
The acute abdomen and the obstetrician

V. Sivanesaratnam MBBS (S'pre), FRCOG, FICS, FACS, FAMM

Professor, Head and Senior Consultant

Department of Obstetrics and Gynaecology, Faculty of Medicine, University of Malaya, Kuala Lumpur, Malaysia

An acute abdomen in pregnancy can be caused by pregnancy itself, be predisposed to by pregnancy or be the result of a purely incidental cause. These various conditions are discussed. The obstetrician often has a difficult task in diagnosing and managing the acute abdomen in pregnancy. The clinical evaluation is generally confounded by the various anatomical and physiological changes occurring in pregnancy itself. Clinical examination is further hampered by the gravid uterus. The general reluctance to use conventional X-rays because of the pregnancy should be set aside when faced with the seriously ill mother. A reluctance to operate during pregnancy adds unnecessary delay, which increases morbidity for both mother and fetus. Such mistakes should be avoided as prompt diagnosis and appropriate therapy are crucial. A general approach to acute abdominal conditions in pregnancy is to manage these problems regardless of the pregnancy.

Key words: acute abdomen; obstetrics.

The acute abdomen in pregnancy constitutes one of the most difficult diagnostic problems in the practice of obstetrics. It is always a source of anxiety, from both the maternal and the fetal point of view. All abdominal catastrophes that occur in the non-pregnant woman can also occur in pregnancy. Because of the risks of abortion and preterm labour, one needs to be sure of the indications for intervention of the various acute conditions before advising that the abdomen be opened. Furthermore, the various anatomical and physiological changes occurring in pregnancy can confuse or mask serious underlying intra-abdominal pathology. An understanding of the anatomical and physiological changes in pregnancy is, therefore, important.

ANATOMICAL AND PHYSIOLOGICAL CHANGES

The most noticeable anatomical change is that seen in the uterus: from the non-pregnant, 70 g organ, it increases to 1110 g with an intrauterine volume of 5 l or more.^{1,2} This enlarging uterus alters anatomical and topographical landmarks. By the second trimester, the adnexae become abdominal organs, and as the uterus enlarges further, these come to lie posterior to the uterus, making the detection of ovarian enlargement by palpation difficult. Furthermore, there is also superior and lateral displacement of the intestines and omentum by the uterus. As described by Baer et al³ in 1932, the appendix is progressively displaced upwards and laterally from McBurney's

point at the third month to be closer to the gallbladder by late pregnancy. The omentum is prevented by the gravid uterus from containing areas of peritonitis. The anterior abdominal wall is stretched and elevated; underlying inflammation often fails to exert direct parietal peritoneal irritation, thus concealing muscular responses (guarding) that would otherwise be expected to occur. Even after delivery, the relaxed and thinned abdominal muscles do not respond actively with guarding or rigidity to underlying peritoneal inflammation.

Clinical and ultrasound assessment, and positioning on the operating table in the third trimester, must take into account the well-recognized supine hypotensive syndrome caused by vena caval obstruction that can occur in 10% of patients; further uterine blood flow could also be compromised.^{4,5,6} Thus, these women should not remain supine except for brief periods. As the uterus enlarges, tension on the round ligaments increases. Spasm of the smooth muscle in these ligaments can produce discomfort and mild pain in the iliac fossa, seen more often in multigravidae than primigravidae.

The total white cell count rises in pregnancy, reaching a peak at 30 weeks and a plateau during the third trimester. The mean total white cell count is around $9.0 \times 10^9/l$, values rising to as high as $40.0 \times 10^9/l$ at the onset of labour in uncomplicated pregnancies. The count returns to the non-pregnant level by the sixth postpartum day.⁷ Therefore, leukocytosis may not be helpful in diagnosing intra-abdominal inflammatory conditions such as appendicitis.

Although the red cell mass increases in pregnancy, there is a greater expansion of the plasma volume, resulting in a 3–4% fall in the haematocrit. This fact should be taken into account in the evaluation of uterine or intra-abdominal bleeding. The plasma albumin concentration decreases by 30% in pregnancy⁸, so care needs to be taken during any rapid infusion of crystalloid solutions in order to prevent pulmonary oedema.

COMPLICATIONS OF PREGNANCY

These can be divided into two groups:

1. those occurring in early pregnancy;
2. those occurring in later pregnancy.

Conditions that tend to occur in early pregnancy

Ruptured ectopic pregnancy

Lower abdominal pain associated with vaginal bleeding in the first trimester is seen in threatened abortion occurring in an intrauterine pregnancy or a ruptured ectopic (usually tubal) gestation. The pain in the former is usually cramp-like and hypogastric, and the diagnosis is easily confirmed on ultrasound examination. The rupture of a tubal pregnancy causes a sharp pain in one or other iliac fossa and the woman collapses. This proceeds to abdominal distension, generalized abdominal tenderness, shifting dullness and shoulder tip pain. The condition demands urgent laparotomy. A pelvic examination in such a situation should be avoided as further bleeding may be provoked and be fatal before surgical intervention is undertaken. Rarely, a concomitant intrauterine and extrauterine pregnancy (heterotropic) can occur and should be kept in mind; the reported incidence of this varies from 1 in 7000 to 1 in 30 000 pregnancies.⁹

A ruptured pregnant rudimentary horn is, in all respects, similar to a ruptured ectopic pregnancy. However, the former usually occurs between 12 and 20 weeks' gestation.

Septic abortion with peritonitis

This is not commonly seen today in Malaysia but is an important cause of death in Asia. A history of amenorrhoea and a history of interference may be denied. Depending on the amount of blood lost and the degree of septicaemia, the woman is often in shock. The temperature, which is usually raised, may be subnormal in severe cases. There is tachycardia and leukocytosis. The abdomen is slightly distended with varying degrees of tenderness and guarding, more marked in the lower than the upper abdomen. Pelvic examination will reveal a soft open cervix with an offensive blood-stained discharge coming through from the uterine cavity. Evidence of interference, such as twigs, may sometimes be present.

These patients are often ill. After cultures from the cervix and blood have been taken, broad-spectrum antibiotics and metronidazole (for anaerobic organisms) should be commenced. Tetanus toxoid administration may be worthwhile in developing countries. After 12–24 hours of adequate antibiotic cover, exploration of the uterine cavity under general anaesthesia should be carried out. A digital exploration and removal of the dislodged products of conception with a sponge forceps will often suffice. Curettage is best avoided as the soft uterus may be perforated. As renal failure can occur, a careful check needs to be kept on the urinary output.

Acute retention of urine owing to a retroverted gravid uterus

This commonly occurs around the 14th week of pregnancy when the retroverted gravid uterus becomes trapped beneath the sacral promontory; in the presence of fibroids, this might occur earlier. The woman may complain of severe abdominal pain and urinary frequency. Abdominal examination will reveal a centrally situated cystic mass arising out of the pelvis, which may be mistaken for an ovarian cyst. The cervix may be extremely difficult to visualize on speculum examination as, because of the retroversion, it is displaced anteriorly and upwards behind the symphysis pubis. A rectovaginal examination will confirm the body of the retroverted gravid uterus. The passage of a catheter is diagnostic. After the bladder has been emptied, the retroverted gravid uterus can be clearly defined on bimanual examination; an ultrasound examination is useful in differentiating a posteriorly situated myoma. A continuous bladder drainage and the semi-prone position in bed will often help to correct the retroversion. Digital repositioning by pressure via the posterior fornix under anaesthesia is occasionally needed.

Conditions arising later in pregnancy

Red degeneration of a fibroid

Pain is not usually a feature of a fibroid. However, severe pain associated with 'red' or 'carneous' degeneration (acute infarction) within a fibroid is not uncommon in pregnancy. This results from an inadequacy of blood supply to the myoma during pregnancy. The pain and tenderness are usually quite localized over the fibroids. There is usually a low-grade pyrexia and leukocytosis. An ultrasound examination is useful in

diagnosis and in following regression of the fibroid in pregnancy. It is important to recognize this condition as its management is essentially conservative – analgesics and bed rest. The prognosis for the rest of pregnancy is generally good.

Torsion of a subserosal pedunculated myoma

This usually presents in much the same way, but a localized tender mass may be readily palpable. Laparotomy and removal are indicated. A subserosal myoma in pregnancy can have large, engorged veins coursing over its surface. The rupture of such a vein, requiring laparotomy, has been reported in pregnancy.¹⁰

Concealed accidental haemorrhage (abruptio placentae)

An entirely concealed accidental haemorrhage occurs in about 20% of cases of abruptio placentae. This usually occurs after 30 weeks, and a preceding history of pregnancy-induced hypertension may not be present. The pain often starts suddenly and becomes continuous and severe. Fetal movements usually cease, and a board-like rigidity of the abdomen as a result of muscular spasm becomes evident. Proteinuria is often present but may be absent initially. The fetal parts may not be palpable.

When first seen, the patient is in shock, with pallor, hypertension and shallow respiration. No guide to the severity of the haemorrhage or degree of coagulation failure can be given by the amount of visible vaginal bleeding.

The diagnosis of placental abruption is primarily a clinical one. Ultrasonography may detect only 2% of abruptions; the reason for undertaking this examination will be more to exclude a placenta praevia and assess fetal viability.

Management will include careful monitoring of maternal haemodynamics, serial haematocrit readings and coagulation profile, and delivery. The intensive monitoring of both mother and fetus is essential as either's condition may deteriorate rapidly. Fluid (Ringer's lactate) and blood (whole or packed cells) should be given liberally if indicated. A central venous line is essential for monitoring the patient's haemodynamic status.

Caesarean section will be needed for obstetric indications only as labour and delivery in these patients is often rapid; vaginal delivery is preferred as long as there is no fetal distress. An amniotomy should be done as soon as possible as this not only hastens labour but also reduces disseminated intravascular coagulation (DIC). The use of oxytocin to augment labour does not aggravate thromboplastin release.¹¹ In cases of mild placental abruption, where the fetus is still alive and vaginal delivery is not imminent, prompt caesarean section may save the baby. Because of the risk of developing DIC, blood, fresh frozen plasma, cryoprecipitate and platelets should be given as indicated based on clinical and laboratory findings.

Severe pregnancy-induced hypertension

Epigastric and right upper quadrant pain may occur in the mid-to-late trimesters of pregnancy as a result of hepatic involvement; this occurs in 10% of patients with severe eclampsia¹¹ and is also a sign of impending eclampsia. The diagnosis is frequently obvious, hypertension, proteinuria and oedema often being present. Laboratory evidence of haemolysis, elevated liver enzyme levels and thrombocytopenia will constitute the HELLP syndrome.¹² Delivery soon after stabilization of the medical

problem is recommended. Subscapular haemorrhage should be looked for and be confirmed with ultrasound. The recurrence risk of HELLP syndrome is minimal.¹³

Spontaneous rupture of liver in pregnancy

This rare complication nearly always occurs in the third trimester, although this can occur rarely in the puerperium and occasionally in early pregnancy.¹⁴ The patients are usually multiparous, 80% having pre-eclampsia/eclampsia. The onset of severe upper abdominal pain is sudden. The diagnosis may be assisted by ultrasound or computerized tomography. Signs of shock and abdominal swelling soon appear, suggesting that an intra-abdominal catastrophe has occurred and necessitating immediate caesarean section. Even with early surgical intervention, a high fetal mortality of 40%, as well as a high maternal mortality of 70%, have been reported.¹⁵ The correction of hypovolemia, anaemia and coagulopathy should be instituted immediately. Control of the bleeding can be difficult; hepatic artery ligation, partial hepatic resection, repair of the laceration and packing can be tried.

Uterine rupture

This should be borne in mind as a possibility in women of high parity or in one whose uterus has been scarred by previous caesarean section, hysterotomy, myomectomy or uterine perforation. Symptoms include sudden pain that becomes constant, shock and collapse. Vaginal bleeding is common, and massive intraperitoneal bleeding can occur. 'Silent' rupture can occur where pain is minimal, but fetal distress commonly develops and the patient soon goes into shock. Abnormal contouring of the abdomen may also occur.

A high index of suspicion is required. Immediate laparotomy and in most instances total abdominal hysterectomy are required. In women of low parity who desire further children, debridement of the rupture site and primary closure may be considered.

Preterm labour

The pain here has characteristics distinguishing it from that arising from other causes. The pain is at first felt in the lower back, radiating to the front. It is intermittent, gradually becoming stronger and more frequent. The external cardiotocograph is helpful to confirm the diagnosis as well as being useful in the first 24 hours after abdominal surgery.

Laparotomy in pregnancy

In view of the increasing risk of preterm labour after mid-pregnancy, elective abdominal surgical procedures (e.g. for ovarian cyst in pregnancy) are best performed in the second trimester.

ACUTE PAIN FROM CONCOMITANT LESIONS

There are various other conditions that can cause pain during pregnancy. Some of these have a predisposition to occur in pregnancy, others being purely incidental.

Conditions associated with pregnancy

Because of the anatomical, hormonal and metabolic changes occurring in pregnancy, there are a number of conditions in which pain may be a prominent symptom.

Acute pyelonephritis

This occurs in 1–2% of pregnancies¹⁶, most frequently in the second and third trimesters, and is one of the most common reasons for hospitalization in pregnancy. It is usually a sequel to untreated asymptomatic bacteriuria, and prompt treatment of the latter will prevent at least 70% of such cases.^{17,18}

The classical symptoms include nausea, fever, rigors, loin pain, dysuria and frequency. Obstructive uropathy and urinary stasis are predisposing factors. A negative urine examination does not exclude the possibility of pyelonephritis. In unilateral infections, the ureter on the affected side occasionally becomes blocked by spasm, kinking or debris, and in such cases, which are always of the severe variety, it is wise to institute treatment on clinical grounds.

Treatment must be aggressive as severe acute pyelonephritis may be associated with sepsis and adult respiratory distress syndrome. Patients therefore need to be hospitalized for adequate hydration and parenteral antibiotic therapy; a penicillin (ampicillin) together with an aminoglycoside (gentamycin) for 5 days is followed by oral therapy for a further 10 days. Symptoms usually resolve within 24–48 hours; if this does not happen, antibiotics may be changed based on the culture and sensitivity reports.

Acute cystitis

This occurs in about 1% of pregnant women. It is more common in the second trimester and is characterized by suprapubic pain, dysuria, frequency, urgency and haematuria. Unlike acute pyelonephritis, it is not usually preceded by asymptomatic bacteriuria and rarely leads to pyelonephritis.¹⁹ Treatment consists of a 7–10-day course of ampicillin or a first-generation cephalosporin. Nitrofurantoin has also been safely used in pregnancy.

Acute intestinal obstruction

This is rare in pregnancy, the incidence ranging from 0.0014% to 0.0034%.²⁰ It occurs most often – in about 50–70% of cases – as a result of adhesions from previous surgery.^{21,22} It generally occurs in the third or fourth month of pregnancy (as the uterus rises out of the pelvis), in late pregnancy (when the head engages) and in the early days of the puerperium (as the uterus involutes). Volvulus of the small and large bowel^{23,24} in pregnancy has been reported.

Diagnosis is often delayed, as symptoms of cramp-like pain, vomiting and constipation can be mistaken for the pain of labour, abortion or just pregnancy symptoms.²⁴ A common misdiagnosis in the second and third trimester is hyperemesis gravidarum. The use of tocolytic agents to suppress premature uterine contractions can predispose to and intensify the intestinal obstruction.²⁴ A delay in diagnosis can result in high maternal and perinatal morbidity and mortality, particularly when neglect leads to strangulation, with disastrous sequelae.²⁰ A recent study noted maternal and fetal mortality rates of 6% and 26% respectively; 23% of cases required bowel resection because of strangulation.²⁵

Concern about the effects of ionizing radiation on the fetus might deter one from subjecting a patient to abdominal radiography. A single upright X-ray film showing loops of bowel and air–fluid levels is valuable in confirming the diagnosis.

Fluid and electrolyte replacement, bowel decompression and finally surgical intervention for failed conservative management are the essentials. Surgery, if performed, should be carried out through an appropriate incision without disturbing the uterus; if uterine contractions occur post-operatively, tocolytics should be employed.

The condition should not be confused with true pregnancy ileus, in which there is no organic cause for the dilated large bowel. Laparotomy is contra-indicated in this condition, and early delivery may be the best option.

The classical Ogilvie's syndrome²⁶ can present as postpartum abdominal distension. The diagnosis is usually made radiologically. In this condition, the grossly distended colon is at risk of perforation at a critical diameter of 9–12 cm^{27,28}, with a clinically significant mortality rate of 8% in cases of impending perforation and a mortality rate as high as 71% in cases of caecal perforation. Conservative treatment with hydration, nasogastric suction and colonic decompression at colonoscopy will be the mainstay of initial treatment. A caecostomy may have to be resorted to if no change occurs after 72 hours of conservative therapy.

Acute cholecystitis and cholelithiasis

A higher incidence of cholelithiasis and cholecystitis occurs in pregnancy. The increased serum cholesterol and lipid levels in pregnancy, as well as decreased gallbladder motility and delayed emptying, are partly responsible^{29,30}; virtually all of the gallstones found in pregnancy are composed of cholesterol. Asymptomatic cholelithiasis occurs in 3.5% of pregnant women³¹ and is the cause of cholecystitis in pregnancy in over 90% of cases.³²

The symptoms are essentially the same as in non-pregnant patients. Nausea, vomiting and an acute onset of colicky and/or stabbing pain in the right upper quadrant, together with tenderness and guarding, suggest biliary tract disease. There is usually an associated fever and leukocytosis. Murphy's sign is less commonly elicited in pregnancy.³³ The evaluation of tenderness and guarding can be difficult in the third trimester because of the large uterus. Ultrasonography will accurately diagnose more than 90% of gallstones³¹; the increased thickness of the gallbladder wall seen on ultrasonography will help to confirm the diagnosis. However, it must be borne in mind that appendicitis, the most common surgical condition in pregnancy, can masquerade as cholecystitis because of the high displacement of the appendix in the latter months of pregnancy.

Potentially life-threatening conditions must be kept in mind in the differential diagnosis: myocardial infarction, acute fatty liver of pregnancy, severe pre-eclampsia and HELLP syndrome. Other less serious conditions include acute pancreatitis, hepatitis, peptic ulcer, pneumonia, pyelonephritis and Herpes zoster infection.

In the first and third trimesters, acute cholecystitis is generally managed conservatively by intravenous hydration, gastric suction, the judicious use of narcotics and antibiotics for signs of sepsis. Surgery is reserved for those with failed medical treatment, those experiencing recurrent attacks of biliary colic, suspected perforation, sepsis or peritonitis. Recent reports suggest a primary surgical approach in the second trimester.³⁴ However, an individualized approach should be adopted. Although laparoscopic cholecystectomy in pregnancy has been performed in a few cases^{35,36}, this approach is generally not recommended.

Acute fatty liver of pregnancy

This is a serious complication that is peculiar to pregnancy. Its incidence is about 1 per 10 000 pregnancies³⁷, and it most commonly occurs in the third trimester of pregnancy or the early postpartum period. The precise pathogenesis is unknown; in some instances it may result from an inborn error of metabolism, possibly a deficiency of long chain 3-hydroxyl co-enzyme A dehydrogenase.³⁸

The condition usually starts with a sudden onset of nausea, vomiting, abdominal pain and jaundice without fever. Hypertension and pre-eclampsia are present in about 50% of patients. Extreme polydipsia and pseudodiabetes insipidus, as well as increased irritability, may be present. The patient usually rapidly progresses into hepatic coma and renal failure. The high mortality of 75–90%¹⁴ is similar to that of other causes of fulminant hepatic failure. DIC is a particularly common occurrence. The condition should be recognized early as immediate delivery results in a survival rate of up to 72%.³⁸

The initial medical treatment aims at the correction of fluid, electrolyte and coagulation abnormalities. Survivors have no residual hepatic damage, and recurrence in subsequent pregnancies is uncommon.

Rupture of the rectus abdominus muscle

The rare injury occurs in late pregnancy or in labour and is usually precipitated by coughing; almost 90% of the patients are multigravida. The bleeding occurs posteriorly to the muscle from the deep epigastric vessels and is more often below the linea seminalis, where there is no posterior sheath to prevent the blood from tracking freely. In the upper abdomen, the rectus sheath is complete, and the interdigitations in the muscle help to localize the haematoma.

Diagnosis can be difficult. Typically, a sudden onset of pain and faintness occurs after a cough, with a tender elongated swelling on one or other side of the lower abdomen. Should blood lie directly on the peritoneum, the peritonism that results can pose difficulties in differentiating the condition from other acute intra-abdominal conditions such as the red degeneration of a fibroid, acute appendicitis, torsion of an ovarian cyst and abruptio placentae.

Small haematomas are managed expectantly as these resolve in a few days; those in the lower abdomen can, however, cause shock. Thus, if the haematoma is enlarging, the mass must be explored and the deep epigastric or other bleeding vessels ligated. Four out of 28 patients reported by Torpin³⁹ died.

Torsion of the pregnant uterus

This rare complication of pregnancy usually occurs in the presence of an abnormal fetal presentation, an ovarian tumour, a myoma, adhesions or a uterine anomaly. The main symptom is severe pain. Signs of shock rapidly develop and may become profound. The thickened cord-like round ligament sometimes becomes palpable obliquely across the abdomen. Vaginal examination reveals the cervical canal to be twisted and closed, and the urethra displaced. The diagnosis is, however, rarely made before laparotomy. Caesarean section is usually performed for obstructed labour or abruptio placentae. When the abdomen is opened, torsion of the uterus above the cervix is recognized and the incision often has to be made on the posterior uterine wall to deliver the fetus. Crona and Bachrach⁴⁰ report the delivery of a 4.3 kg live baby in this manner

with spontaneous rotation of the uterus to its normal position after closure of the uterine incision.

Conditions incidental to pregnancy

Of these, acute appendicitis is by far the most common. Other causes include acute pancreatitis, intraperitoneal haemorrhage, a ruptured haemorrhagic corpus luteum, the torsion of ovarian cysts, a perforated peptic ulcer, abdominal trauma and acute intra-abdominal haemorrhage from other causes.

Acute appendicitis

The incidence of acute appendicitis in pregnancy is approximately 1 in 1500 gestations.^{41–43} This is similar to that found in the non-pregnant female population.⁴⁴ Although with improved surgical techniques and antibiotics maternal mortality is now a rarity, fetal morbidity and mortality with perforated appendicitis ranges between 33% and 43%, and is closely linked to a delay in surgical intervention.^{45,46} Babler in 1908 noted that ‘the mortality of appendicitis complicating pregnancy and the puerperium is the mortality of delay’⁴⁷; in the absence of perforation, the fetal loss is 1.5% or less.⁴¹

The diagnosis of appendicitis in pregnancy can often be difficult. The usual symptoms of acute appendicitis, such as nausea, vomiting, epigastric and lower abdominal pain, may be less apparent in pregnancy. The progressive upward movements of the appendix after the third month to reach the iliac crest by the end of the sixth month was observed by Baer et al³ in 1932 using serial radiographic studies in pregnancy. Such an anatomical shift of the appendix further confuses the picture; the other effects of the enlarging uterus have been discussed earlier in this chapter. The physiological leukocytosis of pregnancy adds to this confusion. Tenderness and guarding are elicited more laterally and higher than in the non-pregnant patient.

Pyelonephritis is the most common condition misdiagnosed in patients with acute appendicitis; the former is treated medically while the latter requires urgent surgical intervention. Other conditions mimicking appendicitis include preterm labour, abruptio placentae, the red degeneration of a myoma, adnexal torsion and acute cholecystitis. Alders’ sign is useful in differentiating uterine from appendiceal pain⁴⁸: if the pain localized in the supine position does not shift to the left when the patient turns to her left, appendicitis is suspected.

A high index of suspicion is crucial in reaching an early diagnosis. The aim is to minimize fetal and maternal mortality; hence, a higher negative laparotomy rate in pregnancy is acceptable. Negative laparotomy rates of 20–35% have been reported⁴¹ and appear acceptable. If the appendix appears normal, it is important to look for other causes, such as an infarcted normal ovary, omental infarcts, cholecystitis and a ruptured corpus luteum; in one of our patients, a small 2 cm pedunculated myoma on the right side of the uterus had undergone torsion and gangrene.

The type and location of the incision depends on the trimester of pregnancy. In the first trimester, a paramedian incision is generally appropriate in view of the high incidence of false-positive diagnosis. In the second and third trimesters, a muscle-splitting incision centred over the point of maximal tenderness appears to provide the best exposure. The uterus should be displaced away from the incision so that it is not inadvertently incised. As a rule, the appendicitis is managed and the pregnancy is left undisturbed.

If perforation has occurred, copious irrigation, an intraperitoneal drain and broad-spectrum antibiotics (including anaerobic coverage) should be used. The peri-operative use of tocolytics is debatable in view of the limited data available; a recent study noted its use to be ineffective.⁴⁹

If the diagnosis of appendicitis is made in the early latent phase of labour, a laparotomy should be performed, and with a properly closed fascial layer, the risk of dehiscence is low and vaginal delivery may be allowed. In the active phase of labour and delivery is imminent, it is reasonable to allow vaginal delivery and perform an immediate postpartum laparotomy. In general, the decision to perform a caesarean section should be based on obstetric indications.

Acute pancreatitis in pregnancy

Acute pancreatitis in pregnancy is rare and is said to complicate 1 in 1000 to 1 in 10 000 pregnancies.⁵⁰ In our institution, this has occurred in 1 in 9151 deliveries.⁵¹ Although it is more frequent in the third trimester and postpartum, it can occur in the early and middle trimester as well. Cholelithiasis is the most common cause. Less common causes include medications (chorathiazide⁵²), infections and hyperlipidaemia, the serum lipid level in pregnancy rising from 600 to 1000 mg/ml.⁵³

The predominant symptoms and signs of acute pancreatitis are not altered by pregnancy, the most common being nausea, vomiting and severe non-colicky epigastric pain radiating to the back, which is relieved somewhat by leaning forward. When these symptoms occur in the first trimester, the diagnosis is likely to be missed. Occasionally, pain is not a significant feature⁵⁴; instead nausea, vomiting, lethargy and abdominal distension predominate. In late pregnancy, because of the enlarging uterus, upper abdominal tenderness may be difficult to elicit.

The principal laboratory test is serum amylase estimation. This tends to be low in the first trimester in normal pregnancy⁵¹; thus, the high levels usually seen in acute pancreatitis may not be seen when this occurs in the first trimester. Since amylase in the serum is rapidly excreted, a urinary diastase estimation must always be ordered concurrently.⁵¹ These tests provide the clinician with a rapid and reliable diagnostic and prognostic test. However, other causes of hyperamylasaemia should be kept in mind; these include perforated peptic ulcer, bowel obstruction, thrombosis of the superior mesenteric artery or portal vein and cholecystitis. In the first trimester, a ruptured tubal pregnancy may produce markedly elevated amylase levels. Some have suggested calculating the amylase:creatinine clearance ratio to increase the diagnostic accuracy. This ratio, which is low in pregnancy, is elevated in pancreatitis in pregnancy.⁵⁵ Ultrasonography is helpful in excluding cholelithiasis, pancreatic pseudocyst and abscess, magnetic resonance imaging being an alternative. The disease is generally self-limiting and responds within 1–10 days to conservative management: bed rest, parenteral fluids, pain relief and nasogastric suction.

Shock and coma are ominous prognostic signs, and such patients need intensive care management. Surgery may be required in those refractory to medical treatment; peritoneal lavage, the removal of toxic pancreatic tissue, drainage of a pancreatic abscess or a combination of these procedures may be carried out. If the mother is near term and the fetus is viable, it is wise to optimize the haemodynamic and biochemical state and proceed to caesarean section. There is no evidence that terminating the pregnancy in the first or second trimester improves maternal outcome.⁵⁶ The overall maternal mortality of 37% in pregnancy⁵⁶ is much higher than the 5.6% reported in the

non-pregnant patient.⁵⁷ The perinatal mortality is also high, at 38%.⁵⁶ Thus, prompt diagnosis and aggressive treatment are essential.

Ovarian pathology

Haemorrhage into a corpus luteum sometimes occurs in the first trimester of pregnancy. There are no typical symptoms or signs that will make a definitive diagnosis possible as these are mimicked by other surgical emergencies such as acute appendicitis and ectopic pregnancy.⁵⁸ Ultrasound evidence of a simple cyst, especially with haemorrhage, will allow for conservative management. The incidence of torsion of an ovarian cyst in pregnancy is higher (22.7%) than that in non-pregnant women (6.1%)⁵⁹, probably because the supporting ligaments elongate as gestation progresses. As the uterus and adnexae ascend into the abdomen in pregnancy or descend into the pelvis in the puerperium, the risk of torsion increases. The chance of malignancy is relatively low, a malignancy rate of 2.4–7.4% being reported.⁶⁰ Most of these tumours are benign cystic teratomas⁶⁰, the low density of these tumours, because of their lipid consistency, encouraging them to 'float'.

Ischaemic events that are a result of torsion of the vascular pedicles are usually heralded by the sudden onset of severe abdominal pain, which may radiate to the flank and down the anterior aspect of the thigh. While in the first and early second trimesters a mass is usually felt on pelvic examination or visualized by ultrasonography, in later pregnancy it may not be possible to palpate a mass clinically. The most probable differential diagnosis includes ectopic pregnancy and haemorrhagic corpus luteum; these, however, seldom occur beyond 10–12 weeks gestation.

Early diagnosis and early intervention are vital for ovarian conservation to be possible in these young women. Delay results in gangrene or marked venous congestion, which makes the recognition of viability a difficult task; the removal of the entire affected adnexa is indicated. Malignant tumours too can undergo torsion in pregnancy.⁵⁹

Peptic ulcer

Peptic ulcer disease is infrequent in pregnancy. The factors responsible include reduced gastric secretion and gut motility, and an increased secretion of histaminase by the placenta.³⁰ A remission rate of 90% in pregnancy has been reported.⁶¹ Nevertheless, acute complications of peptic ulcer can occur in pregnancy. Perforation should be suspected when marked abdominal guarding and generalized board-like rigidity are present, and a single erect abdominal X-ray will be useful to demonstrate gas under the diaphragm. Massive haemorrhage from a bleeding peptic ulcer can result in hypotension and diminished placental perfusion. If endoscopic procedures fail to control the bleed, or if perforation occurs, an emergency laparotomy is necessary, as in the non-pregnant patient.

Intraperitoneal haemorrhage

Intraperitoneal haemorrhage can occur before, during or after childbirth. In some instances, a thorough careful search at laparotomy does not reveal the source of bleeding.⁶² However, in pregnancy, the veins of the ovary and broad ligaments are increased many fold and the venous pressure within them is doubled.⁶³ The rupture of these vessels during labour has been reported, resulting in acute lower abdominal pain

and shock; the haemorrhage may be largely retroperitoneal or partly intraperitoneal. Urgent laparotomy, evacuation of the haematoma and ligation of the vessels needs to be carried out. Mortality rates of 50% have been reported.⁶⁴ Veins on the surface of the uterus or broad ligament can also rupture.

Rupture of a splenic artery aneurysm is not rare in the late months of pregnancy: 20% of all reported splenic artery aneurysms have occurred in pregnancy.⁶⁵ In none of the previously reported cases was an accurate pre-operative diagnosis made.⁶⁵ Clinically, the condition presents in one of two ways:

1. severe intra-abdominal bleeding with pain and tenderness, death often resulting within a short time; at laparotomy it may not be possible to locate the site of bleeding;
2. a similar presentation to that of a delayed rupture of the spleen: a haematoma forms in the lesser sac and ruptures into the general peritoneal cavity after hours or days.

The initial diagnosis may be that of acute pancreatitis or perforated ulcer. Treatment consists of immediate blood transfusion and urgent laparotomy. In late pregnancy, caesarean section needs to be carried out immediately in order to gain access to the bleeding site; ligation of the aneurysm and splenectomy are required. Although dual maternal and fetal survivals have been reported in a few instances, a maternal mortality of 69% and fetal demise of 97% have been noted.⁶⁴

Abdominal trauma

By far the most common cause of abdominal trauma is motor vehicle accidents. Uterine rupture and contusions, and abruptio placentae may occur. An exploratory laparotomy may be needed to stop bleeding from and repair uterine lacerations. The management of abruptio placentae has been discussed above.

Gunshot wounds to the abdomen are managed as in the non-pregnant-women, appropriate measures being taken to stop bleeding and repair lacerations. As long as the pregnancy is intact, the uterus should not be disturbed. The fetus should be carefully monitored both before and after surgery.

SUMMARY

The diagnosis of an acute abdomen in pregnancy can be difficult. An understanding of the anatomical and physiological changes in pregnancy, a detailed history and clinical examination and the use of appropriate laboratory and imaging techniques, including abdominal X-rays if necessary, will assist in the early diagnosis and institution of treatment. Many conditions described above should be managed in conjunction with specialist colleagues. The aim is to reduce maternal morbidity and minimize danger to the fetus.

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