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ORIGINAL ARTICLE

Frequency of positive antenatal scans in neonates with congenital diaphragmatic hernia admitted in NICU of tertiary care hospital.

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ABSTRACT… Objective: To determine the frequency of positive prenatal scans in newborns with CDH admitted to a tertiary care hospital, we designed the current study. **Study Design:** Cross-sectional study. **Setting:** Neonatal Care Intensive Unit of NICH. **Period:** March to October 2024. **Methods:** Neonates admitted with confirmed diagnosis of CDH were included in this study. Neonates born with multiple gestation (like twin or triplet) were excluded from this study. Gestational age at diagnosis, baby age and gender, birth weight and laterality of CDH were noted and documented in a pre-designed proforma. **Results:** Total 40 patients were included into the study. Mean gestational age was 37.5±2.8 weeks. Majority patients were males (56%). Mean birth weight was 25.3 ± 1.6 grams. Out of 40 patients, 22.5% patients were prenatally identified to have CDH. None of the patients' features were significantly different among those who were prenatally and post-natally diagnosed for CDH. **Conclusion:** The present study found that prenatal diagnosis rate of CDH in our settings is low. We should focus on advanced techniques and improving our skills for increasing prenatal diagnosis rate which will be help for parental counselling and planning the management for safe neonatal outcomes.

Key words: Antenatal Care, Congenital Diaphragmatic Hernia, Liver Herniation, Pregnancy, Stomach Herniation.

INTRODUCTION

A disorder known as congenital diaphragmatic hernia (CDH) is brought on by a flaw in the diaphragm's development. It arises from the pleuroperitoneal canal's failure to close at approximately the tenth week of pregnancy. This flaw makes it possible for the contents of the abdomen to herniate into the thoracic cavity. It is a typical intrathoracic non-cardiac fetal abnormality. 1 in 4000 live births is the incidence.[1] The most frequent site, termed as the posterior-lateral position or Bochdalek hernia, accounts for 70–75% of cases. Up to 85% of these cases occur on the left side. Just 2% of these hernias are bilateral, and 13% are on the right side.[2] A small masculine preponderance is observed.[3]

It's unclear what caused the illness. It could manifest independently or in conjunction with gastrointestinal, genitourinary, and cardiac abnormalities. Trisomy is also linked to some occurrences. It has been suggested that dietary, environmental, and genetic variables are the etiological contributors.[4]

The opposite side mediastinal shift is caused by the stomach, colon, spleen, and left liver lobe protruding into the chest as a result of the left-sided lesion. This is linked to another comorbid condition in about 40% of patients, and the outcome is really reliant on the comorbid diseases.[5] The presence of concomitant symptoms, lung hypoplasia, and liver position all affect the prognosis.[6] Although a varied link to neonatal outcomes has been reported, right-sided CDH is less common than left-sided CDH (15 vs. 85%). Additionally, CDH laterality—that is, right vs. left sided—may impact prognosis.[7,8]

The prognosis is related to a number of risk factors

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that can be evaluated during pregnancy, such as the presence of chromosomal abnormalities, concurrent anomalies, hydrops fetalis, low fetal lung volume, stomach herniation, liver herniation, and low lung area-to-head circumference ratio (LHR) on prenatal ultrasound.[9-11]

Fetal imaging is a useful tool for diagnosing congenital diaphragmatic hernias and determining their severity. More than 60% of cases of congenital diaphragmatic hernias (CDH) are detected by antenatal ultrasound screening, which also offers the chance for an in-utero referral to a tertiary care facility for perinatal therapy and expert assessment. In the last ten years, there has been a significant improvement in the prenatal assessment of fetuses with CDH. Advanced genetic testing and medical imaging can predict the result prenatally.[12]

To maximize infant care and enhance clinical outcomes, a precise and timely diagnosis of congenital diaphragmatic hernia (CDH) during the perinatal period is crucial. The inconsistency in the available research, however, makes it more difficult to forecast perinatal outcomes, make judgments about the care of the pregnancy, and educate pregnant women about the severity of CDH. Furthermore, there aren't many reports from Pakistan in the literature. In order to determine the frequency of positive prenatal scans in newborns with CDH admitted to a tertiary care hospital, we designed the current study.

METHODS

This descriptive cross-sectional study was performed in neonatal care intensive unit of NICH during March to October 2024. The study was commenced after acquiring formal permission from hospital ethics committee (IERB-51/2022,08.01.2024). Neonates admitted with confirmed diagnosis of CDH were included in this study. Neonates born with multiple gestation (like twin or triplet) were excluded from this study. Patients were enrolled into the study with a written of consent of their parents. Sample size of 39 neonates was calculating using Open-EPi calculator taking 95% confidence interval at 5% margin of error with incidence of 2.6 per 10000 live birth.[13] Non-probability consecutive sampling technique was used to enlist study subjects.

Diagnosis of CDH was established either in prenatal or postnatal period. In prenatal period scans were performed in first and third trimester of pregnancy. In post-natal period, ultrasound were performed when necessary for establishing the diagnosis. All of the ultrasound were performed by sonographers having at least 5 years of relevant experience. LUS was conducted with a Philips CX50 (Philips, Eindhoven, the Netherlands) ultrasound device utilizing a high-frequency (7–15 MHz) linear probe, with infants positioned supinely or laterally to examine the anterior, lateral, and posterior chest walls, and a curvilinear transducer (5–8 MHz) to investigate the diaphragm. Images of both longitudinal and transverse sections were captured and documented. Trans-abdominal scanning of lung bases was performed using trans-hepatic and trans-splenic perspectives. The subcostal perspective was also utilized to examine the diaphragm. Gestational age at diagnosis, baby age and gender, birth weight and laterality of CDH were noted and documented in a pre-designed proforma.

The collected data was entered in SPSS version 27 to perform statistical analysis. Frequencies and percentages were computed for categorical variables. Numerical variables were expressed as mean ± standard deviation. Results were presented in charts or tabular form.

RESULTS

Total 40 patients were included into the study. Mean gestational age was 37.5±2.8 weeks. Majority patients were males (56%). Mean birth weight was 2530 ± 160 grams. Table-I displays features of neonatal admitted to NICU with CDH.

Out of 40 patients, 22.5% patients were prenatally identified to have CDH. Positive scan showed pulmonary hypoplasia (n=5, 12.5%), mediastinal shift (n=2, 5%), intrathoracic herniation of liver (n=1, 2.5%), and absent bowel loops in abdomen (n=1, 2.5%).

Table-II displays comparison of patients' features

who were pre and postnatal diagnosed for CDH. None of the patients' features were significantly different among those who were prenatally and post-natally diagnosed for CDH.

Variables	Frequency	Percentage
Age groups		
0-5 days	15	37.5
6-10 days	22	55
>10 days	3	7.5
Gender		
Male	22	56
Female	20	44
Gestational age		
Premature	10	25
Full term	30	75
Birth weight		
Low birth weight	36	60
Normal birth weight	4	40
Laterality		
Right	1	2.5
Left	37	92.5
Both	2	5

Table-I

Variables	Prenatal diagnosis N (%)	Postnatal diagnosis N (%)	P-Value
Age			
0-5 days	8(53.3)	7(46.7)	0.782
6-10 days	1(4.5)	21(95.5)	
>10 days	0(0)	3(100)	
Gender			
Male	7(46.7)	8(53.3)	0.345
Female	2(10)	18(90)	
Gestational age			
Premature	8(53.3)	7(46.7)	0.296
Full term	2(8)	23(92)	
Birth weight			
Low birth weight	6(40)	9(60)	0.417
Normal birth weight	3(12)	22(88)	
Laterality			
Right	1(100)	0(0)	0.524
Left	8(21.6)	29(78.4)	
Both	0(0)	2(100)	

Table-II. Comparison of patients' features who were pre and postnatal diagnosed for CDH

DISCUSSION

Congenital diaphragmatic hernias have an unknown cause. It is believed to be multifactorial, involving elements from nutrition, the environment, and/or heredity.[14] Despite improvements in neonatal care over the past ten years, congenital diaphragmatic hernia (CDH), which develops during pregnancy, causes considerable postnatal mortality and morbidity.[15] But since more patients are surviving past the neonatal stage, it's critical to concentrate on factors that predict morbidity. Diaphragmatic hernia is also linked to other hereditary abnormalities in about 40% of cases.[16] A prenatal CDH diagnosis is necessary in order to have therapeutic choices during the prenatal period. At a tertiary center, prenatal diagnosis enables counseling and birth planning. Personalized predictions should preferably be generated after a diagnosis has been made, based on an evaluation by an expert.

In this investigation, 22.5% of prenatal cases of CHD were detected. According to published research, 60–80% of cases of CDH are detected in utero.[17-21] A study assessing the prenatal diagnostic rate of CDH in 20 European locations showed that the diagnosis rate ranged from 0 to 100%, with an overall aggregated rate of 59%.[22] A more comprehensive Swedish investigation that examined CDH patients between 2007 and 2015 discovered a total of 3746 cases. Sixty-eight percent of these 3746 patients had prenatal diagnoses.[23] According to a Romanian study, 71.4% of instances of isolated congenital diaphragmatic hernia were detected prenatally, and surgery was later required to confirm the condition.[24]

It is crucial to carry a pregnancy to term since unborn children may have difficulties breathing, eating, and regulating their body temperature. Infections, learning disabilities, and stays in the newborn intensive care unit are all among their increased risks. The diaphragm typically begins to form in the fourth week of pregnancy and closes in the twelfth week.[25] Over 50% of CDH patients are detected by prenatal ultrasonography diagnostic at a mean gestational age of 36 weeks.[26] It is advised to deliver CDH babies close to term gestation. The literature currently in publication refutes the idea that CDH development affects gestational age. Although a quarter of the babies in our research were born

prematurely, the average gestational age was 37.5±2.8 weeks. This result is comparable to that of another study, which found that the mean gestational age of newborns with prenatal CDH diagnosis was 37.3±17 weeks.[27]

According to this study, male newborns had a greater CDH burden than female newborns. The results are consistent with a comparable Chinese survey, which found that male babies had a 20% higher probability of developing CDH than female babies.[28] Another similar study from China found that 53.8% of the kids with prenatal diagnoses of CDH were male.[21] A more comprehensive study conducted in the USA between 2004 and 2017 that examined the prenatal imaging characteristics of CDH revealed a gender predominance of males (54%).[29] Another study that looked at the prevalence of male gender among CDH indicated that 57.1% of those with hernias had males, while 60.9% of people with CDH without sac had men.[30]

Generally speaking, the location of the liver is the primary distinction between left and right CDH. Approximately 83% of babies have a left-sided CDH, which leaves open the possibility of the stomach, intestines, and occasionally the liver moving (herniating) up into the baby's chest. Almost always, a right-sided CDH (found in approximately 17% of newborns) permits the liver to migrate into the chest. Most of the cases in our analysis were left-sided hernias, however few were right-sided as well. There were not many examples of bilateral CDH. The literature regularly reports this finding.[27,29,30] It's critical to understand the CDH laterality in order to forecast the results. Studies have revealed elevated cardiac and pulmonary morbidities in patients with R-CDH, indicating that a higher incidence of intrathoracic liver in R-CDH patients may be linked to a higher severity of pulmonary hypertension and pulmonary hypoplasia.[31,32] On the other hand, L-CDH increases the risk of stomach herniation, and some research has shown that infants with L-CDH who have a higher degree of stomach herniation have higher gastrointestinal (GI) morbidities.[29,33]

The present study was performed in a single center institution from Karachi. This study did not record the CDG diagnosis time and other maternal features like gravida, parity, maternal complications and habit of any addiction. The future study may be performed addressing the gap of current study for validating findings of this study.

CONCLUSION

The present study found that prenatal diagnosis rate of CDH in our settings is low. We should focus on advanced techniques and improving our skills for increasing prenatal diagnosis rate which will be help for parental counselling and planning the management for safe neonatal outcomes.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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