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ORIGINAL RESEARCH

Four vessels cerebral angiography in idiopathic intracranial hypertension

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ABSTRACT

Introduction: Idiopathic intracranial hypertension (IIH) is a syndrome characterized by elevated intracranial pressure that usually occurs in obese women in the childbearing years. The annual incidence of IIH is 0.9/100,000 persons and 3.5/100,000 in females 15 to 44 years of age. **Aim of the study**: To evaluate the prevalence of the venous sinus disease in the etiology of Idiopathic Intracranial Hypertension (IIH) using digital subtraction cerebral angiography (DSA) in venous phase. **Material and Methods:** Total 18 patients admitted with symptoms and signs of Idiopathic intracranial hypertension (IIH) in department of neurosurgery and neurology CNMC&H during the study period will be included in present study during January 2017 to December 2018. Complete general and neurological assessment, Lumbar puncture (LP), Full ophthalmologic assessment and CT scan brain ±MRI brain without contrast or Digital subtraction angiography (DSA) (venous phase) was done. **Results:** The mean age group of 30.4(+ 6.24) years. Idiopathic intracranial hypertension is mostly found in female i.e.88.9%. IIH Patients with higher grade of papilledema having higher CSF opening pressure. Dural venous sinus stenosis or hypoplasia in cerebral angiogram (DSA) is present in 12(66.7%) IIH patients. Sensitivity of MR Venography in this study is 91.7% and specificity is 50%. By applying chi-square test, the differences were significant at p value of <.045. **Conclusion:** Idiopathic intracranial hypertension (IIH) is a well-known but under- investigated clinical entity with an unsolved pathophysiologic background. However, MR venogram is good screening tool to exclude the possibility of cerebral venous sinus involvement.

Keywords: Digital subtraction angiography (DSA), Idiopathic intracranial hypertension (IIH), MR venogram.

INTRODUCTION

Idiopathic intracranial hypertension (IIH) is a well-known but under- investigated clinical entity with an unsolved pathophysiologic background; hence its diagnosis and optimal management usually creates problems for clinicians.

The terms ‘‘pseudotumor cerebri’’ and ‘‘benign intracranial hypertension’’ were originally applied to patients with increased intracranial pressure (ICP) in whom no tumor was found and whose course was believed to be benign.[1]

Idiopathic intracranial hypertension (IIH) is a syndrome characterized by elevated intracranial pressure that usually occurs in obese women in the childbearing years. The signs and symptoms of intracranial hypertension are that the patient maintains an alert and oriented mental state has no localizing neurologic findings. There is no evidence of deformity or obstruction of the ventricular system and neurodiagnostic studies are otherwise normal except for increased cerebrospinal fluid pressure (greater than 200 mm of water, in the non- obese and probably greater than 250 mm of water in the obese patient).[2]

The annual incidence of IIH is 0.9/100,000 persons and 3.5/100,000 in females 15 to 44 years of age[1]. It is increasing in incidence in parallel with the current epidemic of obesity. In obese women aged 20 to 44 years who were 20% or more over ideal weight, the incidence of IIH is 19 per 100,000. More than 90% of IIH patients are obese and over 90% are women of childbearing age. The mean age at the time of diagnosis is about 30 years[3].

The diagnostic characteristics of this syndrome were first defined by Dandy in 1937 and were later formulated as “Modified Dandy Criteria” by Dr. J. Lawton Smith in 1985[4-6].

Neuroimaging is usually contributing a key role in the diagnosis of cerebral venous flow obstruction. Though angiography is still considered to be the gold standard. 47 Magnetic resonance (MR) imaging, un- enhanced computed tomography (CT), unenhanced time-of-flight MR venography, and contrast material-

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enhanced MR venography and CT venography are particularly useful techniques for detecting cerebral venous pathology.

Venous phase of conventional catheterized Digital subtraction angiography (DSA) is considered as gold standard investigation for analyzing intracranial venous anatomy and a definite diagnostic tool for intracranial venous pathologies. Although being a gold standard technique DSA is still an invasive procedure with associated risks such as cerebral infarction, vascular wall injury and hematoma at puncture site. Radiation exposure, allergic or nephrotoxic effects of iodinated contrast medium, limitation of 2-Dimensional (2D) planar imaging are additional disadvantages[7-9].

Therefore, the present study was done to evaluate the prevalence of the venous sinus disease in the etiology of Idiopathic Intracranial Hypertension (IIH) using digital subtraction cerebral angiography (DSA) in venous phase.

MATERIAL AND METHODS

The present study was conducted in Department of neurosurgery and neurology, Calcutta National Medical College and Hospital (CNMC &H). Complete enumeration methods will be used and hence all patients admitted with symptoms and signs of Idiopathic intracranial hypertension (IIH) in department of neurosurgery and neurology CNMC&H during the study period will be included in present study during January 2017 to December 2018.

The approval to conduct the study was obtained from Institutional Research Ethics Committee, before the study commenced. An informed written consent was obtained from each participant before enrolment and operation. The purpose and nature of the study was fully explained to the participants in a language they could fully understand.

Inclusion criteria include Modified Dandy's criteria. Exclusion Criteria was Patients with true localizing findings on examination denoting focal brain dysfunction. Patients with traumatic, neoplastic, infectious, structural or iatrogenic causes of intracranial hypertension Patients with clinical and neuroimaging evidence of acute primary dural sinus thrombosis or cortical vein thrombosis.

Modified Dandy's criteria include: Symptoms and signs of increased intracranial pressure, No Localizing sign in neurological examination (Except sixth cranial nerve lesion or rarely other false localizing signs), Normal neuroimaging (CT brain, MRI brain), Increased intracranial pressure as measured by lumbar puncture (250 mmH2O), Normal CSF constituents, Awake alert patient, No other Causes of increased intracranial pressure present, Benign clinical course apart from visual deterioration.

STUDY TECHNIQUE

All patients included in this work were subjected to the following:

1. Complete general and neurological assessment.
2. Lumbar puncture (LP).
3. Full ophthalmologic assessment included:

a. Visual acuity measurement: using Snellen chart.
b. Direct and indirect ophthalmoscopic fundus examination:

4. Radiological investigations:
5. CT scan brain ±MRI brain without contrast.

Digital subtraction angiography (DSA) (venous phase).

DATA ANALYSIS

Data will be analyzed by simple proportions and presented in tables and graphs. Appropriate statistical tests will be done to find out any significant association.

RESULTS

Present study shows the age of patients ranged from 18 to 42years, with a mean age group of 30.4(+ 6.24) years. Maximum numbers of cases were seen in the age group of 20-30 years (50%). Idiopathic intracranial hypertension is most commonly present in child bearing age group in female i.e. 20-40 year. Idiopathic intracranial hypertension is mostly found in female i.e.88.9%. Female to Male ratio in my study is 8:1.

Table 1: Grade of papilledema with CSF Opening pressure in IIH Patients

Frisen Grade Papilledema	CSF OPENING PRESSURE			Total (%)
	25-30(%)	31-35(%)	>35(%)	
Grade 1	01(5.5)	0	0	01(5.5)
Grade 2	03(16.7)	05(27.8)	0	08(44.4)
Grade 3	0	01(5.5)	06(33.3)	07(38.9)
Grade 4	0	0	02(11.1)	02(11.1)
Grade 5	0	0	0	0
Total	04(22.2)	06(33.3)	08(44.4)	18(100)

Table 1 showed that IIH Patients with higher grade of papilledema having higher CSF opening pressure.

Table 2: Venous sinus stenosis in MR Venoghraphy

MRV	Male (%)	Female (%)	Total (%)
Positive	02(11.1)	12(66.7)	14(77.8)
Negative	00	04(22.2)	04(22.2)

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Total	02(22.2)	16(88.9)	18(100)

Table 2 showed MR Venography was done in all cases. MR Venography showed narrowing of dural sinus in 14(77.8%) patients and normal in 4(22.2%) patients.

Table 3: Venous sinus stenosis or hypoplasia in Cerebral Angiography (DSA)

Venoussinus stenosisor hypoplasia in DSA	Male (%)	Female (%)	Total (%)
Positive	02(11.1)	10(55.6)	12(66.7)
Negative	00	06(33.3)	06(33.3)
Total	02(11.1)	16(88.9)	18(100)

Table 3 shows that dural venous sinus stenosis or hypoplasia in cerebral angiogram (DSA) is present in 12(66.7%) IIH patients. 5 patients do not reveal any dural venous sinus narrowing in DSA. One of MRV Negative patient shows Left Transverse sinus thrombosis in DSA.

Table 4: MR Venography versus cerebral angiography (DSA) finding in IIH patients

Venoussinus stenosis/hypoplasia	DSA Positive (%)	DSA Negative (%)	Total (%)
MRV Positive	11(61.1)	03(16.7)	14(77.8)
MRV Negative	01(5.5)	03(16.7)	04(22.2)
Total	12(66.7)	06(33.3)	18(100)

Chi square value ($\chi 2$) = 4.0179 P < .045, Descriptive

Table 4: reveals that narrowing of dural venous sinus i.e stenosis or hypoplasia is present in 14(77.8%) patients in MR Venography and in 12(66.7%) patients in cerebral angiography (DSA). Out of 14 MRV positive patients Cerebral Angiography does not reveal any narrowing of dural venous sinus in 03(16.7%) cases. Sensitivity of MR Venography in this study is 91.7% and specificity is 50%. By applying chi-square test, the differences were significant at p value of <.045.

DISCUSSION

Idiopathic intracranial hypertension (IIH) is a neurological disorder presenting with symptoms of increased intracranial pressure (headache, visual disturbances, papilledema) without localizing neurological findings in an alert patient.

The mechanism of increased intracranial pressure in these disorders is still unclear. One of the most commonly accepted proposed mechanism leading to IIH is intracranial venous hypertension secondary to stenosis/ hypoplasis of one or both transverse sinuses.

Karahalios et al suggested that increased intracranial venous pressure may be a universal mechanism in Idiopathic intracranial hypertension of different etiologies but it seems that it is secondary to venous sinus stenosis[10].

The present study was conducted to evaluate the prevalence of the venous sinus disease in the etiology of Idiopathic intracranial hypertension using cerebral angiography (Digital subtraction angiography) in venous phase.

Present study shows the age of patients ranged from 18 to 42years, with a mean age group of 30.4(+ 6.24) years. Maximum numbers of cases were seen in the age group of 20-30 years (50%). Idiopathic intracranial hypertension is most commonly present in child bearing age group in female i.e. 20-40 year. The mean age of disease's onset is reported to be 28 to 35 years. IIH may also appear in younger patients, however it is rare in prepubertal age [11-13].

Present study shows that Idiopathic intracranial hypertension is mostly found in female i.e.88.9%. Female to Male ratio in this study is 8:1. There is a clear predilection for women over men ranging from 3:1 to 15:1 in the literature[14-15].

This study shows that IIH Patients with higher grade of papilledema having higher CSF opening pressure. Reports of case series have described that higher CSF opening pressure is associated with worse grade of papilledema and optical imaging measurement of optic nerve head swelling[16-17].

In this study MR Venography was done in all cases. MR Venography showed narrowing of dural sinus in 14(77.8%) patients and normal in 4(22.2%) patients.

MR Venography is a good screening tool for diagnosis of cerebral venous sinus pathology.

Improvements in brain venography (MRV) imaging reveal that most patients with IIH have anatomical abnormalities of the cerebral venous sinus system.106 These include stenosis of the dominant or both transverse sinuses. There are two recognized morphological types of venous stenosis, and a combination of both can occur in one patient. An extrinsic stenosis is described as a smooth gradually narrowing tapered stenosis. In the intrinsic type, discrete obstructions within the sinus are seen, and these are thought to be due to arachnoid granulations or fibrous septae[18].

CONCLUSION

Idiopathic intracranial hypertension (IIH) is a well-known but under- investigated clinical entity with an unsolved pathophysiologic background; hence its diagnosis and optimal management usually creates problems for clinicians. However, MR venogram is good screening tool to exclude the possibility of cerebral venous sinus involvement. The pathology can be more adequately identified and assessed with Four vessel DSA (venous phase) hence considered as gold standard diagnostic tool. It helps in understanding the

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pathophysiology of the disease, expecting response to medical and surgical treatment. DSA showed thrombosis in transverse sinus in one patient which was not seen on MRV. In view of better ability to detect IIH, DSA appears to be beneficial.

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