

Antenatal Sonographic Diagnosis of Fetal Cholelithiasis with Postnatal Follow-Up: A Study of 12 Cases.

*Dr. Ravi Garg¹, Dr. Paul Chethalan², Dr. Anu Aggarwal³

^{1&2}Post Graduates, Department of Radiodiagnosis, Navodaya Medical College Hospital & Research Centre, Raichur, Karnataka.

³ Post Graduate, Department of Obstetrics & Gynaecology, JJM Medical College, Davangere Karnataka.

Corresponding author: Dr. Ravi Garg

Abstract: Fetal gall-stones are extremely rare but benign findings associated with a very favorable prognosis. The presence of gallstones or echogenic material has been described in the literature with controversial clinical significance. It is easily detectable by routine trans-abdominal sonography during the third trimester of pregnancy. Anomalies of the gall bladder, including sludge and gall stones, are extremely uncommon in fetal life, however, they may be associated with other several maternal and fetal conditions. We present a study of 12 fetuses diagnosed with cholelithiasis on antenatal sonography and serial postnatal follow-up sonographic evaluations, with a description of any associated fetal comorbidities.

Keywords: fetus, cholelithiasis, prenatal, antenatal, pregnancy, ultrasound, sonography

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I. Introduction

Sonographically, the fetal gall-stones are defined as mobile echogenic foci in the fetal gall bladder lumen. Although the prenatal diagnosis of fetal gallstones has been described in literature, fetal cholelithiasis is an uncommon finding.^[1] On sonographic evaluation, the fetal gallstones are identified by their typical shape and location of the echogenicity.^[2] The significance and natural history of fetal cholelithiasis is not yet well defined. Fetal gallstones are extremely rare but benign findings which are associated with a favorable prognosis.^[3] Over the last few years, the frequency of diagnosis of fetal cholelithiasis has increased, probably due to the improved accuracy of sonography.^[4] Several maternal and fetal conditions have been proposed to have a causative role, but none of them appears conclusive. Fetal gallstones are a distinct third trimester phenomenon due to abnormal production, composition and mode of transportation of bile in the biliary tract.^[5] We present the study of 12 fetuses in which cholelithiasis was diagnosed on routine antenatal third trimester sonography, which was conducted over a period of 24 months. In every case, serial postnatal follow-ups were performed on the first day of birth, and at the ages of 1 week, 1 month, 3 months and 6 months. A thorough attempt was also made for the identification of any associated comorbidities in each case.

II. Material And Methods

All the pregnant female patients, ranging in ages from 18 to 42 years, who were referred to the Department of Radiodiagnosis for routine third trimester sonography for fetal well-being, were included in the study. This study was performed over a period of 24 months. The patients were evaluated trans-abdominally, with a 3.5 MHz curvilinear transducer. Multiple sections of the fetal gall-bladder were obtained in all patients in both transverse as well as longitudinal planes. The presence of echogenic debris was identified in a total of 12 fetuses. Serial follow-up trans-abdominal scans were then performed in the target fetuses on the first day of birth, and at the ages of 1 week, 1 month, 3 months and 6 months. The findings of antenatal and postnatal scans were noted and the results were tabulated.

III. Results

The presence of echogenic debris was identified in a total of 12 fetuses (Fig. 1-3). The gestational ages of the fetuses as assessed by sonography were between 24 and 36 weeks (Chart 1). Majority of the cases were diagnosed after 30 weeks of gestation (n=8). A high-risk pregnancy as the result of a pre-existing maternal medical condition or one that appeared later during the current pregnancy was excluded in every case. A thorough attempt was made in evaluation of any associated fetal co-morbidities (Chart 2). No evidence of any sonographically obvious anomalies could be identified in 50% of the fetuses with cholelithiasis (n=6). In the remaining 6 fetuses with cholelithiasis, oligohydramnios was seen in 3 cases with amniotic fluid index below 5th percentile for that gestational age. Mild-to-moderate degree of intra-placental hemorrhage was identified

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sonographically in 2 fetuses as a well-defined, predominantly hypoechoic region within the substance of the placenta. Another fetus with cholelithiasis was diagnosed with IUGR, with fetal weight below 10th percentile for that gestational age. However, the sample size of the associated fetal anomalies was inadequate to test for significance.

A basic systemic examination with detailed history-taking of the mothers of affected fetuses was also performed (Chart 3). Majority of the pregnant females under study did not reveal any associated abnormalities (n=9). Maternal obesity was identified in 2 cases with BMI more than 30 in the pre-pregnant state. In 1 patient, pre-existing cholelithiasis was identified in the pregnant female. However, the sample size of the associated maternal abnormalities was also inadequate to test for significance.

Serial follow-up trans-abdominal scans were performed in the affected fetuses on the first day of birth, and at the ages of 1 week, 1 month, 3 months and 6 months. The post-natal abdominal sonogram on 1st day of birth identified the presence of echogenic debris in the gall-bladder of affected patients in all the cases, except for 1 patient (Chart 4). At 4 weeks after birth, the post-natal trans-abdominal sonogram revealed the resolution of cholelithiasis in another 5 cases. By 6 months of age, complete resolution of cholelithiasis was seen on sonography in a total of 11 cases. Only in 1 case, persistence of echogenic material was noted in the gall-bladder even after 6 months of age. Further follow-up of the infants could not be performed beyond 6 months of age.

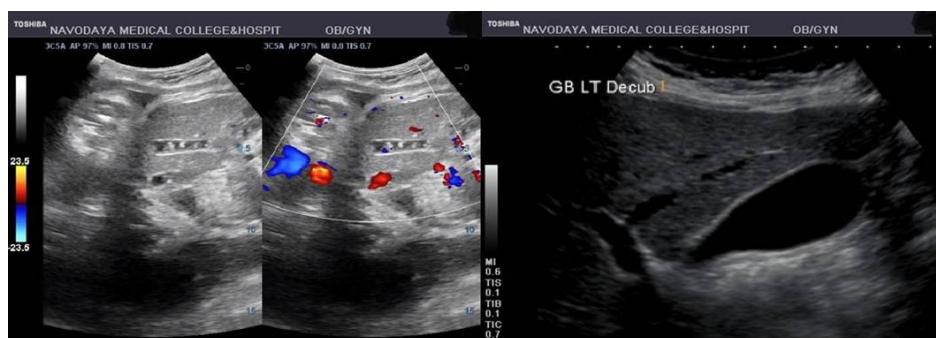


Figure 1: A 30 weeks fetus showing presence of echogenic solid debris within the gall-bladder. A follow-up sonography at 6 months of birth showing complete resolution.

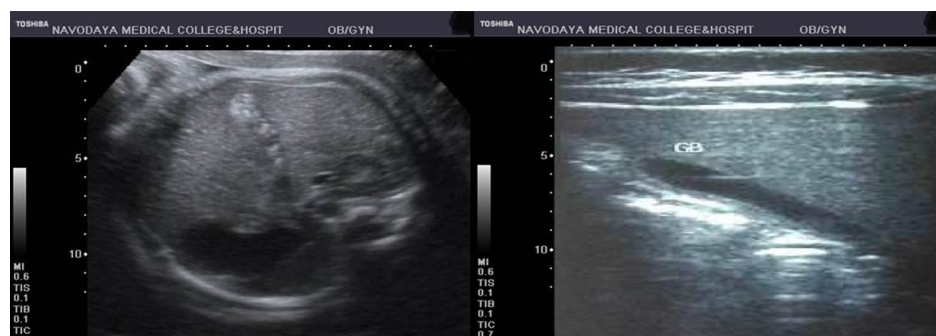
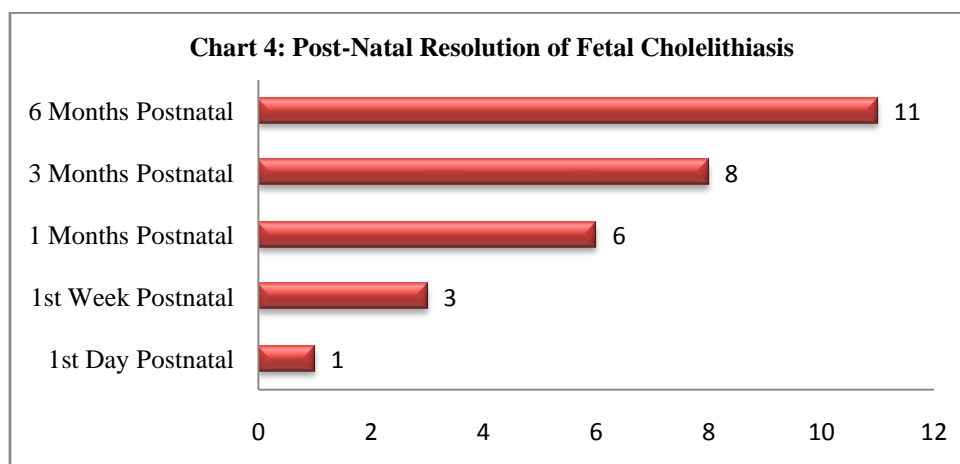
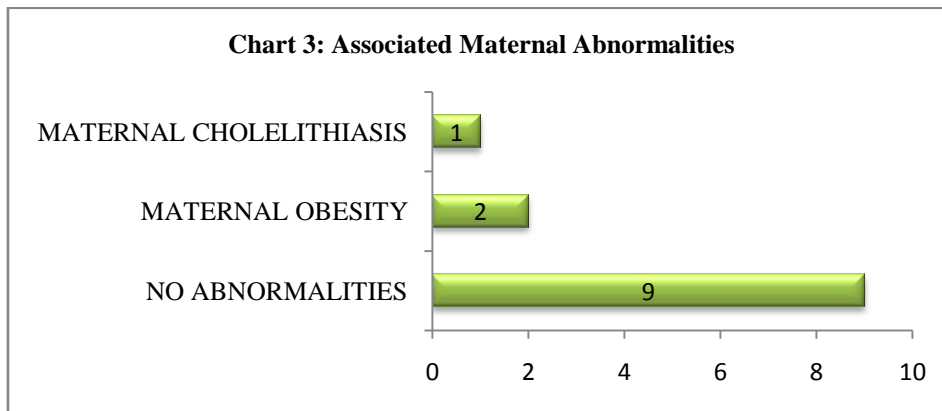
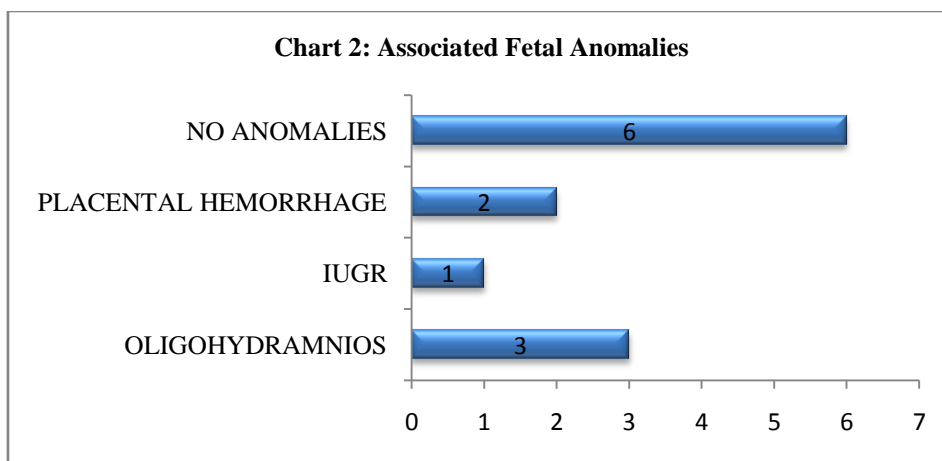
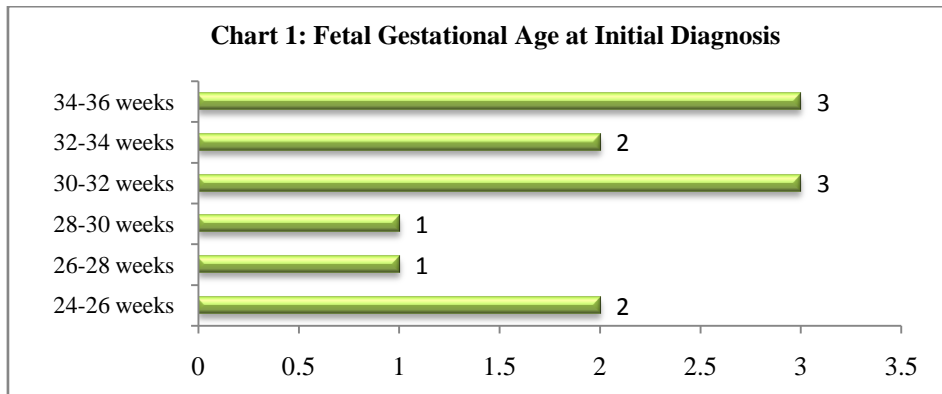


Figure 2: A 34 weeks fetus showing presence of echogenic solid debris within the gall-bladder. A follow-up sonography at 3 months of birth showing complete resolution.



Figure 3: A 31 weeks fetus showing presence of echogenic solid debris within the gall-bladder lumen. A follow-up sonography at 6 months of birth showing persistent cholelithiasis.



IV. Discussion

The first sonographic report of prenatal cholelithiasis was published as early as in 1983.^[6] Years before that, in 1928, Potter had published the presence of fetal cholelithiasis in a neonatal autopsy.^[7] Fetal cholelithiasis is a well-established disorder, frequently associated with other pathological conditions, and has an incidence of 1.5%.^[3] Anomalies of the gall-bladder, including sludge and gall stones, are extremely rare in fetal life, and have a slightly greater male predilection.^[4] Several maternal conditions and fetal or obstetrical predisposing risk factors have been proposed to have a causative role, however, none of them is conclusive. The presence of placental hemorrhage favors gallstone formation in the fetus^[8], due to the breakdown of hemoglobin to bilirubin which crosses the placenta and increases fetal levels of indirect bilirubin along with increased levels of estrogen, which predispose to increased cholesterol secretion and decreases bile acids synthesis, favoring gallstone formation.^[9] The maternal use of narcotic drugs modifies the gastrointestinal activity of the fetus, with an increased transition time, resulting in formation of solid echogenic material.^[10] Hemolytic anemia and blood group incompatibilities also predispose to the development of echogenic material in the bile.^[3,11] Fetal chromosomal disorders and congenital anomalies like cardiac malformations and gastrochisis may also be associated with the presence of sludge in fetal gallbladder.^[12] Genetic disorders, racial and environmental variables, socioeconomic status, poor nutrition, maternal dehydration and sepsis should be considered as risk factors affecting the severity of fetal cholelithiasis.^[7] In our study, majority of the cases were idiopathic, with no discernible etiology. In 75% of the cases, there was no associated maternal abnormality while 50% cases didn't reveal any co-morbidity in the affected fetuses.

Sonographically, the fetal gall bladder can be recognized after 14 weeks of gestation as a tubular, oblong, anechoic, cystic structure with a thin hyperechoic wall located on the inferior surface of the right lobe of liver. After 20 weeks of gestation, the fetal gall-bladder can be visualized sonographically in 37.5% to 64.7% of the fetuses.^[13] Fetal gallstones are a distinct third trimester phenomenon due to abnormal production, composition and mode of transportation of bile in the biliary tract.^[5] In our study, majority of the cases (approx 67%) were identified after 30 weeks of gestation.

Biliary sludge can have variable sonographic appearances, however, it is usually seen as a single or multiple echogenic particles, with or without regular flat borders, freely mobile, with or without posterior acoustic shadowing.^[2] About 70% of cholelithiasis cases are diagnosed postnatally.^[14] Usually, most cases (87%) resolve spontaneously within the first 3 and 7 months of birth. Most of the patients are asymptomatic, but few cases may present with some gastrointestinal symptoms.^[15] In our study, post-natal sonography revealed the resolution of cholelithiasis in approximately 93% of the cases, with only 1 case showing persistent cholelithiasis beyond 6 months of age.

V. Management

In most of the neonates, spontaneous passage of gallstones with postnatal hydration is noted. Some cases may be complicated with stones in the common bile duct and peritonitis. A follow up sonographic evaluation is required in infants with persistent cholelithiasis beyond 6 months of age. If the patients are symptomatic then, ursodeoxycholic acid can be used.^[16]

VI. Conclusion

Fetal Gall stones are extremely rare but benign findings associated with a favorable prognosis. It needs to be differentiated from the sinister pathologies and requires accurate diagnosis. In our study, the fetuses with cholelithiasis showed good prognosis with majority of the cases showing complete resolution within 6 months of age. Majority of the cases didn't reveal any associated fetal or maternal anomalies. However, the recurrence rate is unknown and long term sequelae could not be determined due to inadequate sample size. A close follow-up is indicated in the affected patients until spontaneous resolution is demonstrated by sonography.

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