

The acute abdomen

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Introduction

The term “acute abdomen” is used to describe a spectrum of gynaecological, medical, surgical and urological conditions, ranging from minor ailments to life-threatening diseases. These conditions usually require hospital admission and investigation, after which a treatment plan can be devised, that often includes surgery. The main presenting complaint is severe abdominal pain.

Aetiology

All gynaecologists should be familiar with the presenting picture of the most common causes of an acute abdomen, as well as in depth knowledge in managing the

gynaecological causes of this condition. It is however prudent that the gynaecologist be aware of the differential diagnosis and if the most likely diagnosis is not within the domain of the gynaecologist, prompt and proper referral must be made to the relevant speciality. The modern doctor should be humbled by the fact, despite diagnostic and therapeutic advances (computed tomography, ultrasonography and laparoscopy), the misdiagnosis of the most common surgical emergency, acute appendicitis, has changed little over time.¹

The following table I represents possible causes of an acute abdomen. It is by no means an exhaustive list.

Pathophysiology of abdominal pain

Due to the complex viscera and parietal sensory network innervating the abdominal area, pain is not always precisely localised, yet some general patterns exist that aid in the diagnosis² of the cause of an acute abdomen.

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Table 1: Differential diagnosis of an acute abdomen

Gynaecological causes	Surgical causes	Medical causes
<i>Pregnancy related</i>	Appendicitis	Gastritis
Ectopic pregnancy	Diverticulitis	Gastro-enteritis
Miscarriage	Pancreatitis	Hepatitis
Red degeneration of a fibroid	Cholecystitis	Diabetes Mellitus
Abruptio Placentae	Intestinal obstruction	Malaria
Uterine rupture		Sickle cell crisis
Acute fatty liver of pregnancy	Rectus sheath hematoma	
Chorioamnionitis	Mesenteric ischaemia	Thyrotoxicosis
<i>Non-pregnancy related</i>	Perforated peptic ulcer	Uraemia
Acute salpingitis	Bowel perforation	Porphyria
Endometriosis	Ruptured aortic aneurysm	Addison's disease
Ovarian Cyst: • Torsion • Rupture • Haemorrhage • Infarction • Infection	Urological causes • Nephrolithiasis • Pyelonephritis • Acute cystitis	

Visceral pain

Visceral sensation is mediated by afferent C fibres located in the walls of hollow viscera and in the capsules of solid organs. Visceral pain is caused by distention, inflammation or ischaemia stimulating the receptor neurons of sensory fibres. The pain is slow in onset, dull and poorly localised in the area occupied by the viscus during development. The viscera is insensitive to mechanical, thermal and chemical irritation and therefore can be cut, cauterized and handled painlessly.

Parietal pain

The anterior and posterior abdominal walls, the under surface of the diaphragm and the pelvic cavity are covered by parietal peritoneum, which is innervated by the somatic nerves supplying the abdominal wall musculature and skin (T5-L1). The central diaphragmatic portion is supplied by the afferent nerves in the phrenic nerve (C3-C5). In contrast to the viscera, the parietal peritoneum is sensitive to mechanical, thermal or chemical stimulation and therefore cannot be cut, cauterised or handled painlessly. When parietal peritoneum is irritated there is reflex contracture of the corresponding area of muscle, causing rigidity of the abdominal wall – also known as guarding. This is one of the key features in diagnosing an acute abdomen. Somatic pain is described as sharp and well localised.

Clinical approach to the patient

The approach to a patient with an acute abdomen must be orderly and thorough. Because there is frequently a progressive underlying intra- abdominal disorder, undue delay in diagnosis and treatment increases the morbidity and mortality associated with the condition. The history and the physical examination of the patient should guide the choice of initial diagnostic investigations. However it is important rather to revert to surgery in an unstable patient who is deteriorating than seek for a specific diagnosis.

History

A complete history forms the cornerstone of an accurate diagnosis.³ The history should include a complete description of the patient’s pain and associated symptoms (see table 2). Underlying medical conditions, medication usage, previous surgery, gynaecological history (see table 3) allergies and social history can provide important diagnostic information.

Examination

The gynaecologist must not be mono-focused and concentrate on the abdominal examination only! A methodical and complete general physical examination is crucial in establishing a cause for the acute abdomen.

Table 2: The classic PQRST mnemonic for a complete pain history

P 3	Positional, palliating and provoking patterns
Q	Quality
R 3	Region, radiation, referral
S	Severity
T 3	Temporal factors (time and mode of onset, progression and previous episodes)

Table 3: Important aspects in gynaecological history taking

Last menstrual period
Pregnancy status
Menopausal status
Contraceptive history including barrier methods
Pelvic discharge and infections

General appearance

General observation gives a rapid overview of the severity of the condition. The writhing of patients with visceral pain (intestinal or ureteric colic, torsion of an ovary) can be distinguished from parietal pain (generalised peritonitis caused by a ruptured pelvic abscess or a haemoperitoneum) with a glance. Be aware of the patient with diminished responsiveness or an altered level of consciousness – this often proceeds cardiopulmonary collapse. Should this happen, the examination must be halted and cardiopulmonary resuscitation instituted. Once the patient is stable examination can then be continued in the secondary survey.

During this assessment observe if the patient has jaundice, pallor, cyanosis, oedema and dehydration.

Vital signs

The heart rate, blood pressure, respiratory rate and temperature must be evaluated. These parameters are also used to monitor response to treatment. Systemic signs usually accompany rapidly progressive and serious conditions associated with an acute abdomen. Haemorrhagic or septic shock can be diagnosed and resuscitative measures instituted whilst searching for a definitive cause.

Systemic examination

If all the organ systems are evaluated in a systematic manner, the possibility of missing important information is diminished. The “big five, forgotten four, core one” approach is often used (see table 4).

Table 4: Systematic examination of the patient with an acute abdomen

Big Five	Forgotten Four
Neurological system	Haematological system
Cardiovascular system	Endocrine system
Hepatic system	Dermatological
Gastro-intestinal system	Musculoskeletal system
Renal system	
Core One	
Genito-urinary system	

Examination of the acute abdomen

▪ *Inspection*

The full extent of the abdomen must be visible. Patient dignity must be maintained and breasts and genitalia only exposed during the examination thereof. Previous surgical scars must be noted and tested for herniation. Abdominal distention can be due to an enlarged organ (e.g. hepatomegaly, a gravid uterus or an ovarian mass), fluid (ascites or blood) or gas.

▪ *Palpation*

The palpation of the abdomen must be approached in a systematic way. The patient can be asked to point to the area of maximum tenderness – superficial palpation then starts away from the area of maximum pain and moves towards the tender site. The hallmark signs of an acute abdomen are voluntary guarding, involuntary guarding and rebound tenderness. Voluntary guarding is caused by palpation over an area of pain which will stimulate the patient to contract her abdominal muscles. If the pain is caused by peritoneal inflammation, the approximation of the parietal peritoneum to the inflammatory area will cause reflex contraction of the abdominal muscles, known as involuntary guarding. The latter usually indicates diffuse peritonitis. Rebound tenderness is elicited by pressing the abdominal wall deeply with the fingers and then suddenly releasing the pressure.⁴ This is experienced as a sharp pain, caused by the viscus bouncing back and hitting the parietal peritoneum. If light palpation causes no pain, deep palpation follows. This will allow for the detection of organomegaly or masses.

▪ *Percussion*

Percussion is useful in localisation and assessment of the tenderness as well as determining the presence of fluid in the abdominal cavity. This fluid can be either

ascites or blood. A fluid thrill can be elicited indicative of fluid in the abdominal cavity. The shifting dullness sign can also be used to differentiate distention due to fluid from gas.

▪ *Auscultation*

Normal bowel sounds are low pitched and occur every few seconds. If they are absent for 30 seconds or more, peristalsis has ceased and ileus has set in. This can be caused by a host of conditions including generalised peritonitis that is caused for example by a ruptured tubo-ovarian abscess.

▪ *Vaginal examination*

After obtaining verbal consent, a vaginal examination must be done in patients who are not virgo intacto. The presence of an open cervical os will indicate a pregnancy complication, for example a miscarriage. Foul smelling products will raise the suspicion of a septic miscarriage and the sequelae thereof. Cervical excitation tenderness indicates a peritonitic process, for example pelvic inflammatory disease or a ruptured ectopic pregnancy. The following step involves the passing of a Cusco speculum to evaluate the cervical os. A necrotic cervical os is an indication that a laparotomy must be done with the possibility that a total abdominal hysterectomy will be performed.

Side room investigations

Urine BHCG

This side room investigation is inexpensive and can detect BHCG in urine from 20-100 mIU/ml depending on the test. This is a rapid way to detect whether the acute abdomen is linked to a complication of early pregnancy.

Rapid Haemoglobin measurement

Various devices exist that can provide a haemoglobin result within seconds. For example the Hamecue® device, which was demonstrated to show acceptable agreement between the HemoCue® and laboratory measurement with the Coulter® LH 750 automated haematology analyser. Ninety five per cent of the values had a clinically significant difference of < 1 g/dl, making this an acceptable method.⁵ Thus clinical decisions can be based on this haemoglobin value and blood products ordered accordingly in the acute resuscitative phase.

Special investigations

Following initial clinical assessment, supplementary laboratory and radiologic investigations can guide further management and help determine a diagnosis. Even in the absence of a specific diagnosis, there may already be enough information on which to base a rational decision about management. Further investigations are only indicated if they are likely to improve or alter therapeutic decisions – especially in the light of limited resources in our setting.

Blood tests

Haemoglobin and haematocrit provide information with regards to the patient's haemodynamic status. A rising or marked leucocytosis is indicative of a serious infection. Clotting studies (platelet count, INR) should be requested if the history and physical examination indicates a possible haematological abnormality. Both septic and haemorrhagic shock can cause disseminated intravascular coagulation (DIC). This must be diagnosed promptly so that all efforts can be made to reverse the condition.

Serum electrolytes, urea and creatinine measurement is important, especially if hypovolaemia is expected. Possible electrolyte abnormalities must be corrected before taking the patient to theatre. It is important to assess and monitor renal function in the patient with an acute abdomen.

In patients with suspected liver impairment, liver function tests are requested as this can indicate a primary hepatobiliary cause for the acute abdomen, but is more frequently used in our setting to evaluate for organ failure as a sequelae of haemorrhagic or septic shock.

Further laboratory investigations will be determined by the clinical picture of the patient. The most important questions to ask at this stage are whether the patient will benefit from explorative laparotomy, whether the opinion of other disciplines must be called upon or whether further diagnostic tests are warranted.

Imaging studies

The American College of Radiology has recommended using different imaging studies to assess abdominal pain based on the pain location: abdominal ultrasonography (US) is recommended to assess the right upper quadrant, and computed tomography (CT) is recommended to assess the right and left lower quadrant.⁶ However, although CT is emerging as the modality of choice for the evaluation of the acute abdomen in many review articles, US remains the primary imaging in the majority of cases in our patient population and our setting. In young female patients, when the limitation of radiation exposure is mandatory, the use of CT is often limited to cases of non-diagnostic ultrasound and in cases where there is a discrepancy between negative imaging at ultrasound and clinical findings.⁷

▪ *Ultrasound*

US is the primary and sometimes the only necessary imaging tool in the assessment of acute pelvic pain in women. The value of ultrasound lies in its ability to detect gynaecologic disorders and rule out other causes of acute abdomen that need surgical repair. In the non-pregnant patient, ultrasound diagnosis and early treatment can preserve ovarian function.⁸ In the patient population of the gynaecologist, special attention to pregnancy, including ectopic

pregnancy and loss of pregnancy, is paramount in forming an appropriate differential diagnosis. In suspected ectopic pregnancy, US together with quantitative measures of BHCG, can be considered the best imaging procedure to guide the diagnosis and determine the size and location of the ectopic pregnancy and the presence of bleeding, which in turn helps guide treatment decisions.

▪ *Plain X-ray studies*

The information available on plain radiographs regarding the amount and distribution of intestinal gas, recognition of extra-luminal gas collections, significant calcifications (eg renal stones causing severe colic), organomegaly and the demonstration of soft tissue masses or fluid collections⁹ are still very useful today even in the light of more advanced imaging techniques.

An erect chest X-ray may be useful in a patient complaining of acute abdominal pain following a uterine evacuation. Free air under the diaphragm can indicate perforation of the uterus and further surgical exploration is warranted.

An erect abdominal X-ray can indicate obstruction as a cause of the acute abdomen and appropriate referral is indicated. Pregnancy should be excluded in all patients going for radiological investigation and informed consent obtained for proceeding with the investigation in a pregnant woman.

▪ *CT scan*

The use of CT in the evaluation of the acute abdomen has increased to a large extent.¹⁰ This increase is related to the high accuracy of CT in the diagnosis of specific diseases. However the limiting factors are radiation exposure and increased cost. It can be said that the role of CT in the gynaecological patient is secondary after that of a US examination and useful for the evaluation of the patient with an acute abdomen who does not already have clear indications for laparotomy or laparoscopy.

▪ *MRI scan*

Magnetic resonance imaging (MRI) is not widely used or studied in the diagnostic work-up of patients who present with acute abdominal pain. The major advantage of MRI is the lack of radiation exposure. However the lack of availability and the high cost (especially compared to an ultrasound) make it a logistic problem in many hospitals.

Paracentesis

Diagnostics paracentesis has been used since 1906 to aspirate fluid in the acute abdomen. The role for this procedure has been replaced mostly by imaging techniques. However in a study due for publication this year in the International Journal of Surgery, this diagnostic procedure has been revisited and it has been shown to be 92% accurate in diagnosing the

cause of an acute abdomen. The procedure was also shown to be safe and simple to perform.¹¹ It could therefore be worthwhile to consider this diagnostic aid in a limited resource and skills setting. In patients with free peritoneal fluid detected on clinical exam or US imaging, aspiration of blood, bile or bowel contents is an indication for urgent surgical intervention.

Culdocentesis

Culdocentesis is a procedure in which a hollow needle, normally a spinal needle is inserted through the posterior vaginal into the peritoneal space. Prior to the wide availability of high-resolution transvaginal US, it was considered an invaluable aid in the diagnosis of ruptured ectopic pregnancy. This procedure is simple, rapid and relatively safe. Complications of this procedure include rupture of a tubo-ovarian complex, puncture of the bowel or a pelvic kidney and puncturing of a malignant ovarian cyst. If blood or puss is aspirated, it is an indication for laparotomy.

Diagnostic laparoscopy

Laparoscopy can be regarded as a diagnostic and therapeutic modality. As the scope of practice of the laparoscopic surgeon is increasing, the indication for this procedure is also ever increasing. In critically ill patients who often have deceptive manifestations of acute abdomen, it may facilitate earlier treatment in those with positive findings while eliminating the added morbidity of a laparotomy in negative cases.

Management of patient

General management

All patients evaluated for an acute abdomen require resuscitation with close monitoring and regular re-evaluation. Initial treatment should be based around the CAB principle (circulation, airway, and breathing). Except in the management of overwhelming haemorrhage, e.g. in a ruptured ectopic pregnancy, when resuscitation takes place on the way to an operating theatre, all patients with an acute abdomen will benefit from resuscitation. This normally involves the administration of several litres of a crystalloid like fluid, for example Ringer's Lactate, intravenous antibiotics if indicated and optimisation of oxygenation (this can range from additional oxygen by facemask to intubation with full ventilation).

Monitoring the response to resuscitation by regular review of the heart rate, blood pressure, oxygen saturation, temperature and urine output is mandatory. Good pre-operative assessment, resuscitation and monitoring is a prerequisite for a good clinical outcome.

Specific management

Adnexal torsion

Adnexal torsion refers to the complete or partial rotation of the ovary and fallopian tube on its ligamentous supports, often resulting in impingement of its blood supply. An ovarian physiologic cyst

(functional cyst, corpus luteum) or a neoplasm is the most likely factor to predispose to ovarian torsion. The classic presentation of ovarian torsion is the acute onset of moderate to severe pelvic pain, often with nausea. A high index of suspicion is necessary to make the diagnosis. The diagnosis of torsion is confirmed by direct visualisation of the rotated ovary, tube, or paratubal or paraovarian cyst. Management is either via laparoscopy or laparotomy. The ovary is assessed for viability. If it is necrotic an adnexectomy is done. If the ovary is viable, detorsion with bilateral oophorectomy is done.

Haemorrhagic functional ovarian cyst

Rupture of a follicular cyst may cause acute abdominal pain for a short time. Corpus Luteum cysts are very vascular and can cause severe haemorrhage in certain instances when they rupture. This condition must be distinguished from a ruptured ectopic pregnancy. Ultrasonographic identification of an intra-uterine pregnancy makes the diagnosis more likely, but be aware of the rare case of a heterotopic pregnancy. Management of a ruptured ovarian cyst is only indicated if haemorrhage continues. A laparotomy or laparoscopy can be performed, depending on the surgeon's preference.

Pelvic inflammatory disease and tubo-ovarian abscess

Pelvic inflammatory disease (PID) refers to an acute, or acute on chronic infection of the upper genital tract in women, involving any or all of the following: the uterus, the fallopian tubes and the ovaries. In severe infections the disease may spread to involve adjacent organs. There is no single diagnostic gold standard – clinical diagnosis remains the most important practical approach. Findings that suggest PID are: temperature >38.3°C, abnormal cervical or vaginal mucopurulent discharge, cervical friability and excitation tenderness, presence of abundant numbers of white blood cells (WBCs) on saline microscopy of vaginal secretions (eg, >15 to 20 WBCs per hpf or more WBCs than epithelial cells) and documentation of cervical infection with *N. gonorrhoeae* or *C. trachomatis*. Management depends on the severity of the disease. If the patient presents with an acute abdomen, it is likely that a tubo-ovarian complex has ruptured. This diagnosis can be confirmed by the presence of a tubo-ovarian complex and complex free fluid in the abdomen. In this case antibiotic therapy must be instituted promptly and the patient taken for a laparotomy or laparoscopy. Definitive management will be guided by intra-operative findings and may range from the rinse out and deroofting of the abscesses, to an adnexectomy and maybe even a total abdominal hysterectomy and bilateral salpingo-oophorectomy.

The acute abdomen in the pregnant patient

Just as in the non-pregnant patient, assessment of the pregnant woman with an acute abdomen must take

place in a systematic and thorough manner. The cause of an acute abdomen in this population subgroup may be due to gastro-intestinal, gynaecologic, urologic, obstetric or medical causes. These patients often require surgical intervention, and delay in diagnosis and intervention worsens the outcome for the mother and fetus.¹²

Anatomical and physiological changes specific to pregnancy may make the diagnosis more difficult. The gravid uterus becomes an abdominal organ at around 12 week's gestation and compresses the underlying abdominal organs. The localisation of the pain also becomes more difficult and the intra-abdominal positions of organs are changed as they are displaced by the uterus. The laxity of the anterior abdominal wall may also mask or delay signs of peritonitis.

Diagnostic procedures

Radiologists often approach the pregnant patient with apprehension and the use of radiologic examinations are viewed with undue fear. It is usually not the diagnostic procedure, but the delay in diagnosis which leads to the harm of the mother and fetus.

Ultrasound and MRI are not associated with ionizing radiation and have not been shown to have any deleterious effects on pregnancy and should therefore be the investigations of choice. It is also important to note that no single diagnostic radiographic procedure results in radiation exposure to a degree that would threaten the wellbeing of the pre-embryo, the embryo or fetus according to the American College of Radiology.¹³ Exposure to less than 5 rad has not been associated with an increase in fetal anomaly or pregnancy loss.

The greatest risk to the fetus is exposure at 8 to 15 weeks gestation, with radiation induced mental

retardation the highest specific potential danger. Risks increase exponentially above 20 rad. Always shield the abdomen and counsel the patients on the baseline risks, but never delay an urgent investigation, as has been stated this will cause more harm.

Anaesthesia during pregnancy

The highest pregnancy loss is during the first trimester and patients must be counselled accordingly. Emergency surgery for an acute abdomen cannot be deferred, but patients must be counselled regarding risk. When possible regional anaesthesia is favoured over general anaesthesia, since maternal mortality is 16 times higher with general anaesthesia.¹⁴ There is an increased rate for preterm delivery after non-obstetric surgery and the risk increases with increasing gestational age.

Common causes of an acute abdomen in pregnancy Pathology related to the uterus

- *Miscarriage*
Miscarriages are the most common pathological cause of pain in the first trimester.¹⁵ The pain is often described as severe, but does not usually have signs related with an acute abdomen and is accompanied by vaginal bleeding. Treatment is by evacuation of the uterus.
- *Red degeneration of a fibroid*
Acute abdominal pain may be caused by the degeneration of a fibroid during pregnancy. Treatment is conservative with the short term administration of Indomethacin, Paracetamol and bed-rest. Surgery should be avoided.
- *Placental Abruption*
Placental abruption complicates 0.2-1% of pregnancies.¹⁶ Patients present with acute abdominal pain, a woody hard abdomen and vaginal bleeding. Management is by delivery of the fetus. If the fetus is still alive deliver by a caesarean section. If the fetus has demised, a trial of vaginal delivery can be given with careful monitoring of progress.
- *Chorioamnionitis*
The key clinical findings in chorioamnionitis include fever, uterine fundal tenderness, maternal tachycardia (>100/min), fetal tachycardia (>160/min) and purulent or foul smelling discharge.¹⁷ Prompt initiation of antibiotic therapy is essential to prevent both maternal and fetal complications in the setting of clinical chorioamnionitis. Time -to-delivery after institution of antibiotic therapy has been shown not to affect morbidities. Therefore caesarean section to expedite delivery is not indicated for chorioamnionitis unless there are other obstetric indications.¹⁸ However tocolysis is contra-indicated and delivery should not be delayed.

Table 5: Data from American College of Obstetricians and Gynaecologists. Guidelines for diagnostic imaging during pregnancy. ACOG committee opinion Number 299. Obstet Gynaecol 2004;104:649

Procedure	Fetal exposure
Chest radiograph (two views)	0.02-0.07 mrad
Abdominal radiograph (single view)	100 mrad
Intravenous pyelography	>1 rad
Hip radiograph (single view)	200 mrad
Mammography	7-20 mrad
Barium enema or small bowel series	2-4 rad
CT scan of the head or chest	<1 rad
Ct scan of the abdomen and lumbar spine	3.5 rad

- *Uterine rupture*

Rupture of the unscarred uterus is uncommon and associated with pregnancy developing in a malformed uterus, unsupervised doses of oxytocin administration, placenta percreta, obstructed labour and grand multiparous women. The overall incidence of uterine rupture in women with a prior caesarean delivery varies between 0.3 to 1%.¹⁹ The risk of rupture is increased with a previous upper segment scar, to approximately 2%. Patients present with an acute abdomen and signs of hypovolaemia. The risks to the fetus include shock, hypoxia, anaemia and death. The management is urgent laparotomy with uterine repair or hysterectomy.

Pathology related to the adnexa

- *Ectopic pregnancy*

Ruptured ectopic pregnancy should be considered in any woman presenting with an acute abdomen and signs of hypovolaemia in the reproductive age. Haemorrhage from ectopic pregnancy is the leading cause of maternal mortality in the first trimester and accounts for 4 to 10 percent of all pregnancy-related deaths. In the developed world.²⁰ If the diagnosis of a ruptured ectopic pregnancy is made (usually by a positive pregnancy test and an empty uterus on ultrasound with free fluid in the abdominal cavity) the treatment is surgical. There are two choices of surgical approach for tubal pregnancy. Salpingectomy (removal of the fallopian tube) and salpingostomy (incising the tube to remove the tubal gestation but leaving the remainder of the tube intact) appear to result in similar fertility outcomes in subsequent pregnancies. Traditionally, salpingectomy has been the standard procedure, but salpingostomy is commonly performed to provide women with a conservative surgical option.²¹ Laparoscopic surgery is the standard surgical approach for ectopic pregnancy. Most ectopic pregnancies, even in the presence of haemoperitoneum, may be treated using a laparoscopic procedure. However, for patients with acute bleeding, some surgeons prefer laparotomy. The choice of surgical approach should be made by the surgeon in consultation with anaesthesiologist and by taking into consideration the clinical status of the patient.

- *Ovarian Torsion*

The ovary can also be the cause of an acute abdomen in pregnancy. The incidence of torsion in case reports varies from 1 to 22%.²² US may aid in the diagnosis, but the presence of Doppler flow does not exclude the diagnosis of torsion. Surgery may be performed by laparotomy or laparoscopy.²³

- *Acute fatty liver of pregnancy*

Acute fatty liver of pregnancy is rare, with an approximate incidence of 1 in 7000 to 1 in 20,000

deliveries.²⁴ Acute fatty liver occurs typically in the third trimester. The disease is always present before delivery, although it is not always diagnosed prior to delivery. The most frequent initial symptoms are nausea or vomiting (approximately 75 percent of patients), abdominal pain (particularly epigastric, 50 percent), anorexia, and jaundice. The diagnosis of acute fatty liver of pregnancy is usually made clinically, based upon the setting, presentation, and compatible laboratory and imaging results. Laboratory tests that are helpful include serum aminotransferases, serum bilirubin, coagulation studies, electrolytes, serum glucose, uric acid level and creatinine, and a white blood cell count. Another major condition that must be excluded is the HELLP syndrome, which is characterized by haemolysis, elevated liver enzymes, and a low platelet count.²⁵ Treatment of acute fatty liver of pregnancy is a combination of maternal stabilisation and prompt delivery of the fetus, regardless of gestational age.

- *Rectus sheath hematoma*

Rectus hematoma presents in late pregnancy, due to coughing or direct abdominal trauma. It is caused by a rupture of an inferior epigastric vessel. The patient presents with acute abdominal pain, unilateral abdominal wall swelling and hypovolaemia. Treatment is by surgical exploration.

Pathological conditions unrelated to the pregnancy

- *Appendicitis*

Appendicitis affects 1 in 1500 pregnancies and is the most common reason for non-obstetric surgical intervention in pregnancy.²⁶ In the past it has been postulated that the appendix changes position in pregnancy, thus altering the presentation of pain. This has been challenged by a prospective study comparing the location of the appendix in women undergoing caesarean sections at term, in pregnant women undergoing appendectomy and in non-pregnant women undergoing appendectomy, with no difference in appendix location among the three groups.²⁷ Gross peritonitis with rebound and guarding is not common in pregnancy. Thus a high clinical suspicion is necessary when evaluating the pregnant patient for appendicitis. Laparotomy or laparoscopy can be used to treat this condition in pregnancy.

- *Acute cholecystitis*

There is an increased risk of gallstones in pregnancy, but not of acute cholecystitis. The presenting symptoms of right upper quadrant pain, nausea, vomiting and fever are the same in the pregnant patient as in the non-pregnant patient. Management is that of hospital admission, intravenous anti-biotics and adequate hydration –

conservative management is preferred in pregnancy. If pancreatitis, ascending cholangitis or common bile duct obstruction is suspected, endoscopic retrograde cholangiopancreatography (ERCP) can be performed safely in pregnancy with little ionizing radiation to the fetus.²⁸ If a cholecystectomy is indicated, laparoscopic surgery is the preferred approach.²⁹

▪ **Small bowel obstruction**

Small bowel obstruction in pregnancy complicates 1 in 3000 pregnancies. This is usually caused by adhesions, volvuluses, intussusceptions and hernias. The presenting complaints are nausea, vomiting and abdominal distention. This condition must not be confused with hyperemesis gravidarum. Nausea and vomiting accompanied with signs of an acute abdomen (rebound and guarding) should never be considered normal in pregnancy.

Conclusion

A careful history and performing a thorough physical examination are key features in establishing the diagnosis and treatment of a patient presenting with an acute abdomen. The further use of special investigations is determined by clinical findings. The primary imaging technique for the gynaecologist remains ultrasonography, given its availability, relatively low cost and absence of ionizing radiation. If a patient's clinical condition is deteriorating and a surgical intervention is most likely to benefit the patient, the search for an exact diagnosis must be abandoned in favour of explorative and definitive surgery.

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