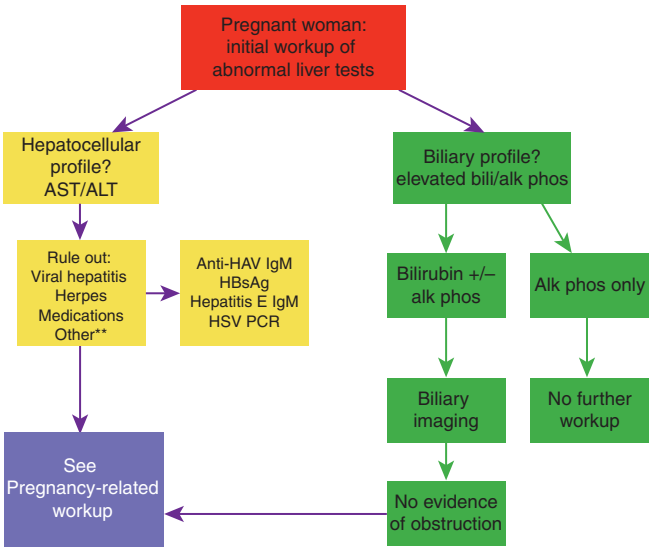

Figure 1. Workup of abnormal liver test in pregnant woman. **Other differential diagnosis to consider if clinically appropriate: AIH, Wilson disease.

It may be clinically appropriate and necessary during pregnancy to image the liver, hepatic vasculature, or biliary system. Any pregnant woman presenting with abnormal aminotransferases or jaundice should first undergo an abdominal ultrasound. Ultrasound, with or without Doppler imaging, as it uses sound waves and not ionizing radiation, has never been shown to have any adverse fetal effects (4,5). Therefore, there are no contraindications to ultrasound in pregnancy and it should be used as the imaging modality of choice.

Teratogenicity has been clearly established, with large doses of radiation >100 rad, linked in humans to growth restriction and microcephaly, among other adverse effects. The greatest exposure risk is at 8–15 weeks of gestation. Fetal risks of anomalies and growth restriction appear not to be increased if the exposure is <5 rad. Fetal exposure for commonly used gastroenterology imaging ranges from 100 mrad, for a single abdominal film, to 2–4 rad, for a barium enema or small bowel series, to 3.5 rad for a CT scan of the abdomen (6,7). If ultrasonography is indeterminate and further imaging is necessary, judicious use of CT or MRI without gadolinium may be considered for the expeditious diagnosis of an acute presentation. Oral and intravascular contrast agents used for CT contain derivatives of iodine which do not appear teratogenic in animal studies. However, neonatal hypothyroidism has been associated with iodinated contrast agent exposure during pregnancy (8). Gadolinium is not recommended as it crosses the placenta and is excreted by the fetal kidneys into the amniotic fluid where it can remain for long periods, exposing the fetal pulmonary and gastrointestinal systems to potential injury. Animal studies have also reported spontaneous abortion, skeletal abnormalities, and visceral abnormalities with high doses of gadolinium (4).

Fortunately, the necessity of liver biopsy for diagnosis of disease in pregnancy is uncommon as most etiologies can be determined in this population by biochemical, serological, and clinical parameters. However, if required, percutaneous liver biopsy can be performed safely. Transjugular liver biopsy can also be performed but carries some limited radiation exposure of 0.05–0.1 rad (9,10).

SAFETY OF ENDOSCOPY IN PREGNANCY

Recommendations:

5. Endoscopy is safe in pregnancy but should be deferred until the second trimester if possible (strong recommendation, low level of evidence).
6. Meperidine and propofol can be used for endoscopic sedation (strong recommendation, moderate level of evidence).

Although clinical studies on the safety and effectiveness of endoscopy for the pregnant patient have been limited, endoscopy can be safe and effective if careful assessment of the risks, benefits, and clinical rationale is performed. One of the most important clinical issues in endoscopy of the pregnant patient is to ensure hemodynamic stability and oxygenation. Oversedation, resulting in hypotension or hypoxia, or positioning that compresses the inferior vena cava can lead to decreased uterine blood flow and fetal hypoxia. Thus, the patient should be positioned in the left lateral position to avoid vascular compression and aggressively managed with respect to intravenous hydration (11). Other concerns include teratogenicity of medications and radiation exposure.

There are currently no FDA pregnancy category A medications available for the management of sedation during endoscopy. The benzodiazepine class of sedatives (FDA category D) should be avoided in pregnancy owing to known congenital malformations (12,13). One of the most commonly used sedation medications during pregnancy is meperidine, an opiate analgesic, which has more recently been replaced by shorter acting agents, such as propofol, with lower risk for respiratory depression and seizures. Meperidine crosses the placenta and is converted to a long-lasting normeperidine, so repeated or prolonged meperidine administration should be avoided late in pregnancy or at term, as meperidine is an FDA pregnancy category C (14,15).

Propofol is an FDA pregnancy category B anesthetic which is very short acting with a rapid recovery period, which is of significant benefit in the case of a pregnant patient. If propofol is used, an anesthesiologist should monitor respiratory function closely.

Multidisciplinary consultation with obstetrics is essential, and further anesthesia and surgical opinion may be helpful in approaching endoscopy. Deferring endoscopy until the second trimester is recommended when possible and special considerations for maternal–fetal monitoring, and aspiration precautions should be undertaken.

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