Adverse Perinatal Conditions Associated With Prenatally Detected Fetal Echogenic Bowel in Nova Scotia

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Abstract

Objective: This study sought to estimate the association of adverse perinatal outcomes with pregnancies complicated by fetal echogenic bowel.

Methods: Data for pregnancies complicated with echogenic bowel identified in the second trimester were derived from the tertiary referral IWK Health Centre (Halifax, NS) Viewpoint Ultrasound Database augmented by medical chart review. The study was undertaken between 2003 and 2014. Rates of positive cytomegalovirus and toxoplasmosis infection were determined using maternal serology and amniocentesis results. Rates of intrauterine growth restriction, abnormal karyotype, cystic fibrosis, antenatal bleeding, and bowel abnormalities were also determined. Neonatal information included newborn urine culture results and postnatal genetic testing. Univariate analyses compared rates of infection with isolated echogenic bowel and echogenic bowel with other ultrasound findings, with statistical significance set at $P < 0.05$.

Results: There were 422 pregnancies identified prenatally with echogenic bowel (82% had isolated echogenic bowel). Of these, 92 (22%) had at least one of the foregoing associated abnormalities. Three percent of women had serologic test results positive for cytomegalovirus or toxoplasmosis, with <1% documented newborn infections. Cystic fibrosis and other genetic diagnoses were observed in 8%, intrauterine growth restriction in 14%, antenatal bleeding in 19%, and bowel abnormalities in 3% of the cases of echogenic bowel. Pregnancies with isolated echogenic bowel had an 80% reduction in risk for these significant outcomes, in contrast to a four- to 11-fold increased risk of specific outcomes when additional ultrasound findings were present.

Conclusion: An overall rate of adverse conditions of 22% with prenatally detected echogenic bowel serves to inform women and health care providers and emphasizes the importance of careful screening fetal ultrasound studies and timely referral for comprehensive assessment with findings of echogenic bowel for evaluation for associated findings.

Key Words: Echogenic bowel, adverse perinatal outcomes, prenatal diagnosis

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Résumé

Objectif : Cette étude avait pour but d'évaluer le lien entre les issues périnatales défavorables et l'intestin échogène chez le fœtus.

Méthodologie : Les données sur les grossesses durant lesquelles un intestin échogène a été découvert chez le fœtus au deuxième trimestre provenaient de la base de données échographiques Viewpoint du Centre de soins de santé tertiaires IWK (Halifax, N.-É.) et d'un examen des dossiers médicaux. L'étude s'est déroulée de 2003 à 2014. Les taux de cytomégalovirus et de toxoplasmose ont été établis au moyen des résultats de tests sérologiques d'IgM maternels et d'amniocentèse. Les taux de retard de croissance intra-utérin, de caryotype anormal, de fibrose kystique, de saignements anténataux et d'anomalies intestinales ont également été établis. Les renseignements néonataux dont nous disposions étaient tirés notamment des résultats d'uroculture du nouveau-né et du dépistage génétique postnatal. Des analyses univariées ont été utilisées pour comparer les taux d'infection en présence d'intestin échogène isolé, et les taux en présence d'intestin échogène et d'autres constatations échographiques. La signification statistique a été établie à $P < 0,05$.

Résultats : Un intestin échogène a été constaté dans 422 grossesses (dans 82 % des cas, il constituait la seule particularité échographique). Quatre-vingt-douze (22 %) de ces grossesses présentaient au moins une des anomalies associées mentionnées plus tôt. Trois pour cent des femmes ont obtenu un résultat positif aux tests sérologiques de dépistage du cytomégalovirus ou de la toxoplasmose; le taux d'infection chez les nouveau-nés était de moins de 1 %. La fibrose kystique et d'autres troubles génétiques étaient présents dans 8 % des cas d'intestin échogène, le retard de croissance intra-utérin dans 14 % des cas, les saignements anténataux dans 19 % des cas et les anomalies intestinales dans 3 % des cas. Le risque qu'une de ces issues soit présente diminuait de 80 % lorsque l'intestin échogène était isolé, tandis qu'il augmentait de quatre à onze fois lorsque ce résultat était accompagné d'autres constatations échographiques.

Conclusion : Savoir qu'un intestin échogène découvert en période prénatale est associé à un taux global d'issues défavorables de 22 % permet de renseigner les femmes et les fournisseurs de soins, et montre l'importance d'un dépistage échographique fœtal attentif et d'une orientation rapide ayant pour buts l'examen exhaustif de l'intestin échogène et l'évaluation des autres constatations échographiques.

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INTRODUCTION

Fetal echogenic bowel is an ultrasound finding that is defined as fetal bowel with areas of echogenicity that are equal to or greater than that of surrounding bone.[1] This finding is identified most commonly on the second trimester ultrasound scan, and incidence rates range from 0.6% to 2.4%.[2–5] Fetal echogenic bowel has been associated with a number of disorders, including cystic fibrosis, aneuploidy, congenital infections, fetal growth restriction, intra-amniotic bleeding, and congenital bowel malformations.[6,7] The most common pathogens associated with congenital infections include cytomegalovirus, *Toxoplasma,* herpesvirus, parvovirus, rubella virus, and varicella virus; of these infectious agents, CMV is the most common, whereas *Toxoplasma* is uncommon, and the rest are rare.[8]

Most perinatal programs do not routinely screen for infections; maternal symptoms or ultrasound findings suggestive of congenital infection prompt serologic screening. Studies examining the incidence rates of congenital infection after investigations for fetal echogenic bowel have shown rates that vary from 0% to 10% for CMV infection and very low rates, often less than 1%, for toxoplasmosis.[1,6,9]

Although many pregnancies affected by infectious agents are asymptomatic, symptomatic newborns with CMV infection and toxoplasmosis are reported at rates of 5% to 30% and 15% to 71%, respectively[10–12]; this variation reflects timing of infection in the pregnancy, as well as whether or not it was a primary infection. Adverse outcomes for the fetus may include intrauterine demise, neurodevelopmental delays, auditory and vision abnormalities, growth restriction, or failure to thrive for the newborn, infant, or child.[10,11] There have been few studies examining the relationship between fetal echogenic bowel and perinatal outcomes.

This study was performed using data derived from a comprehensive clinical ultrasound database linked to chart review outcome data to determine the incidence of adverse newborn conditions in pregnancies complicated by prenatal ultrasound findings of echogenic bowel, to inform health care providers and families more definitively.

ABBREVIATIONS

CF	cystic fibrosis
CMV	cytomegalovirus
FATC	Fetal Assessment and Treatment Centre
IUGR	intrauterine growth restriction

METHODS

This was a retrospective cohort study using the Fetal Assessment and Treatment Centre Viewpoint Database to identify women with fetal echogenic bowel (2003–2014) combined with a chart review to determine pregnancy outcomes. The FATC in Halifax, Nova Scotia is the tertiary referral centre for abnormal maternal serum screen results and ultrasound markers for fetal aneuploidy (e.g., echogenic bowel) detected on screening prenatal ultrasound scans for residents of Nova Scotia. All diagnoses of echogenic bowel were confirmed by a specialist in maternal fetal medicine at the time of the ultrasound assessment. In addition, the IWK Health Centre is the tertiary referral centre for women who are residents of Nova Scotia, as well as for women from Prince Edward Island with fetuses identified with conditions that may require delivery at the IWK and assessment and/or surgical management in the newborn period.

The Viewpoint Database contains all ultrasound data from high-risk scans done in the FATC at the IWK since 2000, including indication for referral, demographic characteristics, ultrasound findings, and diagnosis. Information stored also includes GA, viability and growth, fetal number, fetal anatomic assessment, amniotic fluid volume assessment, placental location and any noted anomalies, Doppler assessment of fetal or maternal vessels, and any ultrasound-guided procedures (e.g., amniocentesis, chorionic villus sampling, intrauterine transfusion, cordocentesis). All women having abnormal results on maternal serum testing would have had an opportunity for assessment in FATC.

A computerized database search identified all pregnancies with echogenic bowel on second trimester ultrasound examination. Pregnancy, perinatal, and neonatal outcomes were collected for each case by chart review. Demographic information included maternal age, GA at time of testing, parity, indication for ultrasound assessment, BMI, smoking, medication use, bleeding in pregnancy, pre-existing maternal medical conditions, diagnostic testing (amniocentesis), and ultrasound findings consistent with congenital infections, by using Viewpoint and chart review. Multiple gestations were categorized as one pregnancy and by any outcome present. If a variable, such as bleeding in pregnancy, was not commented on in the health record, it was presumed not to have occurred.

Adverse pregnancy and perinatal or newborn outcomes included positive maternal serologic findings and positive newborn urine cultures for CMV and *Toxoplasma* (congeni-