

Gastrointestinal Disease in Pregnancy

The following section is entitled “**Gastrointestinal Disease in Pregnancy**”. This section deals with some of the basic concepts important in caring for some gastrointestinal diseases that are commonly seen in pregnant women. The section begins with a *learner handout* with space for the learner to make their own notes. The *learner handout* is followed by the *teaching script* for the educator, some *cases* for discussion and a bibliography for this topic.

**GASTROINTESTINAL DISORDERS
IN PREGNANCY**

**COMMON
GASTROINTESTINAL
COMPLAINTS IN
PREGNANCY**

Hyperemesis Gravidarum

**Nausea and vomiting occur in up to half of pregnancies.
Hyperemesis is intractable N & V severe enough to cause dehydration and occurs in less than one percent of pregnancies.**

Hyperemesis Gravidarum

**Promethazine (Phenegan®)
Prochlorperazine (compazine®) and
Metoclopramide (Reglan®) are useful medical treatments for hyperemesis.**

However, nutritional supplementation is often necessary.

**GASTROINTESTINAL DISORDERS
IN PREGNANCY**

Hyperemesis Gravidarum

Hyperemesis is associated with hyperthyroidism, hyperparathyroidism, and elevated transaminates.

Gastroesophageal Reflux Disease

**GERD is nearly universal in pregnancy due to altered GI motility.
Treatment options include lifestyle modifications, antacids, sucralfate, ranitidine, and metoclopramide.**

Biliary Tract Disease

**Biliary disease is increased in pregnancy because of altered smooth muscle motility and an increased lithogenicity of bile during pregnancy.
A cholecystectomy can be performed throughout pregnancy, but is safest during the second trimester.**

**GASTROINTESTINAL DISORDERS
IN PREGNANCY**

Cholestasis of Pregnancy

Itching, elevated liver enzymes, and elevated serum bile salts in the third trimester may be due to cholestasis of pregnancy.

Treatments include cholestyramine and ursodeoxycholic acid.

For unknown reasons, the fetus is at risk in this condition and requires increased obstetric monitoring.

PIH/HELLP

Epigastric pain and elevated LFTs are important manifestations of PIH and the HELLP syndrome.

Acute Fatty Liver of Pregnancy

This uncommon and life threatening condition presents as progressive hepatic failure in the third trimester that often occurs in association with PIH.

**GASTROINTESTINAL DISORDERS
IN PREGNANCY**

Viral Hepatitis

Hepatitis B and C have significant rates of vertical transmission.

Hepatitis E has a mortality rate of seventeen percent during pregnancy.

Constipation

Constipation is a common complaint in pregnancy and can be generally managed by non-pharmaceutical methods.

Inflammatory Bowel Disease

The course of IBD is not significantly affected by pregnancy except that if the disease is active at conception, it is likely to remain so.

Steroids, sulfasalazine, antibiotics and 5-ASA have been used safely in pregnancy.

GASTROINTESTINAL DISORDERS IN PREGNANCY

Teaching Script

Hyperemesis Gravidarum

Nausea and vomiting occur in up to half of all pregnancies. This should be considered part of the normal course of a pregnancy. However, the term “morning sickness” is a misnomer as the nausea and vomiting of pregnancy can occur at any time of day. The “normal” nausea and vomiting experienced by many pregnant women should be distinguished from hyperemesis gravidara. Hyperemesis is defined as an intractable nausea and vomiting, severe enough to cause dehydration. It occurs in less than 1% of all pregnancies. Although older textbooks refer to a relationship between this entity and ambivalence about pregnancy, social stressors and psychological factors, present thinking about hyperemesis does not give credence to these pejorative associations. The present understanding of hyperemesis gravidarum suggests that elevated levels of human chorionic gonadotropin (hCG) has a central nauseant effect in susceptible women. Hyperemesis gravidarum generally is an illness only of the first trimester and tends to resolve in most patients around the time that hCG levels begin to decline during a pregnancy. Contributing to the illness of hyperemesis gravidarum is the delayed gastric emptying that is a normal part of pregnancy. This delayed gastric emptying is a manifestation of the progesterone effects upon gastrointestinal smooth muscle.

Medications used for the management of hyperemesis gravidarum include promethazine (Phenergan®), prochlorperazine (Compazine®) and metoclopramide (Reglan®). Oral vitamin B₆ at a dose of 10-20 mg per day may also be helpful in controlling symptoms in some women. Use of ondansetron (Zofran®) for hyperemesis has been advocated by some but we prefer to use this as a third line agent because of its’ cost and the limited experience with use in pregnancy. However, many pregnant women with hyperemesis gravidarum will require intravenous hydration and even nutritional supplementation. Because of the generally self-limited course of hyperemesis (it usually ends by the twelfth to fourteenth week of pregnancy) central

hyperalimentation is not usually necessary and nasogastric feeding or peripheral parenteral nutrition is usually adequate in those cases where the patient with hyperemesis is progressively losing weight.

Hyperemesis can be associated with hyperthyroidism, hyperparathyroidism and elevated transaminases. In those cases of hyperemesis severe enough to require hyperalimentation we always screen a free T4, TSH, calcium, and check liver function test. Liver enzymes elevations related to hyperemesis should not usually be greater than ten times normal.

Gastroesophageal Reflux Disease

Gastroesophageal reflux disease is nearly universal in pregnancy due to the altered GI motility that occurs in pregnancy. Both delayed gastric emptying and decreased gastroesophageal sphincter tone occur due to the effects of progesterone on smooth muscle. Pregnancy related reflux is therefore not simply the result of increased intra-abdominal contents and can occur at any time in gestation. Treatment options include such things as lifestyle modification (small frequent meals, avoiding meals prior to bedtime, elevating the head of the bed, avoidance of smoking, caffeine and alcohol) and antacids. For patients with symptoms that persist despite such interventions, medications such as sulcrafate (Sulcrate®), Ranitidine (Zantac®) and Metoclopramide (Reglan®) can be used. Sulcrafate is an excellent choice because it is not absorbed systemically and therefore has no fetal effects. All the H2 blockers appear to be relatively safe in pregnancy although we feel that Ranitidine has the best pregnancy data. There is also extensive experience with the use of metoclopramide in pregnancy. Use of the proton pump inhibitors omeprazole (Prilosec®) and lansoprazole (Prevacid®) in pregnancy should be avoided.

Cholelithiasis

Biliary disease is seen with increased frequency in pregnancy. This is both because of the altered smooth muscle activity of the gallbladder (again due to progesterone effects) and an increased lithogenicity of bile during pregnancy. Mild symptoms of biliary tract disease can be managed conservatively in pregnancy but, for those patients with persistent symptoms or significant complications, cholecystectomy can be performed safely throughout pregnancy. The

ideal time for cholecystectomy during pregnancy is the second trimester. In the first trimester any abdominal surgery carries the risk of miscarriage. In the third trimester a cholecystectomy is associated with an increased risk of preterm labor as well as being technically more difficult. However, necessary cholecystectomy should never be delayed because of a woman's gravid status.

Cholestasis of Pregnancy

Cholestasis of pregnancy is an interesting entity which presents as severe itching in a gravid woman. There are usually no findings on examination except for excoriations from extensive scratching. Investigations demonstrate the finding of elevated liver enzymes, although these enzyme elevations are generally not more than 4-5 times above the normal range. Alkaline phosphatase may also be elevated but may be difficult to interpret as alkaline phosphatase is normally elevated in pregnancy. Ultrasound of the liver and gallbladder show no abnormalities. Measurement of serum "bile salts" however will show them to be markedly elevated. The underlying abnormality in cholestasis in pregnancy appears to be a biochemical one. Although the hepatocytes properly metabolize bilirubin there is a failure of excretion of the bile salts into the bile canaliculi. The bile salts therefore accumulate in the serum and are deposited into the skin inciting the intense pruritus characteristic of this disorder.

The fetus has been recently shown to be at increased risk of sudden fetal demise in this condition. Therefore, it is the practice of obstetricians to increase fetal monitoring in patients with cholestasis of pregnancy. There are some individuals who advocate that early delivery should be done for this condition. Also, there is an increased risk of maternal and neonatal hemorrhage in this condition believed to be related to an associated malabsorption of vitamin K. Medical treatments for cholestasis in pregnancy include cholestyramine (Questran®), phenobarbital and ursodiol (Actigall®). Vitamin K supplementation at 10 mg. per day should also be provided. Our anecdotal experience with the use of these agents has not been very favorable. Fortunately, this condition rapidly resolves post partum, but may recur in subsequent pregnancies.

Preeclampsia and the HELLP syndrome

It is important to remember that preeclampsia and the HELLP syndrome are causes of elevated liver function tests during pregnancy. HELLP syndrome stands for hemolysis, elevated liver enzymes, and low platelets and is believed to be a severe form of preeclampsia.

Acute Fatty Liver of Pregnancy (AFLP)

Acute fatty liver of pregnancy (AFLP) is an uncommon illness that carries a mortality that may be as high as 30%. It presents as a progressive hepatic failure that occurs in the third trimester or the postpartum period and usually occurs in association with preeclampsia. Progressively rising liver enzymes are complicated by jaundice and coagulopathy and treatment includes both delivery and supportive management. Liver biopsy, if performed, will show extensive fatty infiltration of the liver. This disorder has been associated with the presence of LCHAD deficiency in the newborn and therefore all infants whose mothers have had AFLP should be screened for this metabolic abnormality.

Viral Hepatitis

Viral hepatitis is not an uncommon complication of pregnancy. Hepatitis A has no fetal effects and is not transmitted from mother to fetus. Hepatitis B and C however have significant rates of vertical transmission. All infants born in the United States of America receive hepatitis B vaccine. Infants born to mothers who are hepatitis B surface antigen positive should receive a higher dose of the vaccine and also be given hepatitis B immune globulin. There is presently no treatment available to decrease the maternal fetal transmission of hepatitis C. Hepatitis E is a relatively rare disease in North America but is significant because new infection with hepatitis E has a very high mortality rate during pregnancy that runs as high as 17%. The reason for this is not understood but it is presumably related to immune changes that occur during pregnancy.

Constipation

Constipation is a common complaint in pregnancy and once again is related to the effects of progesterone upon the smooth muscle of the bowel. It can generally be managed by

nonpharmaceutical methods such as bulk laxatives (psyllium products such as Metamucil) and surfactants (such as docusate sodium, i.e., Colace). It is also helpful to reassure pregnant women that some degree of constipation is normal during pregnancy and a decreased frequency of bowel movements itself does not require treatment.

Inflammatory Bowel Disease

The course of inflammatory bowel disease is not significantly affected by pregnancy. However, if the disease is active at the time of conception, it is likely to remain so. Steroids, sulfasalazine, antibiotics and 5' ASA have been used safely in pregnancy. Metronidazole, however, should be avoided in the first trimester. For patient women requiring TPN (total parenteral nutrition) during pregnancy, close monitoring of the blood glucose is required because of the increased insulin resistance seen in pregnancy.

Investigations

Indicated endoscopy, sigmoidoscopy, colonoscopy and biopsies can and should be performed during pregnancy with the same indications as would occur in the non-pregnant individual. There is no evidence of any increased complication rate for any of these procedures during pregnancy.

COMMON GASTROINTESTINAL COMPLAINTS IN PREGNANCY

Case Discussion

Case #1

22 year-old G₁P₀ woman at 30 weeks gestation with twins presents with nausea and vomiting, malaise, and headache. She has no previous medical history and her pregnancy has been uncomplicated thus far.

Physical exam on admission reveals HR 90, T 97, RR 14, and **BP 150/90**. The rest of the physical exam is normal and the fetuses test well.

Laboratory evaluation shows:

- WBC 18 HGB 14 PLT 140
- CR 0.9mg/dL (80 Φ mol/L) BUN 25mg/dl (8.9 mmol/L)
- uric acid 5.5 mg/dL (327 Φ mol/L)
- urinalysis shows 2+ proteinuria
- AST 100 (1.7 Φ kat/L) ALT 86 (1.4 Φ kat/L) ALKP 140 Bili 30 Φ mol/L (1.7mg/dL)
- INR 1.0 PT 12 PTT 28

The patient is admitted with presumed PIH for bed rest and observation. Hepatitis A, B, and C serologies are sent.

During the first 48 hours after admission the patient's blood pressure varies from 140/80 to 160/94. On the third morning since admission a nurse reports that the patient was transiently confused this morning prior to breakfast.

Examination on morning rounds reveal that the patient has a normal neurologic assessment but that she has developed mild scleral icterus.

Labs are repeated:

- WBC 20 HGB 14 PLT 100
- CR 1.0 mg/dL (88 mmol/L) BUN 30 mg/dL (10.7 mmol/L)
- electrolytes normal glucose 50mg/dL (2.7 mmol/L)
- U/A 2+ proteinuria
- AST 400U/L (6.6 Φ kat/L) ALT 530U/L (8.8 Φ kat/L) Bili 30 Φ mol/L(1.7mg/dL)
- INR 2.0 PT 16 PTT 38

An ammonia is subsequently sent and is mildly elevated.

What are the possible diagnoses at this point? What is the most likely diagnosis?

How might the episode of confusion this morning be explained?

How can the distinction between HELLP and AFLP be made? Is there a clinical utility in making the distinction?

What are this woman's risk factors for AFLP? For HELLP?

What would your next step be?

What is the role for liver biopsy in this situation?

If this is AFLP, what is the expected course?

Was the initial diagnosis of PIH wrong? If not, what is the association between PIH and AFLP?

The patient is started on a glucose drip.
Hepatitis A, B and C serologies from admission come back negative.
Gastroenterology is consulted to consider a liver biopsy.
Further fetal testing is carried out and both fetuses have a good NST.

Induction is begun on the patient and steroids are given to aid fetal lung maturity.

What are the relative merits of vaginal vs. operative delivery in this situation?

Progression of the first stage is slow and at 72 hours into the admission the patient is now markedly jaundiced and demonstrates signs of mild encephalopathy.

Delivery is assisted by forceps and complicated by considerable postpartum hemorrhage. She is given FFP to correct her coagulopathy but the bleeding settles down despite the fact that her PT and PTT remain elevated at 16 and 43 respectively.

Why do many women with coagulopathy still achieve good hemostasis postpartum?

Postpartum the liver enzymes continue to rise for a few days and her jaundice and encephalopathy worsen and require supportive management. On postpartum day 5 her liver enzymes begin a downward trend however and her PT and PTT no longer require supportive transfusions of factors.

What endocrine condition can complicate the course of AFLP?

What options are available for those patients who do not improve?

The patient continues to improve and is discharged two weeks postpartum with a healthy baby.

What is her risk of recurrence in subsequent pregnancies?

What residual do we tell her to anticipate?

COMMON GASTROINTESTINAL COMPLAINTS IN PREGNANCY

Case Discussion

Case #2

REFLUX

A 38-year-old woman in your practice comes to see you at 32 weeks gestation with complaints of an epigastric or retrosternal burning that she calls “heartburn”. It is periodically associated with an acid taste in her mouth. It is worse when she lies down to go to bed at night and after a meal. She has not taken any caffeinated beverages or alcohol during this pregnancy. She is not a smoker. She has tried some Tums® and Roloids® with partial relief of the pain. She had a duodenal ulcer diagnosed 3 years ago and was treated with a 4-week course of ranitidine with a good symptomatic response. She has been gaining weight normally during this pregnancy.

Her examination is completely normal.

Key Points to Review

- 1. Gastroesophageal reflux disease is almost universal during pregnancy. It is believed to be caused by the decreased gastroesophageal sphincter tone and decreased gastric motility that is a direct effect of progesterone.***
- 2. Conservative methods such as elevating the head of the bed, not eating before bedtime, and avoidance of precipitating foods are important but generally not that effective in pregnancy. All the common antacids can be used comfortably in pregnancy. Ranitidine is the preferred H₂ antagonist for use in pregnancy and can be very effective in this setting. Sucralfate is also a reasonable agent to use during pregnancy as it is not significantly systemically absorbed. The data on proton pump inhibitor use in pregnancy is limited and therefore these agents should only be used in special circumstances during pregnancy.***
- 3. Endoscopy and upper gastrointestinal radiologic investigations can be safely carried out during pregnancy.***

REFERENCE

Riely CA, Abell TL. Gastrointestinal and Liver Problems in Pregnancy.
*Gastroenterology Clinics of North America.*1992;21(4).

COMMON GASTROINTESTINAL COMPLAINTS IN PREGNANCY

Case Discussion

Case #3

CONSTIPATION

An 18-year-old patient at 12 weeks gestation comes to you because she is feeling very constipated. Before she got pregnant she had a daily bowel movement first thing in the morning after her morning coffee. She now finds she goes only three times a week and she is very concerned about it. She reports no evidence of any gastrointestinal bleeding. She has not lost any weight and her examination, including a rectal examination, is completely normal.

Key Points to Review

- 1. Constipation is very common throughout pregnancy. This is due to the relaxing effect of progesterone on smooth muscle.***
- 2. The most important therapeutic intervention for a care provider to make with respect to constipation during pregnancy is to reassure the patient that it is normal and that it does not in and of itself warrant treatment. Bulk psyllium agents, surfactants such as docusate (surfak/colace), glycerin suppositories and the peristaltic agent bisacodyl (dulcolax) and senna (senokot) are reasonable to use when necessary in pregnancy.***
- 3. In women who have increased frequency of stools, bloating and flatulence when pregnant, the possibility of lactose intolerance should be considered. Many women increase their milk intake during pregnancy as a way of increasing their calcium intake and this may unmask a relative lactose intolerance in some individuals.***

REFERENCE

Riely CA, Abell TL. Gastrointestinal and Liver Problems in Pregnancy. *Gastroenterology Clinics of North America*.1992;21(4).

GASTROINTESTINAL DISEASE IN PREGNANCY

References

Hyperemesis

Brown TH, Ramirez B, Richter JE. Gastrointestinal motility disorders during pregnancy. *Annals of Internal Medicine* 1993;118:366-75.

Dakar N. Nausea and vomiting in pregnancy: a review of the problem with particular regard to psychological and social aspects. *British Journal of Obstetrics and Gynecology* 1995;102:608.

Hod M, Orvieto R, Kaplan B, Friedman S, Ovadia J. Hyperemesis gravidarum. *The Journal of Reproductive Medicine* 1994;39:605-612.

Iancu I, Kotler M, Spivak B, Radwan M, Weizman A. Psychiatric aspects of hyperemesis gravidarum. *Psychother Psychosom* 1994; 61:143-49.

Tareen AK, Baseer A, Jaffry HF, Shafiq M. Thyroid hormone in hyperemesis gravidarum. *J Obstet Gynecol* 1995; 21(5):497-501.

Liver Disease (General)

Assy N, Minuk GY. Liver disease in pregnancy. *Journal of the American College of Surgeons* 1996;183(6):643-53.

***Knox TA, Olans LB: Liver disease in pregnancy. Current Concepts. Review article. N Engl J Med 1996; 335(8):569-76.**

Wolf JL. Liver disease in pregnancy. *Medical Clinics of North America* 1996;80(5):1167-87.

HELLP

Sibai BM, Kustermann L, Velasco J. Current understanding of severe preeclampsia, pregnancy associated hemolytic uremic syndrome, thrombotic thrombocytopenic purpura, hemolysis, elevated liver enzymes, and low platelet syndrome, and postpartum acute renal failure: different clinical syndromes or just different names? *Current Opinion in Nephrology and Hypertension* 194;3:436-45.

Viral Hepatitis

- Bohman VR, Stettler RW, Little BB, et al: Seroprevalence and risk factors for hepatitis C virus antibody in pregnant women. *Obstet Gynecol* 1992; 80:609-13.
- Chang M. Mother to infant transmission of hepatitis C virus. *Clin Invest Med* 1996; 10(2):227-42.
- Floreani A, Paternoster D, Zappala F, Cusinato R, Bombi G, Grella P, Chiamonte M. Hepatitis C virus infection in pregnancy. 1996; 103:325-29.
- Lynch-Salamon DI, Combs CA: Hepatitis C in obstetrics and gynecology. *Obstet Gynecol* 1992; 79:621-9.
- Mast EE, Purdy MA, Krawczynski K. Hepatitis E. *Balliere's Clinical Gastroenterology* 1996;10(2):227-42.
- Mishra L, Seeff LB: Viral hepatitis, A through E, complicating pregnancy. *Gastroenterology Clinics of North America* 1992; 21(4):873-87.
- Ohto H, Terazawa S, Sasaki N: Transmission of hepatitis C virus from mothers to infants. *N Engl J Med* 1994; 330:744-50.
- Pastorek JG. The ABCs of hepatitis in pregnancy. *Clinical Obstetrics and Gynecology* 1993;36(4):843-54.
- Simms J, Duff P. Viral hepatitis in pregnancy. *Seminars in Perinatology* 17(6):384-93.
- Sjogren MH: Hepatic emergencies in pregnancy. *Medical Clinics of North America* 1993; 77(5):1115-27.
- Wejstal R, Widell A, Mansson AS, et al: Mother-to-infant transmission of hepatitis C virus. *Annals of Internal Medicine* 1992; 117:887-90.

Cholestatic Liver Disease

- Poupon R, Poupon RE. Ursodeoxycholic acid in therapy of chronic cholestatic conditions in adults and children. *Pharmac Ther* 1995; 66:1-15.
- Van de Meeberg PC, Van Erpecum KJ, van Berge-Henegouwen GP. Therapy with ursodeoxycholic acid in cholestatic liver disease. *Scandinavian Journal of Gastroenterology* 1993; 200S:15-20.

Cholelithiasis

Everson GT. Pregnancy and gallstones (editorial). *Hepatology* 1993; 17(1):159-61.

Maringhini A, Ciambra M, Baccelliere P: Biliary sludge and gallstones in pregnancy: incidence, risk factors, and natural history. *Ann intern Med* 1993:116-120.

Martin IG, Dexter SP, McMahon MJ. Laparoscopic cholecystectomy in pregnancy. *Surgical Endoscopy*. 1996; 10:508-10.

Reyes H: The spectrum of liver and gastrointestinal disease seen in cholestasis of pregnancy. *Gastroenterology Clinics of North America* 1992; 21(4):905-21.

Scott LD: Gallstone disease and pancreatitis in pregnancy. *Gastroenterology Clinics of North America* 1992; 21(4):803-960.

Tsimoyiannis EC, Antoniou NC, Eaboulas C, Papanikolaou N. Cholelithiasis during pregnancy and lactation. *Eur J Surg* 1994; 160:627-31.

Valdivieso V, Covarrubias C, Siegel F, Cruz F. Pregnancy and cholelithiasis: pathogenesis and natural course of gallstones diagnosed in early puerperium. *Hepatology* 1993; 17:1-4.

Reflux/PUD

Champion MC: Upper gastrointestinal disorders during pregnancy. In: Lee RV, Garner PR, Barron WM, Coustan DR, eds. Eds. *Current Obstetric Medicine* 1996; 4:209-45.

Olans LB, Wolf JL. Gastroesophageal reflux in pregnancy. *Gastrointestinal Endoscopy C*

Irritable Bowel Syndrome / Constipation / Diarrhea

West L, Warren J, Cutts T. Diagnosis and management of irritable bowel syndrome, constipation, and diarrhea in pregnancy. *Gastroenterology Clinics of North America* 1992;21(4):793-802.

IBD

Barakoff R, Opper F. Pregnancy and nursing in inflammatory bowel disease. *Gastroenterology Clinics of North America*. 1995; 24(3):689-98.

Castiglione F, Pignata S, Morace F, Sarrubi A, Baratta MA, D'Agostini L, D'Arienzo A, Mazzacca G. Effect of pregnancy on the clinical course of a cohort of women with inflammatory bowel disease. *Ital J Gastroenterol* 1996; 28:199-204.

Habal FM, et al. Oral 5-aminosalicylic acid for inflammatory bowel disease in pregnancy. Safety and clinical course. *Gastroenterology* 1993; 105(4):1057-60.

Hanan IM. Inflammatory bowel disease in the pregnant woman. *Comprehensive Therapy*. 1993; 19(3):91-5.

Korelitz BI: Inflammatory bowel disease in pregnancy. *Gastroenterology Clinics of North America* 1992; 21(4):827-33.

Rogers RG, Katz VL. Course of Crohn's disease during pregnancy and its effect on pregnancy outcome: a retrospective review. *American Journal of Perinatology* 1995; 12(4):262-64.

Endoscopy

Cappell MS. Gastrointestinal endoscopy in high risk patients. *Digestive diseases* 1996; 14:228-44.

Surgical Abdomens

Fallon WF, Newman JS, Fallon GL, Malangoni MA. The surgical management on intra-abdominal inflammatory conditions during pregnancy. *Surgical Clinics of North America* 1995; 75(1):15-31.

Miscellaneous Liver Disease

Baruch Y, Weiner Z, Enat R, Ronen N, Blumenfeld Z. Pregnancy after **liver transplantation**. *Int J Gynecol Obstet* 1993;41:273-76.

Janczewska I, Olsson R, Hultcrantz R, Broome U. Pregnancy in patients with **primary sclerosing cholangitis**. *Liver* 1996;16:326-30.

Laifer SA, Guido RS. Reproductive function and outcome of pregnancy after **liver transplantation** in women. *May Clin Proc* 1995; 70:388-94.

Paternoster DM, Floreani AR, Paggiaro A, Laureti E. **Portal hypertension** in a pregnant woman. *Minerva Ginecologica* 1996; 48:243-45.

Rabinovitz M, Appasamy R, Finkelstein S: Primary biliary cirrhosis diagnosed during pregnancy. Does it have a different outcome? *Digestive Diseases and Sciences*. 1995; 40(3):571-4.

Pancreatitis

Swisher SG, Hunt KK, Schmit PJ, Hiyama DT, Bennion RS, Thompson JE. Management of pancreatitis complicating pregnancy. *American Surgeon*. 1994;60:759-62.

