



Formulating an Index Correlating Prenatal Detection of Congenital Diaphragmatic Hernia with Survival: A Three Year Prospective Observational Study



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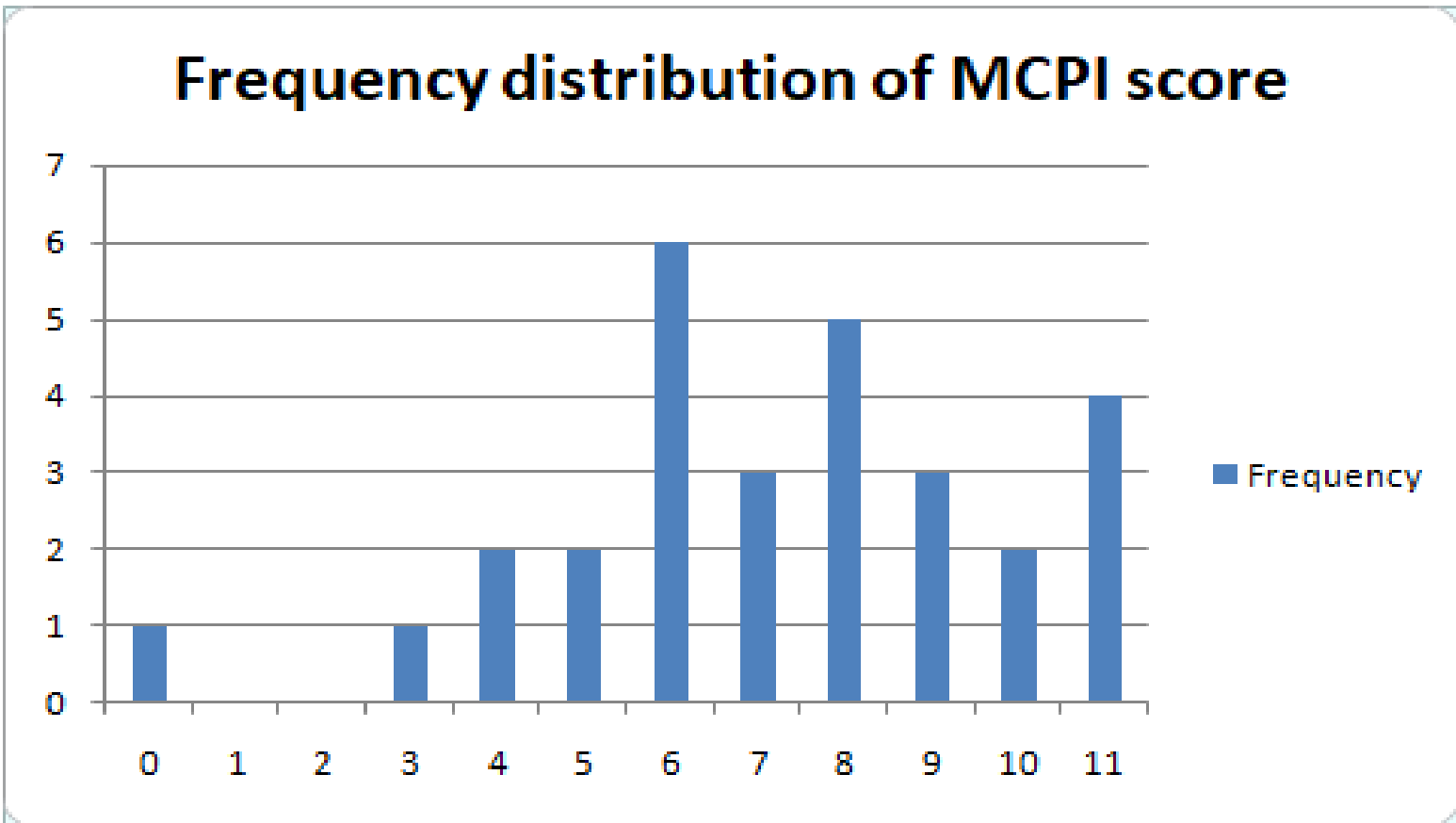
Introduction

- Congenital Diaphragmatic Hernia (CDH) is a major malformation found in 3/10,000 births.¹
- Outcome of the fetus affected by CDH can be optimized if prognosis can be predicted prenatally. Many prenatal prognostic indicators have been defined using 2-D ultrasonography, Fetal ECHO and MRI.
- We have tried to formulate a composite prognostic indicator encompassing different aspects of CDH, measured using ultrasound along with fetal karyotyping, to provide a more inclusive prognostic indicator.

Methods

- Period of study: June 2018 to June 2020
 - Sample size: **29**
 - 2D ultrasonography using Voluson E8 and fetal karyotyping was used to derive Modified Composite Prognostic Index (MCPI)
 - Parameters of MCPI: Karyotype abnormality, Associated malformations, Observed/Expected Lung Head Ratio (O/E LHR), Presence of Congenital heart disease, Tricuspid Valve/Mitral Valve ratio, Modified Mc Goon Index, Thoracic contents, Liver position, Gestation at first diagnosis, Site of herniation.
 - Individual parameters were scored between -1 to +2 to represent worse to good prognosis.
 - Follow-up till 30 days postnatal period.
 - Statistical methods: The correlations between the postnatal survival and the MCPI score, and individual parameters were assessed by Pearson and Spearmen rank correlation coefficients, with 95% confidence intervals.
- Comparison of postnatal parameters and operative status of the baby was assessed by Mann Whitney U test. A p-value less than 0.05 was considered as statistically significant.

Results



Group	Score	Frequency	Percent
I	-5 to 0	1	3.4
II	1 to 6	11	37.9
III	≥ 7	17	58.6
	Total	29	100.0

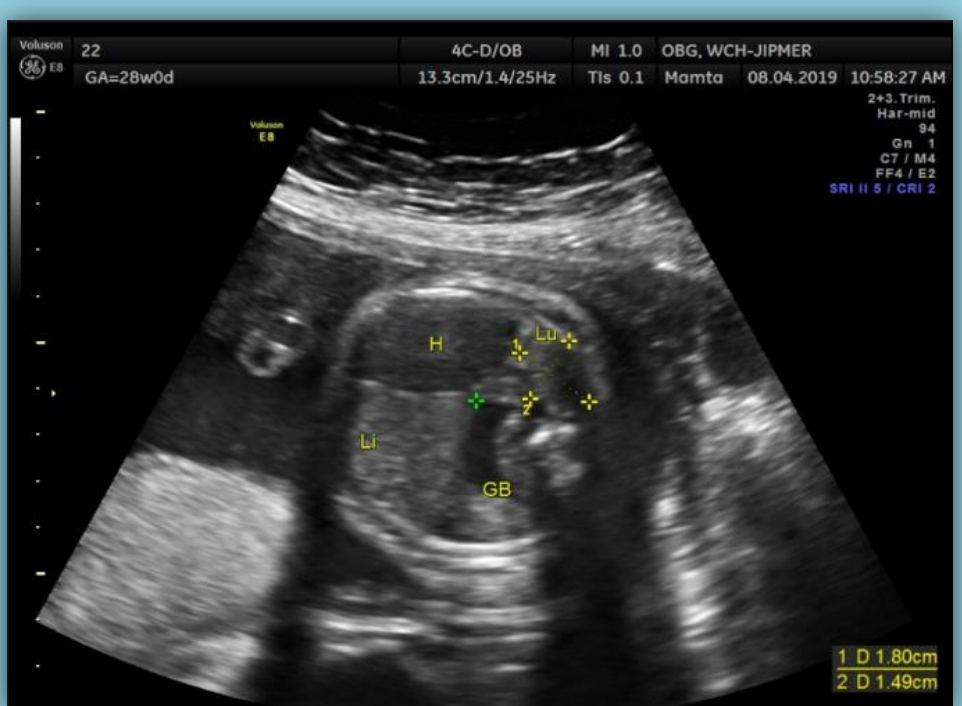
Correlation of MCPI Score with Postnatal Parameters	Score	p-value	Remarks
Days of survival	r = 0.645	0.0001	p-value significant. Strong positive correlation
Operated	r= 0.316	0.095	p-value not significant
APGAR at 1 minute	r = 0.56	0.004	p-value significant. Positive correlation
APGAR at 5 minutes	r = 0.494	0.014	p-value significant. Positive correlation

Individual Parameters of MCPI score with significant correlation with Days of Survival
1.O/E LHR (r = 0.613)
2.Gestational age at first diagnosis (r = 0.609)
3.Associated malformations (r = -0.368)

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3. Jani J, Nicolaides KH, Keller RL, Benachi A, Peralta CFA, Favre R, et al. Observed to expected lung area to head circumference ratio in the prediction of survival in fetuses with isolated diaphragmatic hernia. Ultrasound Obstet Gynecol. 2007;30:67–71.
4. Werner NL, Coughlin M, Kunisaki SM, Hirschl R, Ladino-Torres M, Berman D, et al. Prenatal and postnatal markers of severity in congenital diaphragmatic hernia have similar prognostic ability. PrenatDiagn. 2016;36:107–11.



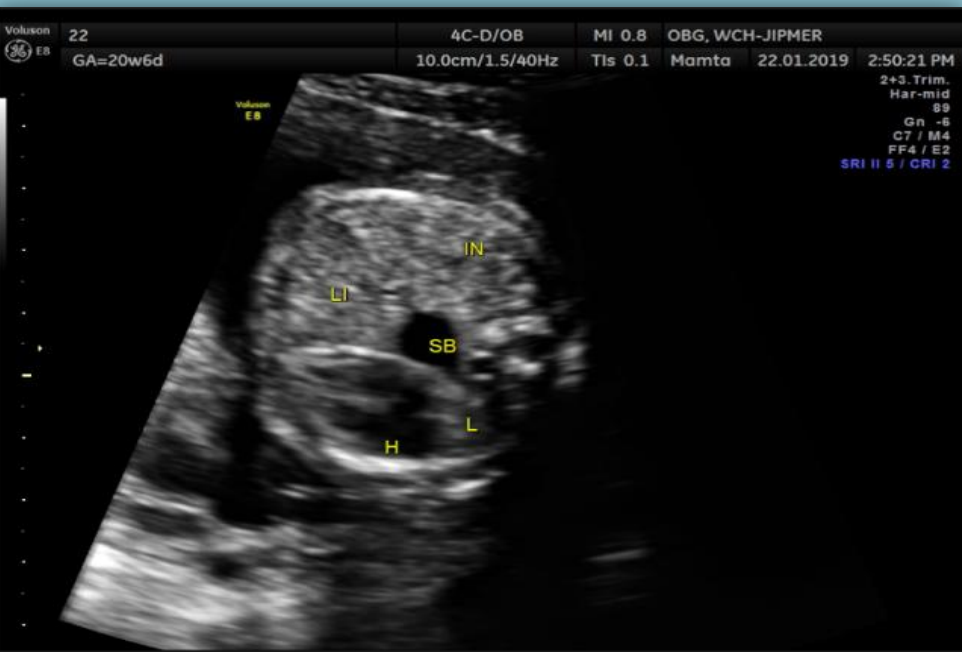
Measuring O/E LHR by trace method



Thoracic Contents



TV/ MV ratio



Modified Mc Goon Index

Discussion and Conclusion

- The prevalence of Congenital Diaphragmatic hernia during the study period was found to be 9.3/10,000 babies delivered in JIPMER.
- The mean period of gestation at first diagnosis was 24+2 weeks. Diagnosis at an earlier gestational age was associated with a worse prognosis. This is in agreement with available literature.²
- The O/E LHR was strongly correlated with the number of days that the baby survived. O/E LHR was measured over a wide range of gestation age, from 19+2 weeks till 35+3 weeks. The good correlation establishes the fact that the ratio is gestation age independent. ³
- The presence of associated malformations showed that the fetus had lesser chance of survival.
- The MCPI score correlated well with survival of the foetus. However, other individual parameters of the score, like Karyotype abnormality, Presence of Congenital heart disease, Tricuspid Valve/Mitral Valve ratio, Modified Mc Goon Index, Thoracic contents, Liver position, Site of herniation, could not be correlated probably due to the small sample size.
- The MCPI score as well as the Apgar scores showed a strong positive correlation with the days of survival. The birth weight of the babies was also positively correlated with the survival. This shows that prenatal and postnatal predictors of survival are comparable.⁴