

Survival to hospital discharge among neonates with congenital diaphragmatic hernia and congenital heart disease

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OBJECTIVE

- Congenital diaphragmatic hernia (CDH) affects 1 in 2500 live births with hemodynamically significant congenital heart disease (CHD) occurring in about 10% of CDH cases.
- CHD significantly increases neonatal and infant mortality.
- This study reports the neonatal survival rate in CDH cases with isolated, hemodynamically significant CHD and compares outcomes with isolated CDH cases matched by prenatal parameters.

METHODS

- A secondary analysis of 223 CDH cases from the Fetal Center at UTHealth Houston (2015–2024) was conducted.
- Cases with isolated, hemodynamically significant CHD were included (e.g., hypoplastic left heart, tetralogy of Fallot); those with additional structural or genetic abnormalities were excluded.
- CDH + CHD cases were matched to isolated CDH cases by laterality, observed to expected lung-to-head ratio, gestational age, and liver herniation at a 1:2 case to control ratio.
- Statistical comparisons were made using Wilcoxon rank sum, Welch’s t-test, chi-squared, and Fisher’s exact tests

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RESULTS

Table 1. Comparison of maternal and imaging characteristics and obstetric and neonatal outcomes between cases with CDH + CHD and cases with CDH only

	CDH +CHD (n=9)	CDH only (n=18)	p value
MATERNAL CHARACTERISTICS			
Age (years)	29 ± 6.3	30.6 ± 5.9	0.53
BMI (kg/m ²)	32.2 ± 7.6	35.3 ± 7.4	0.33
Race			0.69
White	6 (66.7%)	10 (55.6%)	
Other	3 (33.3%)	8 (44.4%)	
Hispanic Ethnicity	3 (33.3%)	5 (27.8%)	>0.99
Gravida	2 (1,8)	2 (1,5)	0.14
Parity	1 (0,1)	1 (0,3)	< 0.01
IMAGING CHARACTERISTICS			
Laterality			>0.99
Left-sided	7 (77.8%)	14 (77.8%)	
Right-sided	2 (22.2%)	4 (22.2%)	
O:E LHR %	30.2 ± 14.2	31.1 ± 12.5	0.87
GA at MRI (weeks)	25.4 ± 0.6	25.4 ± 2.1	0.93
O:E TFLV Rypens (MRI)	26.6 ± 13.1	32.3 ± 16.4	0.49
O:E TFLV Meyers (MRI)	24.3 ± 11.8	34.4 ± 16.7	0.27
Percent liver herniation (MRI)	28 ± 8.5	26.4 ± 16.2	0.83
Stomach grade (MRI)	3 (0,3)	3 (0,3)	0.87
OBSTETRIC OUTCOMES			
FETO	1 (11.1%)	5 (27.8%)	0.63
PPROM	0	3 (16.7%)	0.53
Preterm delivery	3 (33.3%)	9 (50%)	0.68
Delivery at < 32 weeks	0	1 (5.6%)	>0.99
GA at delivery (weeks)	36.4 ± 2.4	36 ± 2.9	0.69
Vaginal delivery	5 (55.6%)	8 (44.4%)	0.69
NEONATAL OUTCOMES			
Birthweight (g)	2375.6 ± 515.6	2790 ± 636.2	0.10
ECMO	2 (22.2%)	8 (44.4%)	0.41
Duration of ECMO	13 ¹	8 (5,15)	>0.99
ECMO among survivors	0	7 (50%)	0.11
Duration of ECMO	----	11 (5,20)	
Pulmonary hypertension	2 (40% ²)	10 (71.4% ²)	0.30
Survival to hospital discharge	5 (55.6%)	14 (77.8%)	0.37
NICU length of stay (days)	108 (27, 284 ³)	67 (35,244 ³)	0.35

Abbreviations: CDH, congenital diaphragmatic hernia; CHD, congenital heart disease; BMI, body mass index; O:E LHR, observed to expected lung-to-head ratio; GA, gestational age; O:E TFLV, observed to expected total fetal lung volume; FETO, fetoscopic endotracheal occlusion; PPRM, preterm prelabor rupture of membranes; ECMO, extracorporeal membrane oxygenation; NICU, neonatal intensive care unit

¹Missing data for the second patient requiring ECMO in the CDH + CHD group.

²Reported as a proportion of neonates surviving to hospital discharge.

³Reported only for those surviving to NICU discharge.

RESULTS

- Hemodynamically significant CHD was identified in 6.3% (14) of cases, delivery data were missing in 5 cases leaving 9 cases eligible for final analysis.
- The most common CHD diagnosis was hypoplastic left heart syndrome (33.3%).
- There were no differences in need for extracorporeal life support (ECLS) or length of neonatal intensive care unit (NICU) stay among neonatal survivors of CDH + CHD when compared to case-matched CDH only cases.

CONCLUSION

Approximately 6% of CDH cases are complicated by isolated hemodynamically significant CHD. The differences in survival, need for ECLS, and length of NICU stay between CDH + CHD and CDH did not reach statistical significance in our single center analysis. **Modest survival (55.6%) was identified in the CDH+CHD cohort.** Larger, prospective studies are needed to investigate updated neonatal outcomes among neonates with concurrent CHD as neonatal treatment for CDH progresses.