
Maternal Gallbladder Assessment During Obstetric Ultrasound: Results, Significance, and Technique

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Background. Gallbladder disease is four times as common in women as in men, and pregnancy appears to contribute to the development of gallstones. During pregnancy, most women receive ultrasound scans, which are highly sensitive to the detection of gallstones. The purpose of this study was to examine the additional time and effort required to scan the gallbladder during obstetric ultrasound scanning.

Methods. The maternal gallbladder was examined in 228 consecutive obstetric ultrasound scans performed for medical indications at any time during pregnancy. Scanning was conducted by family physician faculty located in two university settings and one rural private practice. Patients were not required to fast prior to the scan.

Results. Gallstones were found in 5.3% of the patients, and an additional 3.1% had undergone prior cholecys-

tectomy, for an overall incidence of current or previous gallbladder disease among 8.4% of the patients. The gallbladder was visualized in 97.4% of patients without a previous cholecystectomy. In 95.7% of cases, obtaining this additional information required less than 2 minutes.

Conclusions. This study suggests that an evaluation of the maternal gallbladder at the time of obstetric ultrasound scans can be performed rapidly without special patient preparation. The study further suggests that obstetric ultrasound skills may allow family physicians to expand their diagnostic use of ultrasound to include gallbladder evaluation. Scanning techniques and the clinical significance of having this information in the patient's medical record are discussed.

Key words. Physicians, family; cholelithiasis; ultrasonography. (*J Fam Pract* 1994; 39:33-37)

Gallbladder disease is four times as common in women as in men.¹ Pregnancy is thought to contribute to the development of gallstones based on (1) the development of obesity, (2) an increase in the cholesterol-to-bile salt ratio in bile, (3) decreased gallbladder contractility caused by progesterone, which produces stasis, and (4) increased gallbladder volume as pregnancy progresses, leading to stasis.²

Diagnostic ultrasound is highly sensitive and specific in detecting gallstones.³ Previous studies have indicated

that diagnostic ultrasound is capable of detecting asymptomatic gallstones and other gallbladder abnormalities in 2.5% to 4.2% of the general population and in up to 11.3% of pregnant patients during an obstetric ultrasound scan.^{2,4,5} Although asymptomatic gallstones require no immediate therapy, 50% of patients with gallstones eventually become symptomatic.¹

A high percentage of pregnant women undergo diagnostic ultrasound examination at some time during pregnancy.⁶ Previous studies of gallbladder screening at the time of obstetric ultrasound examinations have found such screening to be easy to perform,^{2,5,7-9} but Chesson et al⁴ concluded that only certain patients, such as those over 30 years of age, should be screened. Sonographic evaluation of the gallbladder at the time of obstetric ultrasound scans is not considered part of the standard obstetric ultrasound examination as defined by the American Institute of Ultrasound in Medicine,¹⁰ the American College

Submitted, revised, March 7, 1994.

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of Obstetrics and Gynecology,¹¹ or the American College of Radiology.¹²

Obstetric ultrasound has been demonstrated to be a diagnostic skill that family physicians can learn to perform to benefit their patients' care.¹³⁻¹⁵ This study is unique because, as family physicians performing obstetric ultrasound, we were interested in obtaining information that might be used in present or future patient care. We wanted to examine: (1) incidence of asymptomatic gallbladder disease in our obstetric patients; (2) how much additional time and effort gallbladder screening would add to obstetric ultrasound scans performed by family physicians; and (3) whether adequate visualization would be possible without requiring patients to fast before being scanned, since requiring prior fasting would add to the complexity of the process and probably decrease compliance with the obstetric ultrasound scan itself.

Methods

Two hundred twenty-eight consecutive pregnant patients were scanned for medical indications at any time during pregnancy. An attempt was made to visualize the gallbladder in all cases. A variety of real-time ultrasound scanners were used, including those manufactured by PIE Medical (Neptune, NJ), Advanced Technology Labs (Bothell, Wash), and Technicare (Aloka, Wallingford, Conn). The patients were scanned in three family practice facilities, including two university-model family practice settings and one private rural office. The physicians performing the ultrasound scans had between 5 and 10 years' experience in performing standard obstetric ultrasound examinations and appropriate skills in performing gallbladder scans.

Results

The average age of patients in this study was 22.8 years, with a range of 13 to 40. The gestational age averaged 22.1 weeks. Medical indications for the diagnostic ultrasound scans were diverse (Table 1).

Seven of the 228 patients reported having had a cholecystectomy, and therefore were ineligible for the study. Of the remaining 221 patients, the gallbladder was visualized in 215 (97.3%). Twelve patients had an abnormal gallbladder, with 11 showing bright echogenic foci that cast an acoustic shadow typical of stones. One additional patient's gallbladder contained a solitary echogenic object that did not cast a shadow, suggesting a polyp. Thus, 5.4% (11/221) were found to have asymptomatic disease. Among the entire population of 228 patients,

Table 1. Reasons for Conducting Ultrasound Scans in a Group of 228 Pregnant Women

Reason for Ultrasound Scan	No. (%) of Patients
Discrepancy between size and clinically estimated gestational age	71 (31.0)
Uncertainty about last menstrual period	63 (28.0)
Growth assessment	9 (4.0)
Preterm labor	5 (2.0)
Absent fetal heart tones	8 (3.5)
Bleeding	19 (8.5)
Abnormal MSAFP test, suspected anomaly, or in conjunction with genetic amniocentesis	8 (3.5)
Maternal complications (diabetes, toxemia, or previous cesarean section)	17 (7.5)
Miscellaneous	28 (12.0)

MSAFP denotes maternal serum alpha-fetoprotein.

8.4% had either asymptomatic disease or previously treated gallbladder disease. In only six of the 221 patients was the gallbladder not visualized during the course of the ultrasound examination (Table 2). (See Appendix for further discussion of technique of cholecystosonography during pregnancy.)

A large number of the patients had consumed solid food within 4 hours of their ultrasound examination (48.6%). Regardless, the gallbladder was visualized in 97.4% of patients. We identified patients whose gallbladders seemed to be "contracted." In such cases, the gallbladder was 1 cm or less in diameter, regardless of length. A higher percentage of those patients had eaten solid food, especially food that might be considered fatty, within 4 hours of their ultrasound scan. The incidence of solid food ingestion within 4 hours of the scan was 70% in the "contracted gallbladder" group, compared with 48.6% in the overall population scanned.

The time required to visualize the gallbladder was less than 2 minutes in 95.7% of patients scanned.

The patients who had undergone cholecystectomy ranged in age from 22 to 29 years, with an average age of

Table 2. Sonographic Findings in 221 Pregnant Patients with a Gallbladder

Ultrasound Finding	No. (%) of Patients
Gallbladder visualized	215 (97.4)
Gallstones or polyp detected	12 (5.4)
Gallbladder not visualized, no diagnosis	6 (2.7)

25. The average weight of these patients was 185 lb, compared with 155 lb in the overall population. Only one of the seven (14%) patients with a previous cholecystectomy was primiparous, compared with 19% of primiparas in the entire population.

The patients with abnormal gallbladders (stones or polyps) ranged in age from 17 to 29 years, with a 50% incidence of family history of gallstones. The average weight in this group was 174 lb (range, 102 to 272 lb), and one third of the patients were primiparous. They ranged in gestational age from 14 to 39 weeks. Although two thirds of the women had ingested solid food within 4 hours of their examinations, ultrasound was capable of detecting gallbladder abnormalities in each of these patients.

The six patients whose gallbladders were not visualized ranged in age from 18 to 28 years, weighed an average of 164 lb, and ranged in gestational age from 9 to 38 weeks. Five of the six (83%) women had had solid food within 4 hours of the ultrasound examination.

Three of the seven patients who were followed up 1 year after receiving a diagnosis of asymptomatic gallstones returned with symptoms requiring medical or surgical intervention.

Discussion

This study documents that the incidence of gallbladder disease in a family practice obstetrics population is similar to that identified in previous studies. Although the time elapsed since the last meal appeared to affect visualization of the gallbladder, the effect was minimal. Diagnostic information was obtained in 97.4% of patients without the requirement for patient fasting. Despite the prevalence of a nonfasting state in the study group, gallbladder visualization was possible. Therefore, a fasting state may not be necessary for ultrasound examination of the gallbladder during pregnancy. This finding is not widely known and may be useful information for practicing physicians.

Five of the six patients whose gallbladders were not visualized had ingested what could be considered a fatty meal (eg, sausages, eggs, or hot dogs) within 4 hours of the ultrasound study. In these asymptomatic cases, the gallbladder may have emptied in response to fatty meals, leaving it sonographically invisible and indicating that it was functioning.

In the vast majority of cases, documenting the condition of the gallbladder during obstetric ultrasound scans added less than 2 minutes to the scan. Obtaining this additional information for the patient's database is feasible and does not unduly complicate the examination. The

speed and ease of obtaining this information suggests that those who choose to perform gallbladder screening may do so without incurring additional charges to the patient.

That all our patients with abnormal gallbladders were 29 years old or younger indicates that ultrasound screening of the gallbladder yields information at all ages. Screening should not be restricted to patients aged 30 and older, as suggested by a previous study.⁹ Our findings of gallstones in pregnant patients under 20 years of age provides documentation of cholelithiasis in pregnant teenagers.¹⁶ Our data indicate that family history of gallbladder disease, higher maternal weight, and previous pregnancy are risk factors for cholelithiasis.

We were careful to explain to the patients in whom we found asymptomatic cholelithiasis that no intervention was required and that the condition might remain asymptomatic indefinitely. However, should the patient develop symptoms at a later date, having information about the presence of asymptomatic gallstones in the patient's database could help shorten the workup. Asymptomatic gallstones found during pregnancy have been shown in one study to spontaneously resolve postpartum in only 28% of cases.¹⁷ Unfortunately, this information also could cause a physician to prematurely exclude other differential diagnostic possibilities.

The use of screening tools is justified according to standardized criteria: (1) the disease must have a significant effect on quality or quantity of life; (2) acceptable methods of treatment must be available; (3) the disease must have an asymptomatic period during which detection and treatment would significantly reduce morbidity and mortality; (4) treatment in the asymptomatic phase must yield a therapeutic result superior to that obtained by delaying treatment until symptoms appear; (5) tests must be available at reasonable cost to detect the condition during the asymptomatic period; and (6) the incidence of the condition must be sufficient to justify the cost of screening.¹⁸

Although gallbladder screening during a routine obstetric ultrasound does not meet all of the standardized criteria, it does satisfy many. Certainly, the disease can have an effect on a patient's quality of life, and the screening, if free, would be cost-effective. Further study is necessary to determine the implications of gallstone detection during an asymptomatic period, especially in pregnant women.

Sonographic screening of the maternal gallbladder during obstetric ultrasound yields diagnostic information in the vast majority of cases without any special patient preparation. Abnormalities were found even in younger primiparous patients. The technique of visualizing the gallbladder is well within the capabilities of those already performing obstetric ultrasound scans, it adds a negligible

amount of time to the examination, and the information obtained can be a useful addition to the patient's health maintenance database.

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Appendix

Technique of Cholecystosonography During Pregnancy

The gallbladder is visualized sonographically as a pear-shaped anechoic structure in subcostal or intercostal views in the right upper quadrant. Because of the varying depth of the gallbladder and the scattering of sound waves caused by overlying soft tissues, it is often necessary to change the power, gain, and focal zones from those used for obstetric scanning in order to optimize visualization of the gallbladder.

Several maneuvers are helpful in visualizing the gallbladder. First, the patient is asked to take a deep breath, which causes the liver edge and gallbladder to descend below the right costal margin, improving visualization. Second, the patient may be turned to the left lateral decubitus position with the right arm extended over her head to separate ribs and to facilitate scanning through the right flank, thereby avoiding intervening bowel gas in the right upper quadrant. Third, imaging may take place between ribs by using the liver as an acoustic window and completely avoiding intestinal gas. This method is most easily performed with a transducer that has a small foot-

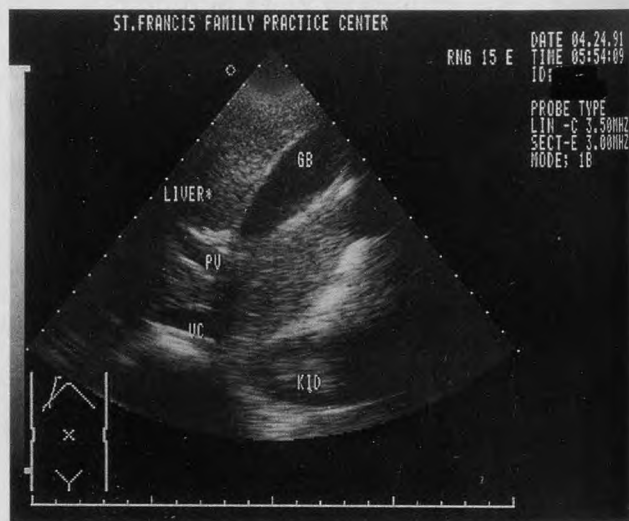


Figure 1. Oblique scan of the right upper quadrant shows the gallbladder (GB), the inferior vena cava (VC), portal vein (PV), the upper pole of the right kidney (KID), and the right lobe of the liver (Liver).