Fate of Papilledema in Cerebral Venous Thrombosis Patients and its Correlation to Affected Cerebral Venous Sinuses

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ABSTRACT

BACKGROUND:

Cerebral venous thrombosis is an important cause of stroke in young and middle-aged adults with estimated (3-4) cases per million annual incidence. Papilledema is the most common sign detected in these patients that can end by blindness if not monitored and treated well. This research aims to assess development and prognosis of papilledema and its association with certain cerebral venous sinuses thrombosis. Evaluation of the optic nerve head has been done clinically and by using optical coherence tomography.

METHODS:

A descriptive_ analytic hospital based study was conducted in neurology unit at wad medani teaching hospital from December 2021 to July 2022. 20 patients were included in the study. Data including optical coherence tomography reports was collected at admission and after 2 months. Analysis was done using SPSS version 25 to report frequency of papilledema, 2months visual outcome, correlation of MRI\MRV findings with the development and outcome of papilledema.

RESULTS:

This study include 20 cerebral venous thrombosis patients with mean age of 35.75 years. Papilledema present in 70% at initial presentation in whom the superior sagittal sinus was affected in 78.6% .after two months period papilledema regressed in80%, 10% developed optic atrophy and10% died .There is clear correlation between the sinus affected and the development of papilledema (P value = 0.009); in contrast no relation between the sinus affected and the two months visual outcome of papilledema (P value = 0.417).

Conclusion:

Papilledema regressed in most CVT patients while small number of them developed optic atrophy confirming the importance of regular ophthalmological follow up of CVT patients at frequent intervals using OCT in addition to other papilledema assessment tools in order to prevent irreversible blindness. Affection of certain cerebral venous sinus can predict development of papilledema in CVT patients, but not the outcome.

Key words: Papilledema, Cerebral Venous Thrombosis, Optical Coherence Tomography Sudanese Patients.

1. Introduction:

Cerebral venous thrombosis CVT is an uncommon condition with variable clinical presentation, it was recognized for more than 100 years ago in postmortem autopsies (1). CVT is remarkable cause of stroke with estimated (3-4) cases per million annual incidence. It causes of stroke in young and middle-aged adults with increased incidence in female gender (2, 3).

CVT commonly present with headache (95%), seizures (47%), unilateral or bilateral paresis (43%) and papilledema (41%)(4), with variable prognosis range from complete recovery to death(2) (5).The most common affected sinuses are superior sagittal sinus and lateral sinuses, nevertheless affection of more than one sinus is common (6), Neuroimaging including MRI and MRV are the best modality to diagnosis CVT (7,8).

While papilledema account to be the most common ocular finding in CVT (9), therefor our study aim to detect association of papilledema to affection of certain dural venous sinuses. Prognosis of papilledema varies and depend on the grade and the initial visual impairment (10), high grade papilledema due to CVT usually associated with permanent visual impairment and if resolution occur; some visual defects might remain (11), therefore Optical Coherence Tomography is beneficial for detection and prognosis of papilledema with correlated clinical findings (12) .

2. MATERIALS AND METHODS

The study was descriptive-analytic hospital based study. It was conducted from December 2021 to July 2022 at the neurology unit in wad medani teaching hospital, Gezira state, Sudan. Ethical approval was obtained from Sudan medical specialization board ethical committee and written consent was obtained from patients who participated in the study.

A total of 20 patients were enrolled in the study. The inclusion criteria were, age above 18 years old, patients confirmed to have CVT by clinical and MRV imaging. Patients documented to have optic neuropathy previously and patients refused to participate in the study were excluded.

Data was collected from the patients using data collection sheets. It includes some demographic data (age, gender), MRI-MRV imaging reports to identify which part of cerebral venous system was affected. OCT done at presentation and after 2 months .In order to determine the outcome of

papilledema, two months OCT assessment was graded into papilledema regressed and optic atrophy.

Data was analyzed by computer using descriptive statistics mean and SD for age, frequency table's and charts using (SPSS) software version 25.Chi-square statistical test was used to assess correlation between cerebral venous sinus affected and development ,outcome of papilledema . P value of less than 0.05 was considered to be significant.

3. Results:

All patients were in the age group (20 - 65) years with the mean age of 35.75 +/-13.4 years .Of them 17(85%) patients were females and 3(15%) patients were males with obvious female predominance 5.7:1.

MRI /MRV images showed that the sinus affected was the superior sagittal sinus in 14 (70%) patients, the transverse sinus in 5(25%) patients and the deep venous system in 1 (5%) patient.

OCT done for patients at first assessment during their admission period revealed papilledema in 14 (70%) of patients.

OCT done after two months revealed that regression of papilledema noted in16(80%) patients while 2(10%)patients developed optic atrophy and 2(10%)patients died before the second assessment .

Regarding CVT patients who developed optic atrophy, the first was young female a case of Behget disease who suffered from headache and blurring of vision for two months before diagnosis as SSS thrombosis and referral to neurology department. The second was an elderly male a case of chronic CVT duo to Anti thrombin III deficiency and who complained of reduced vision. Both had chronic papilledema prescribed anticoagulation therapy, but unfortunately established optic atrophy.

Regarding patients who died before the next assessment, one of them was middle age female patient a case of advanced breast cancer with extensive metastases who died after one week from admission to hospital and the other was young female with a history of self-administration of steroids and complete occlusion of the SSS not responded to initial management and unfortunately interventional techniques was un affordable for them

From Table 1 it is evident that there is clear correlation between cerebral venous sinus affected and development of papilledema in CVT patients, P value was 0.009.

Table 2 showed that there is no significant correlation between the cerebral sinus affected and the 2 months outcome of papilledema in CVT patients and P value was 0.417.

Table 3.1: Correlation between cerebral venous sinus affected and 1st OCT assessment:

		1st Assessment		Total
		Papilledema present	No Papilledema	
Sinus affected	SSS	11	3	14
	Transverse	3	2	5
	Deep venous system	0	1	1
Total		14	6	20
P value		0.009		Significant

Table 3.2 : Correlation between cerebral venous sinus affected and 2nd OCT assessment:

		2nd Assessment			Total
		Papilledema regressed	Optic atrophy	Other (pt died)	
Sinus affected	SSS	11	2	1	14
	Transverse	4	0	1	5
	Deep venous system	1	0	0	1
Total		16	2	2	20
P value		0.417		Not significant	

4. Discussion:

In this study OCT was used as diagnostic tool to assess papilledema in CVT patients admitted to the neurology unit at Wad medani teaching hospital from December 2021 to July 2022.

The female predominance in the study group can be interpreted by the high susceptibility of women to CVT as it is related to pregnancy, puerperium and use of OCP.

It revealed that the frequency of papilledema among CVT patients is 70% ; in contrast of a multicenter retrospective study done in USA ,in which papilledema present in 54% of patients at initial presentation(11). In the former study more CVT patients developed papilledema as the most affected sinus was the SSS, the chief venous sinus draining the brain and the transverse sinus is difficult to diagnose. Another prospective study done in the national center of neurology in Khartoum, Sudan showed that papilledema present in 13 out of 15 patients studied (86.6%) which is slightly near to what is shown in this study (13) .The similarity may be referred to the number of patients included and the timescale of the two studies.

This study showed that the SSS affected in 70% of patients ,the transverse in 20% of patients and the deep venous system in 5% of patients ;this in contrary to a retrospective study conducted at Sultan Qaboos university hospital ,Oman which showed that the SSS affected in 44% of patients ,transverse sinus in 52%,internal jugular vein and straight sinus in 8% and cortical vein thrombosis seen in 20% of patients(14).

A cross-sectional study done at a tertiary care Centre in Tamil Nadu, south India in adult CVT patients from august 2018 to august 2019. It revealed that Superior sagittal sinus (75%) was the most common site for venous thrombosis followed by transverse sinus (40 %)(15).

In most of patients (78.6%) who developed papilledema the SSS was affected. In an Iranian study both the SSS and the transverse sinuses thrombosis was noted in 66.7% of CVT patients who developed papilledema ;that means SSS sinus affection in CVT patients who developed papilledema is lower than in this study(16) .

When OCT is used to assess the two months outcome of papilledema in CVT patients it revealed that ; in 80% of patients papilledema regressed ,10% developed optic atrophy and10% of patients died before the second OCT assessment .

A prospective study conducted in the national center of neurology, Khartoum, Sudan on 15 patients, Papilledema found in 13 and after 12 weeks 7(46,7%) of them recover completely while 4(26,7%) develop optic atrophy and 2(13.3%) died of pulmonary embolism(13) .

The difference between the two studies can be related to the tools of papilledema assessment; OCT in the former and indirect ophthalmoscopy in the later, as OCT can detect minor changes in cup volume and RNFL thickness accurately in comparison to other conventional methods .Also the follow up period differ between the two studies.

Chi-square test was used to test correlation between part of the cerebral venous system affected and the development of papilledema in CVT patients; P value is 0.009 and it is significant result meaning that correlation present.

A descriptive –analytic study performed on CVT patients at al-Zahra medical center in Isfahan ,Iran show that the most common sinus involved in papilledema patients were sagittal and lateral sinuses 66.7% , however in patients without papilledema the most common is the lateral sinus 40% . The fisher exact test shows that the difference in the frequency of the involved sinus based on papilledema and lack of it in CVT patients is significant (0.002); which is similar to the results of this study (16).

Also Chi-square test was used to correlate between the part of the cerebral venous system affected and the two months outcome of papilledema in CVT patients; P value is 0.417 and it is insignificant result rejecting the presence of correlation between them.

The formerly mentioned study which was done in Tamil Nadu, south India clinical, etiological and radiological data were collected from patients assessed and factors influencing the short-term outcome at discharge and at 15 days after discharge were studied. It correlates the collected data to the short term outcome of CVT using MRS score; not the visual outcome of papilledema (15).

Several studies on factors affecting the outcome of CVT patients are present; however no study link the affected cerebral venous sinus to the visual outcome of papilledema was found.

5. Conclusion:

Papilledema regressed in most CVT patients while small number of them developed optic atrophy confirming the importance of regular ophthalmological follow up of CVT patients at frequent intervals using OCT in addition to other papilledema assessment tools in order to prevent irreversible blindness. Affection of certain cerebral venous sinus can predict development of papilledema in CVT patients, but not the outcome.

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