



Ultrasonographic evaluation of hepatobiliary system among fetuses with major congenital anomalies- a descriptive study (FMF Congress ID: 4355)

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INTRODUCTION

- HBS anomalies are rare and incidence in fetal life is unknown.^{1,2}
- During extended USG following detection of a fetal anomaly, HBS is often not evaluated

OBJECTIVES

- To describe the findings of HBS evaluation during extended USG among fetuses diagnosed with major congenital malformation
- To develop a standard examination protocol for HBS evaluation

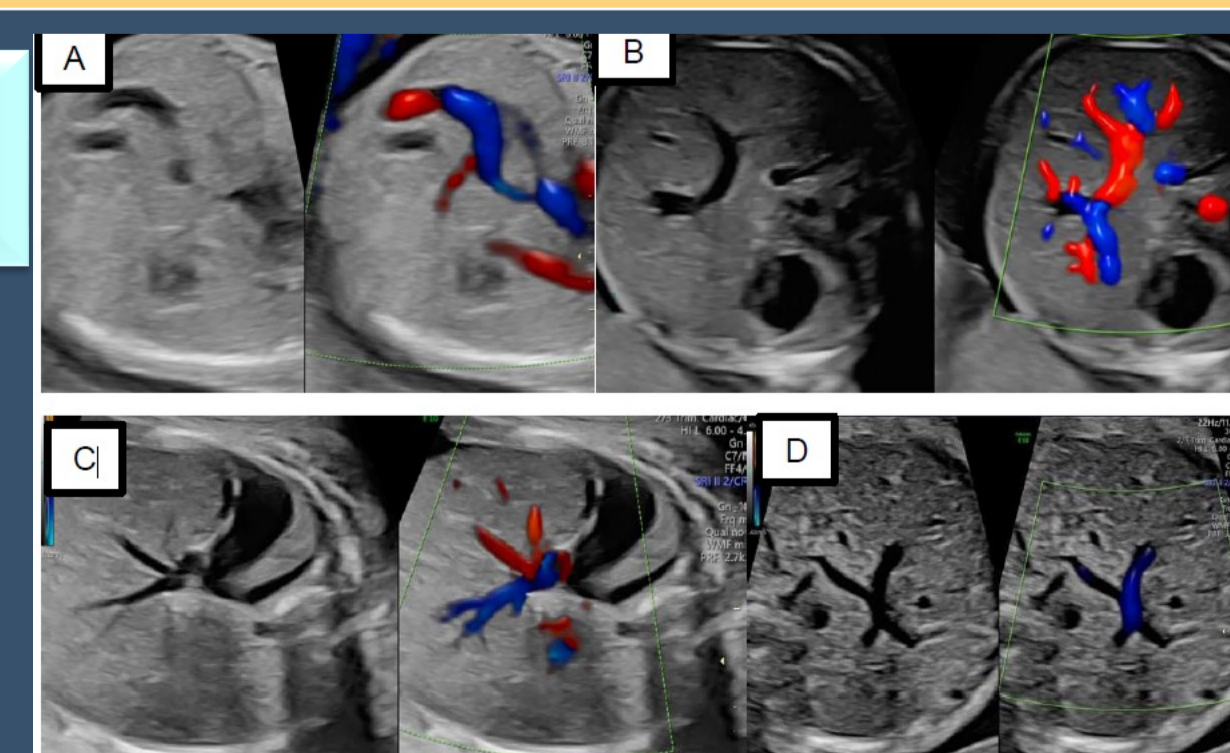
MATERIALS AND METHODS

- Prospective observational study between 2021-22
- Pregnant women with major malformations in fetus diagnosed after 18 weeks of gestation included
- Fetal HBS was evaluated following a pre-designed protocol to note the findings.

Protocol followed for assessing HBS

Liver	<ul style="list-style-type: none"> Situs, Size and Echogenicity of parenchyma Anterior, Transverse and Cranio-caudal diameters of Liver in cm Fetal liver volume (FLV) = $\frac{1}{2}$ AH [A- Area of base, H- Height]
Color doppler	<ul style="list-style-type: none"> Ductus venosus and Inferior Vena Cava Hepatic-Portal vessels Intrahepatic portion of umbilical vessel
Gallbladder	Size, Echogenicity and Contents

Dual mode grey scale and Colour Doppler to trace the Umbilical vein(A), Portal Sinus(B), Hepatic vessel & IVC(C)



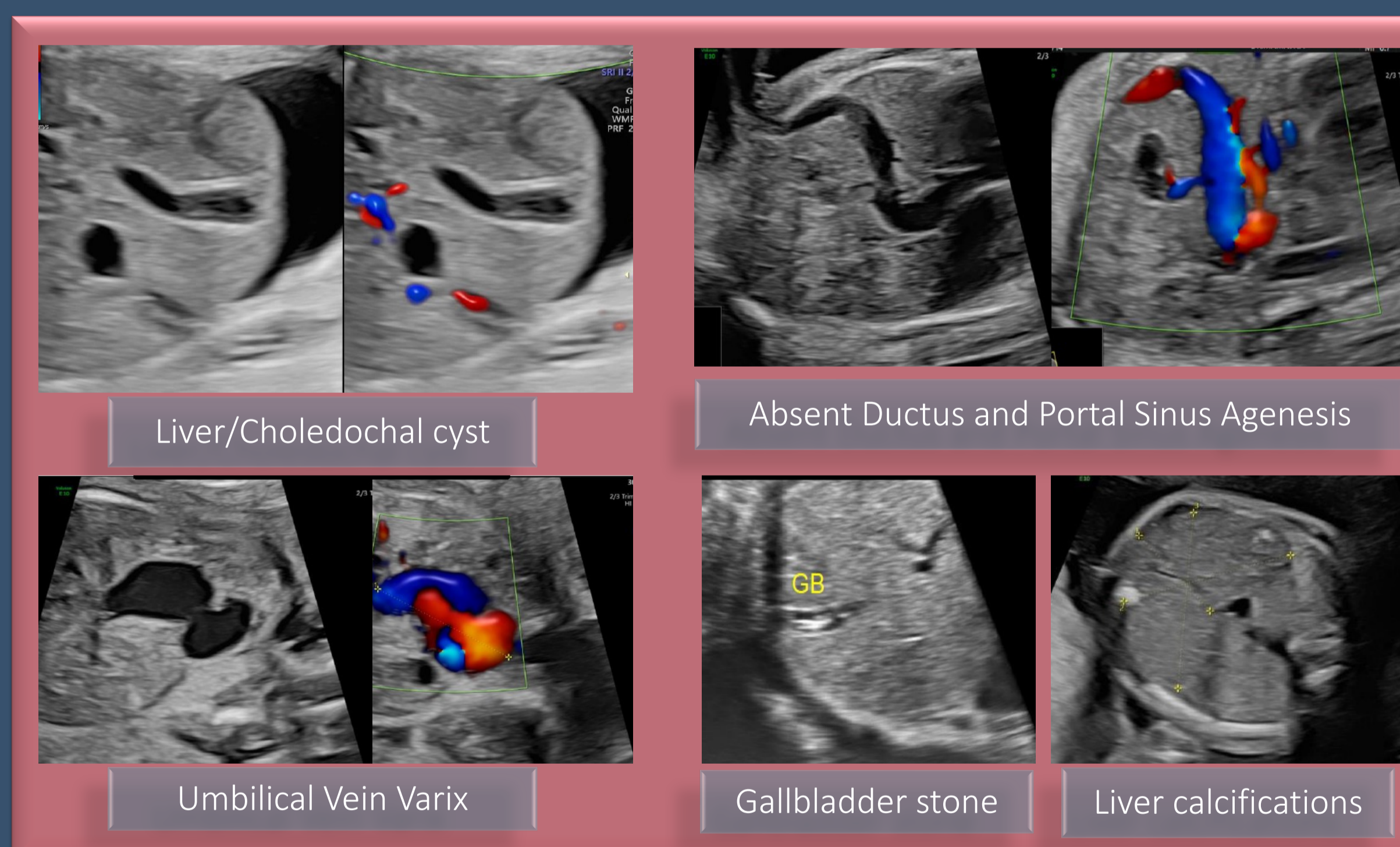
AP, Transverse, Craniocaudal diameters of liver AND Gallbladder measured by 2D Ultrasound

Chi configuration of Main portal vein to Portal Sinus junction(D)

RESULTS

- System-wise Primary anomalies among 75 cases recruited: Renal (19/26%), CVS (17/23%), CNS (11/15%) and GIT (13/18%).
- Abnormal/Variations in the HBS observed among 16/75 (21%) cases.
- The prevalence of major congenital malformation in the hepatobiliary system was 4% in our study population.
- HBS abnormalities were observed as secondary findings in 13 (17%) cases while in 3 cases [Portal system agenesis (1), intrahepatic umbilical vein varix (1) and liver cyst (1)], they were the primary findings.
- The secondary findings in HBS were: gallbladder sludge/stone (4), overdistension (3), bifid/tubular/elongated shape gallbladder (4), agenesis of intrahepatic ductus venosus (1) and intrahepatic calcification (1).
- The study also developed and adopted a systematic protocol for evaluation of HBS using 2D and Colour doppler ultrasound.

Primary anomalies with which HBS abnormalities were associated as secondary finding (N=13)			
	Antenatal findings of HBS	Primary Anomaly	Postnatal findings of HBS
Renal- 5 (38%)	Overdistended gallbladder (2)	HUN (2)	Gallbladder appears distended (2)
	Gallbladder sludge	Gross renal HUN	Sludge not seen
	Intrahepatic agenesis of ductus venosus	Multicystic dysplastic kidney	Intrahepatic Porto-systemic venous shunt
	Elongated/tubular gallbladder	Bilateral renal agenesis	Elongated gallbladder
CVS- 5 (38%)	Bifid gallbladder	VSD	USG not done
	Intrahepatic calcification	VSD	Intrahepatic calcification
	Tubular gallbladder	Common truncus arteriosus with VSD	Tubular gallbladder
	Gallbladder sludge	Hypoplastic left heart syndrome	Sludge not seen
GIT- 1 (8%)	Overdistended gallbladder	Intestinal obstruction	Overdistended gallbladder
	Gallbladder stone 2.1*1cm	Right aortic arch with ARSA	Gallbladder stone 1.8*1.2 cm normal clinical profile
Craniofacial 1(8%)	Gallbladder sludge	B/L cleft lip & palate	Sludge seen
Skeletal 1(8%)	Elongated/ Tubular gallbladder	B/L CTEV	Pear shape gallbladder



DISCUSSION

- Detection of any fetal malformation warrants detailed USG evaluation for associated anomalies.
- There is limited literature on the overall incidence of HBS anomalies especially in fetal life.
- Screening and detailed anomaly scans do not incorporate evaluation of fetal HBS probably due to perceived rarity and lack of standard evaluation guidelines.
- We evaluated the feasibility and yield of incorporating HBS evaluation in fetal malformations.^{3,4}
- Most common system with primary anomaly was renal (25%) followed by cardiovascular (23%).
- Values of liver/gallbladder dimensions and FLV followed normal distribution and compared well with methods used by Vintzeleos et al., Murao et al., and Senoh et al.⁵⁻⁷
- Most cases (89%) had pear shaped gallbladder. Other shapes like Tubular or Bifid were seen rarely.
- Gallbladder was not visualised in 16 cases on initial USG but could be seen on follow up in 6 cases with overall visualisation rate of 87%.
- Overdistension of gallbladder was seen in 3 cases.
- All cases with HBS findings had normal postnatal outcome except for the case with Agenesis of Ductus and Portal Sinus had Intra-Uterine demise
- Intrahepatic calcification, though persisting into postnatal life, had no infectious or karyotyping abnormalities with normal clinical course.
- Shape and size of gallbladder had no significance as evident by normal postnatal outcomes.
- However, as the study was done in a single centre with limited sample size among anomalous fetuses, it may not be representative of prevalence of HBS anomalies in normal fetuses.
- Further studies with larger sample size incorporating evaluation of HBS during anomaly scan is likely to provide more information on the utility, usefulness of the extra effort and time that such evaluation demands are recommended.

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Abbreviations: HBS= Hepato-Biliary System, USG= Ultrasonography, CVS= Cardio-vascular, HUN- Hydro-Uretronephrosis, VSD= Ventricular septal Defect, CTEV= Congenital Talipes Equino Varus, GIT= Gastro-Intestinal Tract,

CONCLUSIONS

- Abnormalities involving HBS are not uncommon among fetuses with malformations in other organ systems, though most of them do not adversely affect the prognosis.
- Variations in HBS anatomy is fairly common, however, their significance is unknown.
- A systematic method to assess fetal HBS can be included as an additional organ system to be evaluated in fetuses diagnosed with major structural malformations.