

A Review of Endoscopy in Pregnancy: Challenges and Current Evidence

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Abstract

Gastrointestinal endoscopy has an emerging diagnostic and therapeutic role. This is also evident with endoscopy in pregnancy however maternal and fetal safety has been raised. The evidence base for endoscopy in pregnancy is limited and more studies needs to be invested in this area. Endoscopy in pregnancy is however thought to be safe with the right expertise and it is also crucial that a multidisciplinary approach is applied for every patient. This niche area is discussed with the aim of providing a general guidance for clinicians.

Keywords: Endoscopy; Trauma; Gastroscopy; Gastrointestinal haemorrhage; Dysphagia

Introduction

Gastrointestinal endoscopy has a major diagnostic and therapeutic role in most gastrointestinal conditions. It is safe in the general population [1] and the therapeutic ability of endoscopy continues to expand. Endoscopy in pregnancy however raises the issue of maternal and fetal safety [2]. Potential risks include premature labour, teratogenic effects, trauma, and radiation exposure [3]. Clinicians also

face difficulties evaluating clinical data on endoscopy in pregnancy due to nature of studies conducted pertinent to this. Studies are often retrospective, non-standardized and lack adequate follow-up. Prospective studies are lacking due to potential fetal risks and medico legal concerns [4]. Despite lack of data, endoscopy in a pregnant patient needs to be considered on its own merit backed up by concrete indications. Expert endoscopists should perform procedures and obstetricians should be consulted to provide the best care for mother and baby [3]. Table 1 outlines the general principles that should be employed for endoscopy in pregnancy. This is a review of gastrointestinal endoscopy in pregnancy based on recent evidence.

1	Always have a strong indication, particularly in high-risk pregnancies
2	Procedure time should be short and performed by experienced endoscopists
3	Endoscopy postponed to second trimester whenever possible
4	Pregnant women positioned in left pelvic tilt or left lateral position to avoid vena caval and aortic compression
5	Fetal heartbeat should be detected before and after procedure
6	Obstetric support should always be available
7	Endoscopy is contraindicated in obstetric complications such as placental abruption, ruptured membranes or eclampsia

Table 1: General principles of endoscopy in pregnancy.

Gastroscopy

Gastroscopy is performed as in non-pregnant patients. Case series and case-control studies suggest gastroscopy is safe and effective in pregnancy although follow up data is limited [5]. Strong indications for gastroscopy in pregnancy include dysphagia, gastrointestinal haemorrhage, radiological suspicion of malignancy and therapy for symptomatic oesophageal strictures [3]. Nausea and vomiting is common throughout pregnancy however can be severe in early pregnancy causing hyperemesis gravidarum [6]. This tends to subside after 20 weeks of pregnancy. Proton pump inhibitors, which are relatively safe in pregnancy, may empirically be commenced without subjecting patients to endoscopy [7,8].

In a case series of 83 pregnant women undergoing gastroscopy, 95% delivered healthy babies and morbid outcomes were related to identify high-risk pregnancies and not procedural related [7]. Majority of indications for this study was gastro-intestinal haemorrhage comprising of 45%. In this study, gastroscopy was diagnostic in 95% of cases, most common finding being reflux oesophagitis. Increased acid reflux mediated by the increased intra-abdominal pressure from a gravid uterus coupled by decreased lower oesophageal sphincter pressures from gestational hormones likely explains this [9]. Mallory-Weiss tears occurred in 14%, most logically explained by increased nausea and vomiting in early pregnancy. Incidence of peptic ulcer was relatively low in this study, which may be explained by decreased gastric acid secretion mediated by gestational hormones [10]. One fetus died in an Israeli study of 60 pregnant patients undergoing

gastroscopy for various reasons. No congenital anomalies were seen in this study [8].

Significant upper gastrointestinal bleeding similarly occurs in pregnancy. Emergency endoscopy to achieve haemostasis is indicated for the well-being of mother and fetus [11]. Data for this however is scarce. Variceal bleeding is rare during pregnancy because advanced liver disease decreases fertility but examples of possible scenarios are vertical transmission of hepatitis B [7]. Exception for this would be for patients with non-cirrhotic portal hypertension whose fertility is generally not impaired [12]. Pregnancy exacerbates portal hypertension *via* increase in plasma volume [13]. Patients with and known varices should be warned about the risk of variceal bleeding especially in second trimester and liver decompensation during pregnancy [12]. Patients on beta-blockers for primary or secondary prophylaxis against variceal bleeding should continue this throughout pregnancy [14,15]. Despite limited data, variceal banding is preferred method of haemostasis with favorable maternal and fetal outcomes [16].

Data on therapeutic endoscopy for non-variceal upper GI bleeding consists of only 4 patients. Maternal and fetal outcomes were favourable in all 4 patients [1]. Endoscopic therapy is justifiable for indications such as active bleeding however this recommendation is derived from expert opinion from studies in non-pregnant patients [12]. Available data is insufficient to recommend specific endoscopic therapy from the available options however electrocoagulation raises specific concerns [7]. Amniotic fluid can conduct electricity to the fetus therefore a grounding pad should be positioned such that the uterus is not between the electrical cord and the grounding pad. Bipolar electrocautery should also be used to minimize current exposure to the fetus [16]. Adrenaline may reduce uterine or fetal perfusion, with a weak association with teratogenesis during pregnancy. Data on this is limited to case reports and in any case, the benefit of achieving haemostasis outweighs any perceived risk [17]. Gastroscopy therefore may be performed when strongly indicated because current data suggests acceptable fetal and maternal risks.

Lower Gastrointestinal Endoscopy

Flexible sigmoidoscopy is a relatively safe and quick procedure. Enema preparation normally suffices and it can be done without sedation or minimal sedation. Phosphate enema can lead to dehydration and electrolyte abnormalities and should generally be avoided in patients with heart or renal failure [1]. A clear colonic lumen is required for a safe and effective colonoscopy. Procedure time is longer and often requires more sedation [7]. Polyethylene glycol preparations have been used however studies examining its safety are limited. An open-label study of 225 women demonstrated that this was safe when used to treat constipation during pregnancy [18].

Indications for sigmoidoscopy/colonoscopy needs clarification and if possible done post-partum or in second trimester. Indications during pregnancy include major lower gastrointestinal bleeding, suspicion of colonic mass or profound diarrhea [3]. Sigmoidoscopy is usually safe during pregnancy [7]. Data for colonoscopy in pregnancy is limited but this is typically safe with the right monitoring and close liaison with obstetricians [14]. Colonoscopy is potentially teratogenic in the first trimester when organogenesis occurs and may cause fetal injury in the third trimester by inducing premature labour or causing neonatal depression from sedatives used [7]. It should be limited to mothers with strong indications or life threatening emergencies in the second

trimester. Data for colonoscopy in the second trimester is the strongest because most cases were done in this trimester [7,14]. Colonoscopy can however be considered in the first and third trimester for uncontrolled lower gastrointestinal bleeding, suspected colonic neoplasia, colonic stricture and colonic pseudo obstruction in lieu of major surgery [14].

There are certain confounding factors that need to be considered for colonoscopy in pregnancy. A gravid uterus can compress the colonic lumen and distort the normal colonic anatomy which may make a complete examination challenging [7]. Patients should not be positioned prone or in a decubitus position especially in latter trimesters of pregnancy. External abdominal pressure should be avoided however if really required, pressure should be minimal and directed away from the uterus [14]. A case-controlled study of 46 patients having sigmoidoscopy in pregnancy demonstrated its safety. The most common indication for the test in this study was haematochezia (29 patients), diarrhea (10 patients) and abdominal pain (4 patients). The procedure was more diagnostic when investigated for haematochezia. The most common endoscopic diagnosis was reactivated or newly diagnosed inflammatory bowel disease, haemorrhoids and other types of colitis. Changes in treatment plan occurred in 24 patients following sigmoidoscopy [19].

38 (93%) of 41 patients delivered healthy babies in this study. Four patients had voluntary abortions and 1 pregnancy outcome is unknown. Poor pregnancy outcomes included death from prematurity of 1 live-borne infant, 1 stillbirth and 1 with cleft palate. These occurred in high-risk pregnancies and unrelated to sigmoidoscopy. Study patients did not have a worse fetal outcome than pregnant controls that were matched for indications [19]. In a mailed survey of 3,300 gastroenterologists, all 13 pregnant patients delivered healthy infants at term [20]. The largest case control study of colonoscopy in pregnancy included 20 patients of which 16 patients had their endoscopy in the second trimester [4]. Patients had endoscopy in the first or third trimester [2]. Patients had mild transient hypotension without any clinical sequelae. Diagnosis included inflammatory bowel disease, ischaemic colitis and lymphocytic colitis. In 7 (35%) patients, having an endoscopy altered their management plan. 18 healthy infants were delivered and there was unfortunately 1 involuntary abortion and 1 infant born with septum secundum [21].

Flexible sigmoidoscopy is probably preferred to colonoscopy in pregnancy. Nevertheless, in the context of strong indications or life-threatening emergencies when alternative treatment is surgery, colonoscopy may be considered, even in the first and third trimesters.

Endoscopic Ultrasound (EUS)

Diagnostic ultrasound is potentially attractive for biliary tract disease in pregnancy because of the alternative option of fetal radiation exposure during ERCP or the unknown risks of MRCP [1]. Conventional trans-abdominal ultrasound is relatively insensitive for choledocholithiasis therefore pregnant patients requiring further investigations are not uncommon. It is particularly useful in patients who have a low or moderate probability of developing choledocholithiasis [7].

There is scant data on EUS in pregnancy with only about a dozen of cases reported [1]. Shelton et al. in their largest case series reported [6] pregnant patients who were investigated for suspected choledocholithiasis with EUS. EUS findings included CBD stones in two patients, biliary sludge in two patients and non-significant

findings in the remaining two patients. All six patients had ERCP. There were no maternal complications. Fetal outcome was favourable in five infants and unknown in one [22].

In another report, EUS was performed in three patients for acute pancreatitis of unknown cause. It revealed important clinical data and there were no maternal procedural complications. Two healthy infants were delivered. One fetus died due to recurrent cholangitis in the mother at 10 weeks after EUS [23].

The scant data is inadequate to provide firm conclusions about the safety of EUS in pregnancy. Firm clinical data is desirable however it may seem reasonable to perform EUS when choledocholithiasis is possible but unproven and MRCP is a less attractive alternative [1].

Endoscopic Retrograde Cholangiopancreatography (ERCP)

Pregnancy promotes cholelithiasis *via* the gestational rise in estrogen and progesterone. Estrogen promotes supersaturation of bile with cholesterol while progesterone inhibits gallbladder motility, which promotes bile stasis [24]. Only 1 per 1000 pregnancies are however complicated by choledocholithiasis [25].

American Society of Gastrointestinal Endoscopy advocates ERCP in pregnancy when therapeutic intervention is planned. Indications for ERCP in pregnancy would be biliary pancreatitis, symptomatic choledocholithiasis and cholangitis [3]. ERCP is attractive in this setting as surgery as an alternative poses a significant risk of fetal loss [26]. Experienced endoscopists should also do it as technical failures have resulted in relatively worse outcomes [7].

It is also advised that ladies of childbearing age be screened for pregnancy to avoid the risk of radiation exposure to the fetus [7]. There is controversy about safety of ERCP in pregnancy and data is limited [1]. Concerns regarding fetal radiation exposure and risk of ERCP on the pregnancy outcome predominate. Radiation exposure can be estimated by fetal dosimetry and estimated fetal roentgenographic exposure ranged from 0.5 mGy to 3.1 mGy in multiple small studies of ERCP in pregnancy [27]. The risks of teratogenicity however become significant at about 50 mGy during first trimester when organogenesis happens [28].

Risks should be discussed with the patient and her family before ERCP [14]. Lead shielding should be used to minimise radiation exposure to the fetus. Fluoroscopy time for cannulation and position confirmation should be minimized.

There are numerous reports of ERCP in pregnancy in the last 10 years. The largest of series included 65 pregnant patients and the most common indications for ERCP were abnormal liver enzymes, recurrent biliary colic and dilated bile ducts on imaging. 68 procedures were carried out majority of which were in the second and third trimester. Median fluoroscopy time was 1.45 minutes and most patients had a therapeutic procedure. 11 patients (16%) developed post ERCP pancreatitis managed conservatively. 89% of patients achieved term pregnancy; 5 babies (8%) were born prematurely or with low birth weight, and there were no congenital malformations or deaths in the 59 known fetal outcomes [29].

In another series of 23 patients who had ERCP, complications included post ERCP pancreatitis (1 patient), spontaneous abortion (1 patient) and neonatal death at 26 hours post-delivery (1 patient). 20 patients had a therapeutic procedure and diagnostic in 3 patients.

Neonatal death and post ERCP pancreatitis happened in the same patient who had 3 procedures for pancreatic ductal stenosis after a previous surgical sphincteroplasty [30].

In summary, ERCP should be performed for strong indications and when therapeutic intervention is planned. It should not be performed for weak indications and in this setting alternative modalities such as MRCP and EUS should be utilized. Nearly all-individual studies demonstrate high maternal success rate, low complication rates and favourable fetal outcome.

Conclusion

Endoscopy in pregnancy will increasingly be a challenging area for clinicians as numbers of patients meeting indications for endoscopy rises. This may be more apparent in inflammatory bowel disease where highest age adjusted incidence rates overlap with peak reproductive years. A multidisciplinary approach involving gastroenterologists and obstetricians is of paramount importance. Endoscopy in pregnancy appears to be safe from data available however larger scale studies are undoubtedly needed to draw firmer conclusions.

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