



CEREBRO-VENOUS ACCIDENTS IN PREGNANCY-ANALYSIS OF RISK FACTORS, ETIOPATHOGENESIS AND OUTCOME IN A SOUTH INDIAN POPULATION

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ABSTRACT **Objectives:** This study aims to assess the incidence of CVT at CMCH for a duration of 1 year. To study risk factors predisposing to CVT in pregnancy and puerperium and to assess their statistical significance. To find a correlation between Serum Homocysteine levels and risk factors affecting CVT in pregnancy and to study the outcome of CVT in pregnancy. **Methodology:** This prospective study was undertaken at Government Medical college hospital Coimbatore. 30 consecutive patients admitted with CVT diagnosed on neuroimaging were evaluated. Data were collected after obtaining prior written consent by the interview method. Data was collected using a structured questionnaire. Venous samples withdrawn from pregnant and those in the puerperal period diagnosed by neuroimaging with CVT and Serum Homocysteine levels were measured. **Result:** In this study, among 8982 obstetric admissions over a period of 1 year, 30 cases were found to be diagnosed with CVT, with a prevalence of 0.3%. In the majority of the cases 26 out of 30 cases (86.7%) were presented during puerperium. Anaemia, lack of aseptic precautions during delivery and prolonged dehydration after delivery are the major causative factors. The majority of the patients belonged to low socio-economic group with 18 out of 30 patients (60%) of them belonging to class V status. We also found that patients hailing from higher altitude areas are at a higher risk of developing CVT compared to the general population. Hyperhomocysteinemia was found in the majority of the patients studied and was found to have a significant correlation with multi-parity. **Conclusion:** So in this present study, the analysis of risk factors, etiopathogenesis and outcome of cerebro venous accidents in pregnancy, Primary cerebral venous thrombosis (CVT) is a major cause of stroke in young women, with factors including anaemia, lack of aseptic precautions, prolonged dehydration and hyperhomocysteinemia.

KEYWORDS : Cerebral venous thrombosis, Cerebro venous accidents, Pregnancy, Stroke, Hyperhomocysteinemia

INTRODUCTION:

Cerebral venous thrombosis (CVT) is an uncommon cause of stroke with extremely varied clinical presentations, predisposing factors, imaging findings, and outcomes. It is a neurological emergency and is a major cause of disability and mortality for women. [1]

An ischemic stroke occurs when blood flow to the brain is impaired causing tissue hypoxia and cell death. Some common causes of ischemic stroke include atherosclerotic disease, embolisms, thrombi and hypotension. Whereas, hemorrhagic stroke is caused when a blood vessel ruptures and tissue is damaged by the resulting spread of blood into the brain parenchyma. Contributing factors to hemorrhagic stroke include hypertension, aneurysms, and arteriovenous malformations with leads to an increasing intracranial pressure due to edema and hemorrhage also contributing to tissue damage. Puerperal CVT is 10-12 times more common in India compared to West and accounts for 10-12% cases of stroke in young with CT / MRI evidence of haemorrhagic or ischemic infarcts in brain.[2] With the advent of newer and more sophisticated diagnostic modalities with an increase in awareness of this entity, the incidence of this disease has increased but with an improvement in prognosis with reduced morbidity and mortality.

Timely and accurate diagnosis of CVT is crucial because prompt and appropriate therapy can reverse or halt the disease process and significantly reduce the risk of neurological deficits and long-term sequelae.[3]

Although the overall number of strokes in women of reproductive age group is low, women in the antenatal period and during puerperium are at an increased risk.[4]

Pregnancy causes several prothrombotic changes in the coagulation system that persists at least during early puerperium.[5] Hypercoagulability worsens after delivery secondary to volume depletion, trauma and immobilisation post labour. The maximum incidence is during the third trimester and the first 4 postpartum weeks. [6]

MATERIAL METHODS

Ethics

The Institutional ethics committee clearance was obtained

(ECR/892/INST/TN/2016, No:0532/2021) and informed consent was taken from each participant before the interview.

Study Design

Prospective study at Coimbatore Medical College Hospital

Study Setting

Coimbatore Medical College Hospital

Study Population

This prospective study was under taken at Government Medical college hospital coimbatore. During this period our hospital has recorded 13,164 obstetric admissions. 30 consecutive patients admitted with CVT diagnosed on neuroimaging were evaluated.

Inclusion Criteria: Following criteria were utilized in selecting patients for this study. Antenatal or postnatal patients admitted with complaints of

- I. Headache
- II. Impaired conscious
- III. Seizures
- IV. Focal neurological defects

Belonging to :

- Age group – 15-45 years
- Antenatal / <6 weeks postpartum
- All cases of CVT confirmed by Neuro-imaging

Exclusion Criteria :

- Non-pregnant/ >6 weeks postpartum
- K/c/o neuropsychiatric illness
- H/o intake of oral contraceptive drugs / hormone replacement therapy
- H/o Smoking habit
- K/c/o cardiovascular disease
- K/c/o epileptic disorder/ head injury / CNS infection

Study Tool:

- Data was collected after obtaining prior written consent by the interview method.

- Data was collected using a structured questionnaire .
- Data was entered and analyzed using SPSS version 2-0 software
- Venous sample withdrawn from pregnant and those in the puerperal period (< 6 weeks post partum) diagnosed by neuro-imagine with CVT and Serum Homocysteine levels measured.

Data Collection and Analysis

History : A detailed history regarding age, parity, time of occurrence, mode of delivery, various symptoms were taken from close relations and also from the patients if she was conscious or taken retrospectively from her. Any past history of hypertension, DVT, PIH, thrombophilias, APLAS were elicited.

Clinical Examination: A thorough general examination and central nervous system examination was done. Blood and urine were sent for all investigations related to cerebral venous thrombosis like renal function test, haematological examinations and APLA. Fundus examination and MRI with MRA/MRV were done for all patients. The diagnosis was made by correlation of clinical features, the time of occurrence of illness and MRI with MRA / MRV scan findings. Neurophysician opinion was obtained for all patients and were treated with anticonvulsants, antiedema measures and anticoagulants and patients were followed up till their discharge.

Data Analysis

- Descriptive statistical analysis was carried out in the present study.
- Chi square test was used as a statistical test of significance and ODDs ratio with 95% confidence interval will be calculated.
- p-value <0.05 is considered as statistically significant.
- Pearson correlation was done to assess the relationship between CVT and Serum Homocysteine levels.

RESULTS:

In our study conducted at Coimbatore Medical College Hospital , among 8982 obstetric admissions over a period of 1 year , 30 cases were found to diagnosed with CVT, with a prevalence of 0.3% .

Among 30 cases , 11 patients (36%) belonged to the urban population whereas 19 patients (63.3%) hailed from rural areas where people lived under unhygienic conditions and were predisposed to infections, poor nutrition and compromised living conditions. As 70% of Indian population still live in village and this could be a reason for rural predominance. The occurrence in the rural population was almost twice of that in the urban population.

Anaemia, malnutrition and predominantly Protein deficiency are widely prevalent in the low socio economic group and these are important predisposing factors for thrombo embolic phenomenon during pregnancy. Majority of the patients belonged to low socio-economic group with 18 out of 30 patients (60%) of them belonging to class V status.

The incidence varied from 18-35 years. The maximum age incidence, 18 out of 30 patients (60%) was in the III decade and correlates with the largest number of deliveries in this period. The least age at which CVT occurred was 18 years and no case was seen above the age of 40 years in this study.

The analysis showed that 14 patients (46.7%) had a BMI within the normal range, whereas 6 patients (20%) were found to be underweight with 7 patients (23.3%) overweight and 3 patients (3%) were found to be obese.

The disease occurred in 18 multiparous women out of 30 patients (60%). This observation is in correlation with the previous studies that multigravidas are at higher risk of CVT in pregnancy compared to primigravidas. Majority of the cases, 25 out of 30 patients (83.3%) were booked , but majority of them were not under regular follow up which implies that mothers with improper antenatal care are more affected.

The maximum incidence, 20 out of 30 cases (66.7%) were seen in the first two weeks of puerperium. 4 cases (1.3%) developed CVT in the antenatal period but majority of the cases 26 out of 30 cases (86.7%) were associated with puerperium. The maximum coagulability of blood is seen during this period, and also Indian village women are not inclined to maintain good hydration during this period.

The Mode of delivery No.of cases Percentage Following Abortion 1 2

Labour natural 30 62.5 Instrumental delivery 5 10.5 LSCS 12 25 The maximum number of cases, 30 out of 48 (62.5%) occurred following full term normal delivery. The reason may be that these patients lack the close observation and care given to those after surgical intervention.

In Table 1, majority of the patients 13 (43.3%) presented with focal/generalised seizures whereas 6% presented with paresis.

Table 1: Presenting Complaint distribution of the study participants

	Frequency	Percentage (%)
Fever/Headache	1	3.3
Focal or Generalised Seizures	13	43.3
Focal/Generalised Seizures/Fever	1	3.3
Headache	7	23.3
Headache/Vomiting	1	3.3
Headache/Vomiting/Blurring of Vision	1	3.3
Paresis	6	20.0
Total	30	100.0

In Table 2, majority of cases in our study, 14 patients (46.7) presented with superior sagittal sinus thrombosis whereas 7 patients (23.3%) where diagnosed with lateral sinus thrombosis.

Table 2: Frequency of venous site distribution of the study participants

	Frequency	Percentage (%)
Deep cerebral vein	2	6.7
Great vein of Galen	1	3.3
Lateral sinus thrombosis	7	23.3
Sigmoid sinus thrombosis	2	6.7
Straight sinus thrombosis	3	10.0
Superior sagittal sinus thrombosis	14	46.7
Transverse sinus thrombosis	1	3.3
Total	30	100.0

In MRI findings combined sinus thrombosis, 19 out of 30 cases (63.3%) was more common than single sinus involvement was observed.

According to their place of residence, out of the 30 patients studied, more than 50% patients were found to be residing at higher altitudes. Increased incidence of CVT has been associated with high elevation, and strenuous activity at peak summits. Most of the reports reported an increased incidence of CVT in men at high altitude. This is in stark contrast to the known increased risk of CVT in women at lower elevations.

The Prognosis of the disease, 25 out of the 30 patients (83.3%) recovered without any neurological disability. 3 out of 30 patients (10%) were discharged with minimal residual paresis out of which 2 were cases diagnosed with ante natal CVT. 2 patients studied (6.7%) expired, out of which one patient developed haemorrhagic transformation of infarct with a midline shift and underwent decompressive craniectomy.

In Table 3, we can see Hyper homocystenemia was found in majority of the patients studied and was found to have a significant correlation with multi- parity.

Table 3: Association of Parity with Homocysteine distribution of the study participants

	Normal	Hyper homocystenemia	P Value
Multigravida	0 (0.0%)	19 (100.0%)	0.001*
Primigravida	5 (45.5%)	6 (54.5%)	

DISCUSSION

During the 1 year of observation, there were 8982 obstetric admissions and 42 of these were admitted with CVT out of which 30 patients has fit our inclusion criteria were studied. 21 patients had delivered, 4 were in the antenatal period and 3 post abortion. 16 out of the 21 patients were delivered by LSCS whereas 7 patients had full term normal delivery. This is in correlation with Srinivasan et al and Maru A et al series. [7] [8]

In cerebral venous thrombosis, symptoms are caused by obstruction of the cortical veins or the superior longitudinal sinus. Impairment of

CSF absorption causing raised intracranial tension or obstruction of the draining veins results in regional cerebral infarction with focal signs or seizures. Disorders of consciousness alone might be due to deep cerebral vein thrombosis. Extensive peripheral venous thrombosis, prolonged unconsciousness or status epilepticus are bad prognostic signs.

Mode Of Presentation

Level of consciousness: Altered sensorium was seen in 5 patients while 25 patients were fully conscious at the time of admission and remained so throughout the illness.

Headache: 10 out of 30 patients had headache at the time of admission.

Seizures: 14 patients (46.6%) had convulsions, being generalized in 10 patients and focal in 4.

Paralysis: 6 patients (20%) presented with paralysis 3 had hemiplegia right or left, 3 patients had hemiparesis. 1 patient had history of fever followed by paralysis.

Blood pressure: 14 out of 30 patients were found to be hypertensive with 3 patients diagnosed with severe pre eclampsia.

Fundus examination: The fundus was normal in 15 patients but 5 patients were found to have papilloedema. All the above mentioned clinical profile correlated with the following studies: Srinivasan et al., Preter et al., Agostoni et al., Wasay et al., Maru A et al. [7][8][9][10]

High altitude: In our study it was found that patients residing at higher altitudes are more at risk for developing cvt, especially with patients with a history of routine strenuous activity.

Investigations: Anaemia with haemoglobin less than 8gm% which is a predisposing factor for CVT was present in 13 patients. Correlates with Stolz E, Valdueza JM, Grebe M et al series. [11]

All 30 68 patients had thrombotic features on MRI and MRA/MRV scan. Out of which 5 had parenchymal brain lesion. Correlates with Idbaih A studies, Cakmak S et al., SD Treadwell . [2][12][13]

Serum homocysteine: Hyper homocystenemia was found in majority of the patients studied and was found to have a significant correlation with multi- parity. This may also correlate with inadequate nourishment and uncorrected Vit B12 deficiency warrants more research.

Treatment: 30 patients with CVT were treated with heparin and none of the cases had worsening of symptoms and had satisfactory recovery. Use of heparin reduces the mortality. This correlates with Ganesh Dungal studies, Srinivasan et al series, Bousser and Ferro et al. [1][4][8] Corticosteroids in the form of Dexamethasone were used in patients who were severely ill on admission. These patients were either unconscious at admission or became unconscious, soon after. These patients fared better on the whole. Recovery of consciousness was quicker and recovery from paralysis was also sooner. This correlates with Canhao P et al. [3]

Prevention: Over the years the incidence of CVT and mortality due to CVT has not declined much. Lack of antenatal and perinatal care is an important contributing factor for maternal death. Prevention could be done by

- Better maternal health education
- Improvement of social status of women
- Early identification and reference of high risk pregnant women to tertiary care centre.
- Comprehensive antenatal and perinatal care.
- Increased emphasis on adequate hydration and nourishment especially during the puerperal period.

CONCLUSION

Primary cerebral venous thrombosis occurs in pregnancy and puerperium in young women and is a major cause of stroke in young females. Apart from hypercoagulable state, anaemia, lack of aseptic precautions during delivery and prolonged dehydration after delivery are the major causative factors. In our study, we also found that patients hailing from higher altitude areas are at a higher risk of developing CVT compared to the general population. Hyperhomocysteinemia

appears to be more common among pregnant women with CVT suggesting that endothelial cell damage in these patients may be mediated by hyperhomocysteinemia. It is concluded that in our study homocysteine levels are significantly high in multi-gravidas presenting with CVT. Early diagnosis and prompt initiation of treatment in CVT in pregnancy is associated with good recovery and minimal morbidity.

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