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OUTCOME STUDY OF FETAL VENTRICULOMEGALY DIAGNOSED PRENATALLY ON USG

Radio-Diagnosis

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ABSTRACT

Introduction: Fetal ventriculomegaly is an excess of fluid in the lateral ventricles within the developing cerebrum which is usually diagnosed on a routine fetal anomaly scan at 18–22 weeks gestation. It is classified as mild (10-12 mm), moderate (13-15 mm) or severe (≥16 mm) based on ventricular diameter which is measured on antenatal sonography or in utero MRI. Present study was performed to analyse fetal ventriculomegaly (FVM) risk factors, associated abnormalities detected at any stage of pregnancy and postnatal outcome **Materials and Methods:** 60 pregnant women between age group 18 to 40 years who were advised USG from antenatal clinic for pregnancy related issues and got diagnosed with fetal ventriculomegaly (FVM) were enrolled. Total subjects were categorized into three groups based on lateral ventricular diameters (mm) as Group I with mild FVM (lateral ventricular diameters between 10 to < 12 mm), group II with moderate FVM (lateral ventricular diameters between 12 to 15 mm) and group III with severe FVM (lateral ventricular diameters > 15 mm). Data regarding patient demographics, obstetric and family history, consanguinity, ultrasound findings were obtained in duration from January 2022 to June 2022. **Observations and Results:** Results obtained consist of all women between gestational age 22 to 26 weeks and majority were primigravida i.e. 34 (57 %). History of consanguinity was found in only 1 case. Intracranial abnormality was found in 13 (22 %) cases whereas extracranial abnormality found in only 5 (8 %) cases. Neural tube defect, Agenesis of corpus callosum, Posterior fossa anomalies and Subdural hemorrhage constituted intracranial abnormality. Polyhydramnios and absent nasal bone constituted extratracranial abnormality. 7 (11 %) cases out of total 60 lost to follow up. Amongst remaining 53 (89 %) abnormal outcome was found in 13 cases (22 %) out of which 10 (17 %) undergone termination. Result is statistically significant (P=0.037) **Conclusion:** Neuroimaging, including fetal ultrasonography helps to diagnose fetal ventriculomegaly and when it is diagnosed, chromosomal microarray analysis is recommended because it can reveal submicroscopic chromosomal abnormalities that are undetectable in conventional karyotyping. The outcome of fetal ventriculomegaly depends mainly on the severity of both ventriculomegaly and associated abnormality that may be present

KEYWORDS

Fetal ventriculomegaly (FVM)

Introduction

Fetal ventriculomegaly is an excess of fluid in the lateral ventricles within the developing cerebrum which is usually diagnosed on a routine fetal anomaly scan at 18–22 weeks gestation1. It occurs in about two per 1000 live births2,3. It is considered one of the most common fetal anomalies detected on ultrasonography during the second trimester4. It is classified as mild (10-12 mm), moderate (13-15 mm) or severe (≥16 mm) based on ventricular diameter which is measured on antenatal sonography or in utero MRI5. Fetal ventriculomegaly has multiple causes which produces broad spectrum of neurodevelopmental outcomes4. Detailed ultrasonography is needed after its diagnosis to rule out other fetal structural anomalies. Many cases have obstructive causes which are associated with hydrocephalus. Mild ventriculomegaly is often found incidentally which is considered benign, but it can be associated with genetic or structural abnormalities1. Isolated ventriculomegaly is a ventriculomegaly that is not associated with structural or genetic abnormalities identified on ultrasonography6. Postnatal management of fetal ventriculomegaly (FVM) depends mainly on the rate of progression of ventriculomegaly and the development of hydrocephalus4. Neurodevelopmental outcomes and prognosis of fetal ventriculomegaly (FVM) are influenced mainly by the severity of both ventriculomegaly and underlying structural or genetic abnormalities7. In the setting of isolated ventriculomegaly of 10 to 12 mm, the likelihood of survival with normal neurodevelopment is >90 % whereas with moderate ventriculomegaly (13 to 15 mm) it is 75 to 93 %8. With this perspective present study was performed to analyse fetal ventriculomegaly (FVM) risk factors, associated abnormalities detected at any stage of pregnancy and postnatal outcome

Material and Methods

Present study is a cross sectional prospective study conducted from duration January 2022 to June 2022. Institutional ethics committee permission was taken prior to commencement of present study. 60 pregnant women fulfilling inclusion and exclusion criteria were enrolled. Study was explained to all participants and written informed consent was obtained from all.

Inclusion Criteria

60 pregnant women between age group 18 to 40 years who were advised USG from antenatal clinic for pregnancy related issues and got diagnosed with fetal ventriculomegaly (FVM)

Exclusion Criteria

1. Cases presenting with a history of hydrocephalus or FVM in a previous pregnancy or in a child
2. Cases unwilling to give consent

Total subjects were categorized into three groups based on lateral ventricular diameters (mm) as

1. Group I (Mild FVM): lateral ventricular diameters between 10 to < 12 mm
2. Group II (Moderate FVM): lateral ventricular diameters between 12 to 15 mm
3. Group III (Severe FVM): lateral ventricular diameters > 15 mm

Data regarding patient demographics, obstetric and family history, consanguinity, ultrasound findings were obtained.

USG procedure

Sonography was performed with ATL 5000 (Philips Healthcare, Andover, MA). Amongst sonograms performed 24 (40 %) included transvaginal scans and rest abdominal. transvaginal scans performed when fetus was in cephalic position. In 36 cases transvaginal scans was not performed due to breech or transverse presentation of the fetus, Twin, patient declining transvaginal exam and TV study at an outside hospital within the past 10 days. Scans were assessed for CNS diagnosis, ventricular size and visualization of the following structures: interhemispheric and Sylvian fissures, calcarine, parieto-occipital, cingulate, central, superior temporal, precentral, postcentral, inferior temporal, inferior frontal, insular, parietal, secondary temporal, secondary frontal, secondary parietal, superior occipital, inferior occipital, and tertiary frontal sulci.

Follow up

Postnatal outcome information was obtained by telephonic interviews with the parents using a questionnaire. No formal developmental assessment was done, and information regarding development was gathered based on history of developmental milestones

Statistical analysis

Statistical analysis was performed using SPSS software, version 20. Data are expressed as mean ± SD and frequency with percentages N (%). $\chi 2$-test was used to evaluate qualitative data and to study association between two variables. Statistical significance was assumed if P value less than 0.05.

Observation and Result

Table 1: Distribution of maternal history

Sr No.	Characteristic	Group I (N=32)	Group II (N=21)	Group III (N=7)	Total (N=60)
1	Age (Mean ± SD)	24.09 ± 1.42	26.09 ± 1.44	28.14 ± 1.57	60 (100 %)
2	Gestational Age (Mean ± SD)	23.15 ± 1.01	23.85 ± 1.10	25.28 ± 0.95	60 (100 %)
3	Gravida N (%) 1. Primigravida 2. Multigravida	18 (36 %) 14 (28 %)	12 (24 %) 9 (18 %)	4 (8 %) 3 (6 %)	34 (57 %) 26 (43
4	Consanguinity N (%) 1. Present 2. Absent	0 (0 %) 32 (64 %)	0 (0 %) 21 (42 %)	1 (2 %) 6 (12 %)	1 (2 %) 59 (90 %)

In Table 1 variables like maternal age, gestational age, gravida status and consanguious marriage history are evaluated amongst mild, moderate and severe cases of FVM. All women were between gestational age 22 to 26 weeks and majority were primigravida i.e. 34 (57 %). History of consanguinity was found in only 1 case.

Table 2: Distribution of associated abnormality

Sr No.	Characteristic	Group I (N=32)	Group II (N=21)	Group III (N=7)	Total (N=60)
1	Intracranial N (%) 1. Neural tube defect 2. Agenesis of corpus callosum 3. Posterior fossa anomalies 4. Subdural haemorrhage	 1 (2 %) 1 (2 %) 1 (2 %) 0 (0 %)	 2 (4 %) 2 (4 %) 2 (4 %) 1 (2 %)	 1 (2 %) 1 (2 %) 1 (2 %) 0 (0 %)	 4 (7 %) 4 (7 %) 4 (7 %) 1 (2 %)
2	Extracranial N (%) 1.Polyhydramnios 2.Absent nasal bone 3.diaphragmatic hernia 4.renal anomalies 5. hydrops	 0 (0 %) 0 (0 %) 0 (0 %) 0 (0 %) 0 (0 %)	 1 (2 %) 1 (2 %) 0 (0 %) 0 (0 %) 0 (0 %)	 2 (4 %) 1 (2 %) 0 (0 %) 0 (0 %) 0 (0 %)	 3 (4 %) 2 (3 %) 0 (0 %) 0 (0 %) 0 (0 %)
3	Absent	29 (58 %)	12 (24 %)	1 (2 %)	2 (70 %)

Table 2 shows distribution of associated abnormality alongside FVM. Intracranial abnormality was found in 13 (22 %) cases whereas extracranial abnormality found in only 5 (8 %) cases. Neural tube defect, Agenesis of corpus callosum, Posterior fossa anomalies and Subdural hemorrhage constituted intracranial abnormality. Polyhydramnios and absent nasal bone constituted extratracranial abnormality

Graph 1: Distribution of associated abnormality

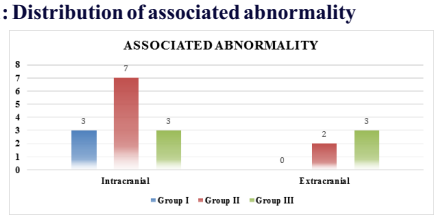
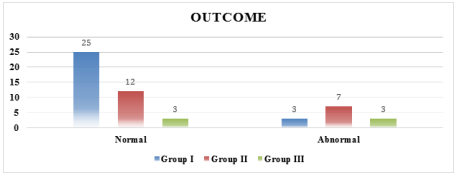


Table 3: Distribution of Outcome

Sr No.	Characteristic	Group I (N=32)	Group II (N=21)	Group III (N=7)	Total (N=60)	P Value

In Table 3 outcome of FVM postnatally is discussed. 7 (11 %) cases out of total 60 lost to follow up. Amongst remaining 53 (89 %) abnormal outcome was found in 13 cases (22 %) out of which 10 (17 %) undergone termination. Result is statistically significant (P=0.037).

Graph 2: Distribution of Outcome



Discussion

Present cross-sectional prospective study was conducted in 60 pregnant women between age group 18 to 40 years diagnosed with fetal ventriculomegaly (FVM). Total subjects were categorized into three groups based on lateral ventricular diameters (mm) as Group I with mild FVM (lateral ventricular diameters between 10 to < 12 mm), group II with moderate FVM (lateral ventricular diameters between 12 to 15 mm) and group III with severe FVM (lateral ventricular diameters > 15 mm). Results obtained consist of all women between gestational age 22 to 26 weeks and majority were primigravida i.e. 34 (57 %). History of consanguinity was found in only 1 case (Table 1). Intracranial abnormality was found in 13 (22 %) cases whereas extracranial abnormality found in only 5 (8 %) cases. Neural tube defect, Agenesis of corpus callosum, Posterior fossa anomalies and Subdural hemorrhage constituted intracranial abnormality. Polyhydramnios and absent nasal bone constituted extratracranial abnormality (Table 2). 7 (11 %) cases out of total 60 lost to follow up. Amongst remaining 53 (89 %) abnormal outcome was found in 13 cases (22 %) out of which 10 (17 %) undergone termination. Result is statistically significant (P=0.037) (Table 3). In similar study by Alluhaybi A A et al (2022)[9] they stated that fetal ventriculomegaly refers to ventricular enlargement that is diagnosed prenatally. One of the most frequent foetal malformations is it. In cases where the ventricle's artery diameter is greater than 10 mm, an ultrasonography was used to make the diagnosis. After diagnosis, it needs to be thoroughly evaluated with comprehensive ultrasound, foetal MRI, and genetic tests. Fetal ventriculomegaly can currently only be surgically treated during pregnancy, and this has significant risks. Treatment for postnatal hydrocephalus is identical to that for other kinds of hydrocephalus. A wide range of neurodevelopmental outcomes can result from foetal ventriculomegaly, which is a heterogeneous disorder with multiple etiologies. The severity of the ventriculomegaly and any related structural abnormalities largely determines the results. This article examined the research on numerous prenatal ventriculomegaly topics. M Wyldes et al (2004)[10] stated that children who had mild isolated fetal ventriculomegaly should be followed until the paediatrician or psychologist is confident that they are functioning within the normal range. Those who don't need to be directed to the right organisations and caregivers. The Bayley scales of infant development11 (mental and motor at 2-30 months), the Griffiths scales of mental development12 (locomotor, personal social, hearing and speech, eye/hand coordination, and performance at 0-8 years, and practical reasoning above 2 years of age) or the schedule of growing skills13 should be used for testing (passive postural, active postural, locomotor, manipulative, visual, hearing and language, interactive social, and self care at 0–5 years). Nathan S et al (2018)[14] stated that when enlargement of the lateral ventricles is identified, a thorough evaluation should be performed, including detailed sonographic evaluation of fetal anatomy, amniocentesis for karyotype and chromosomal microarray analysis, and a workup for fetal infection. When this technology and professional interpretation are available, foetal magnetic resonance imaging should be taken into consideration because it may occasionally reveal further central nervous system problems. A further ultrasound should be done to monitor the course of the ventricular dilatation. K. melchiorre et al (2009)[15] stated that an atrial width of less than 10.0 mm is normal, whereas a measurement of 10.0–15.0 mm constitutes mild VM, which is isolated if there are no associated ultrasound abnormalities. An experienced ultrasound examination should be used to carefully evaluate the foetal anatomy because this finding is usually linked to neural and extraneural abnormalities.

Conclusion

Fetal ventriculomegaly have multiple causes from which

developmental outcomes vary. Neuroimaging, including fetal ultrasonography helps to diagnose fetal ventriculomegaly and when it is diagnosed, chromosomal microarray analysis is recommended because it can reveal submicroscopic chromosomal abnormalities that are undetectable in conventional karyotyping. Prenatal management of fetal ventriculomegaly is still limited whereas postnatal management includes the use of different types of CSF reservoir devices, shunts, and endoscopic fenestration. The outcome of fetal ventriculomegaly depends mainly on the severity of both ventriculomegaly and associated abnormality that may be present.

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