low molecular weight heparin. Following the acute period, we started oral anti-coagulant treatment (warfarin sodium) for the proper patients and the treatment was stopped after 6-12 months. In the control MR venographies of 41 patients, taken after 3 months, we checked whether there was recanalization or not and recanalization was seen in 29 patients (70.7%).

We could not find any meaningful relation between risk factors and lesions in their cerebral MRI or not ( $p = 0.42$ ), and those who were recanalized/ not recanalized in their follow up MR venography ( $p = 0.625$ ).

## DISCUSSION

Although CVST, compared with arterial occlusion, is very rare, since using of MRI and MR venography in the clinical neurology practice, it has become a disease that has been more easily diagnosed and more frequently seen. Cerebral venous sinus thrombosis involves 0.5% - 1% of all the stroke cases and is seen more frequently in young ages and especially among women. Its clinical development is different from other stroke subtypes, and clinical presentations and risk factors vary greatly. While Towbin (3), found CVST in 9% of 182 autopsy cases, Daif and et al., (4) recorded that 7 out of the 100 000 patients had CVST.

It is known that CVST is more common among women. For example, it is recorded that in a study consisting of 110 patients the rate of male/female was observed as 1:1.19 (5). In our study this rate was 1:6.14, and the 66% of the patients were within the 20-40 age group. We inferred that the reason why the rate of women of the present study is higher compared to the literature may be dependent on the high fertility rate observed in the region. Thus, in the story of 13 patients, there were pregnancy, puerperium and oral contraceptives use.

In the study carried out by Jose' M. Ferro and et al., (6) 624 patients were analyzed and they found out that 88.8% of the patients had headache. In our study this rate was 68% and was evaluated a little bit lower than that of literature. While Qi X and et al., (7) found focal neurologic deficit in the 57% of their patients, this rate was 30% in the current study. The epileptic seizure frequency was detected in 3 patients out of 50 (6%), while De Bruijn and et al., (8) found this value as 47%.

In the analysis of risk factors, we observed prothrombotic conditions in 17 patients (34%). When we take a look at literature, we see that in the analysis of 40 cases, performed by Daif and et al., (4) this rate was 27%, whereas in another study it was found as 38.1% (6). While vasculitis frequency, in our cases, was 10%, in another study it was 3%, in other one, it was found as 7.2% (6,9).

While in Preter and his colleagues' long term

prognostic study (10), the rate of obstetric causes and oral contraceptives use was 15%, in international study on cerebral vein and dural sinus thrombosis, the rate of pregnancy and puerperium was 31.1%, in our series the rate of obstetric causes was 22% and oral contraceptives use was 4%. High percentage of obstetric causes in this study compared to the literature was thought to be due to high fertility rate in this region. Supporting this statement, low percentage of oral contraceptives use was thought to be due to low birth control.

When the thrombosed sinuses were examined in terms of their anatomic localizations, we found 86% were transverse sinuses, 8% were SSS and 4% had deep venous system involvements. In a study with 42 cases, 64% SSS and 62% transverse sinus involvements were observed (11), while in the another study 62% SSS, 41-45% transverse sinus, 18% straight sinus, 11% deep venous system involvement and 11% cortical vein involvement were observed (9).

The recanalization rates in literature were monitored in 3 monthly and yearly pursuits, and found 83% (12). In another study this rate was determined only in the half of the patients (13). And in our study, we found that the recanalization rate was 70.7% and it was in compatible with the rate in the literature. Additionally, in a series of study on 40 patients carried by Strupp and et al, (14) concerning the relations between recanalization and clinic, it was determined that the rate of deficiency was higher in the cases which can not be shown as recanalization.

If CVST cannot be diagnosed early and treated properly, its mortality and morbidity will be quite high. In the recent studies, it is recorded that mortality is around 6-10% (15). In our series, only 2 with deep venous involvements of the 50 patients died. Therefore, the calculated mortality rate is 4% which is lesser than those given in literature.

As a conclusion, in this study we ascertained that CVST is more common in women; the most frequent cause is prothrombotic conditions; the most common clinic application symptom is headache; the most frequently thrombosed localization is transverse sinus. CVST, except 2 deep vein thrombosis, is a disease which has low mortality rate.

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