

South Australian Perinatal Practice Guideline

Abdominal Pain and Trauma in Pregnancy

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Note:

This guideline provides advice of a general nature. This statewide guideline has been prepared to promote and facilitate standardisation and consistency of practice, using a multidisciplinary approach. The guideline is based on a review of published evidence and expert opinion.

Information in this statewide guideline is current at the time of publication.

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Health practitioners in the South Australian public health sector are expected to review specific details of each patient and professionally assess the applicability of the relevant guideline to that clinical situation.

If for good clinical reasons, a decision is made to depart from the guideline, the responsible clinician must document in the patient's medical record, the decision made, by whom, and detailed reasons for the departure from the guideline.

This statewide guideline does not address all the elements of clinical practice and assumes that the individual clinicians are responsible for discussing care with consumers in an environment that is culturally appropriate and which enables respectful confidential discussion. This includes:

- The use of interpreter services where necessary,
- Advising consumers of their choice and ensuring informed consent is obtained,
- Providing care within scope of practice, meeting all legislative requirements and maintaining standards of professional conduct, and
- Documenting all care in accordance with mandatory and local requirements

Explanation of the aboriginal artwork:

The aboriginal artwork used symbolises the connection to country and the circle shape shows the strong relationships amongst families and the aboriginal culture. The horse shoe shape design shown in front of the generic statement symbolises a woman and those enclosing a smaller horse shoe shape depicts a pregnant women. The smaller horse shoe shape in this instance represents the unborn child. The artwork shown before the specific statements within the document symbolises a footprint and demonstrates the need to move forward together in unison.



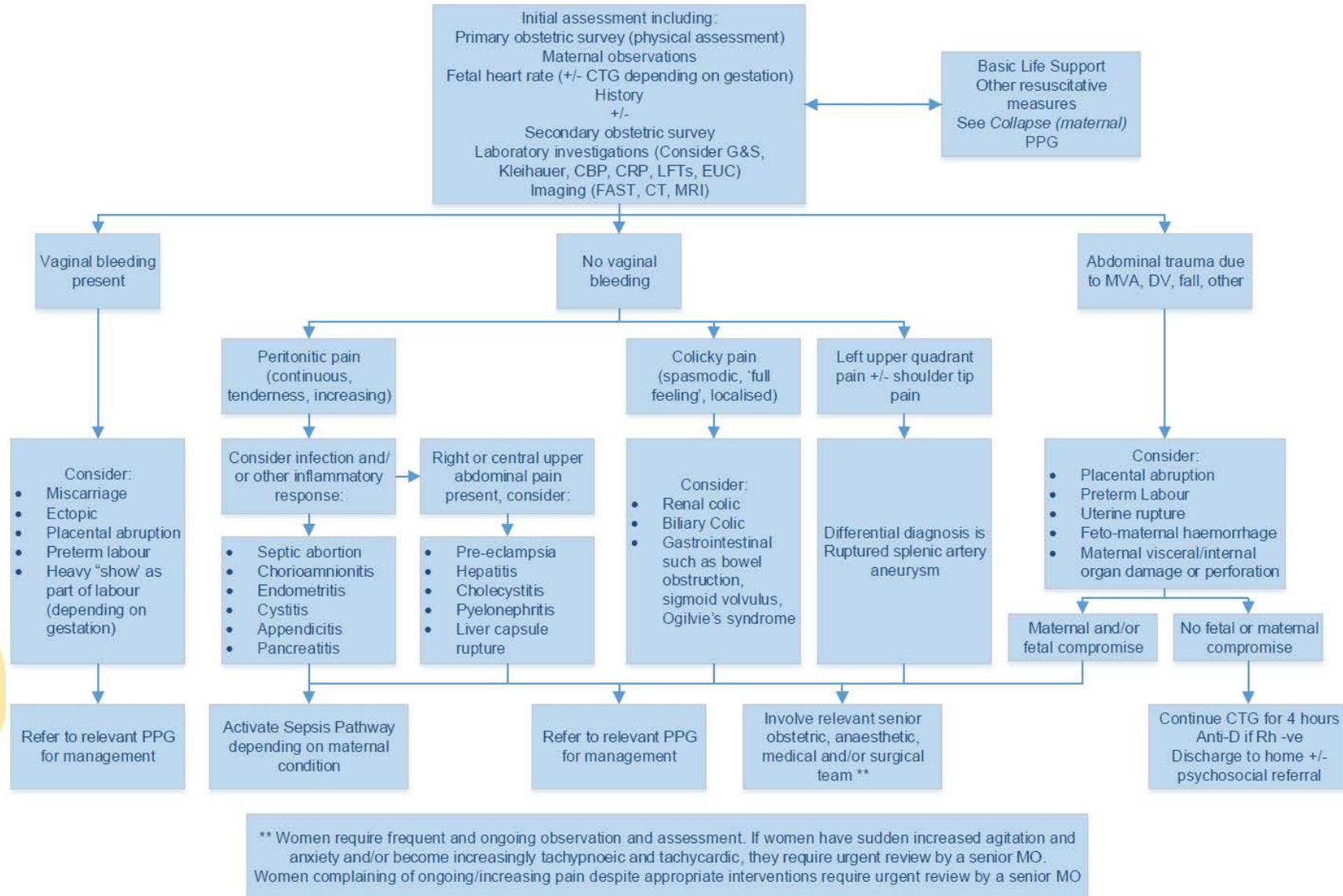
Australian Aboriginal Culture is the oldest living culture in the world yet Aboriginal people continue to experience the poorest health outcomes when compared to non-Aboriginal Australians. In South Australia, Aboriginal women are 2-5 times more likely to die in childbirth and their babies are 2-3 times more likely to be of low birth weight. The accumulative effects of stress, low socio economic status, exposure to violence, historical trauma, culturally unsafe and discriminatory health services and health systems are all major contributors to the disparities in Aboriginal maternal and birthing outcomes. Despite these unacceptable statistics the birth of an Aboriginal baby is a celebration of life and an important cultural event bringing family together in celebration, obligation and responsibility. The diversity between Aboriginal cultures, language and practices differ greatly and so it is imperative that perinatal services prepare to respectively manage Aboriginal protocol and provide a culturally positive health care experience for Aboriginal people to ensure the best maternal, neonatal and child health outcomes.

Purpose and Scope of Perinatal Practice Guideline (PPG)

The purpose of this guideline is to provide clinicians with information for the assessment, diagnosis and management of women presenting with abdominal pain and/or trauma in pregnancy. Its focus is on non-pregnancy causes of pain, presuming that clinicians will access other PPGs where indicated. It is presumed that standard principles for trauma management in the non-pregnant person will apply and are therefore beyond the scope of this guideline.

Abdominal pain and trauma in pregnancy

Flowchart I: Management of abdominal pain and trauma in pregnancy



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Summary of Practice Recommendations

- The first priority for women presenting with abdominal trauma and/or pain is assessment and resuscitation of the woman.
- Management of pregnant women with trauma should be in accordance with the Early Management of Severe Trauma (EMST) guidelines¹ with transfer to a major trauma centre if indicated.
- The Perinatal Advice Line (ph. 137827) with a consultant available 24 hours/day is able to assist with clinical management and emergency transport as indicated.
- CTG monitoring is an important part of assessment as fetal heart rate changes (e.g. tachycardia and reduced variability) will be observed in response to compensation for maternal hypovolaemia.
- CTG monitoring should be continued for a minimum of 4 hours in the context of abdominal trauma.
- Ruptured splenic artery aneurysm (RSAA) should be considered in any pregnant woman who complains of sudden onset of severe left upper quadrant abdominal pain regardless of whether pain or shock is prominent at the time of evaluation.
- Urgent assessment (including use of diagnostic technology) is required when there is a differential diagnosis of RSAA.
- Vaginal bleeding in the presence of abdominal pain is likely to represent a pregnancy complication and should be investigated as such in the first instance.
- Pregnant women who contact their care providers with atypical abdominal pain and/or complaints of worsening abdominal pain should be assessed in person, not by telephone².

Abbreviations

ABG	Arterial blood gas
ABCDE	Airway, Breathing, Circulation, Disability, Exposure/Examination
BP	Blood pressure
CBP	Complete blood picture
CEMD	Confidential Enquiry into Maternal Deaths
cm	Centimetre(s)
CRP	C-reactive protein
CT	Computed tomography
CTG	Cardiotocography
EMST	Early Management of Severe Trauma
EUC	Electrolytes, urea and creatinine
FAST	Focussed assessment sonography for trauma
G&S	Group and save / cross-match
LFTs	Liver function tests
LUQ	Left upper quadrant
mL	Millilitre(s)
MO	Medical Officer
MRI	Magnetic resonance imaging
MVA	Motor vehicle accident
PPG	Perinatal Practice Guideline
ROTEM	Rotational thromboelastometry
RSAA	Ruptured splenic artery aneurysm
RUQ	Right upper quadrant
US	Ultrasound

Abdominal pain and trauma in pregnancy

Background

Abdominal pain in pregnancy is common and missed/delayed diagnoses of intra-abdominal pathology occur often.

The prompt and accurate assessment of the presence of intra-abdominal pathology and its likely source can be challenging and the existence of a gravid uterus makes the decision harder.

Pregnancy makes the assessment of the abdomen more challenging: The peritoneum is less sensitive; the omentum is less able to contain local inflammation and the classically described areas of maximum tenderness may be shifted due to organ displacement secondary to the enlarging uterus, such as in appendicitis.

Trauma in pregnancy is usually the result of motor vehicle accidents, falls or violence. Whilst direct fetal injuries occur in less than 1% of abdominal trauma cases in pregnancy, minor injuries can be associated with placental abruption, preterm labour, feto-maternal haemorrhage and uterine rupture³.

Local context

The SA Health Major Trauma Centres for Adults (>16 years) are the Royal Adelaide Hospital and the Flinders Medical Centre (FMC). Within the Service Capability Framework for Major Trauma it is currently acknowledged that FMC is the Major Trauma Centre with the capability to manage major obstetric trauma (FMC being the only SA hospital with major adult trauma services and intensive care plus obstetric and neonatal Services). The Lyell McEwin Hospital is classified a level 3 Metropolitan Trauma Centre with capacity to assess and manage pregnant women post minor and moderate trauma mechanisms.

Anatomy and physiology

The physiological changes associated with pregnancy generally increase maternal tolerance to blood loss.

A woman in late pregnancy, tolerates moderate blood loss (<1500 mL) well. However the fetus tolerates maternal blood loss poorly and is a good 'monitor' of maternal vascular filling by demonstrating CTG changes in response to compensation for hypovolaemia. (The placental bed blood flow reduces well before the woman may show any of the classical signs of blood loss (tachycardia and hypotension)).

Assessment of maternal abdominal pain and/or trauma and severe non-obstetric haemorrhage – Primary Survey

The principles of management are “ABCDE TILT”

- 1. TILT**
Tilt the woman at 15-30 degrees or provide manual uterine displacement as soon as possible to avoid aortocaval compression with resulting functional hypovolaemia. If woman is on a spine board, place wedge underneath board.
- 2. Airway, Breathing, Circulation**
Life-threatening problems to airway (with cervical spine stabilisation), breathing and/or circulation must be dealt with immediately (see *Collapse (maternal)* PPG⁴ available at www.sahealth.sa.gov.au/perinatal).
Assess circulation and perfusion. Blood loss may be external/visible and therefore compressible or internal/concealed (such as intra-abdominal blood loss) and non-compressible. Consider the need for a FAST (Focussed Assessment with Sonography in Trauma) scan
- 3. Disability – Neurological Status**
Perform an initial Glasgow Coma Scale assessment
Perform a blood glucose measurement
- 4. Exposure**
By the end of the primary survey, the woman should have been fully exposed to ensure no injuries posing an immediate threat to life are missed.

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Urgent laparotomy with an experienced general surgeon is indicated when non-compressible haemorrhage is recognised. Evidence of ongoing maternal hemodynamic compromise despite fluid resuscitation is a surgical emergency. Resuscitation should continue on the way to theatre for laparotomy.

Secondary survey

History

Consider use of the acronym AMPLE⁵:

Allergies

Medication

Past medical and obstetric history

Last meal

Events leading to injury

Abdomen and Obstetric Examination

Following completion of the primary survey with life-threatening injuries identified and treated, a secondary survey should be undertaken.

A full examination of the abdomen, including vaginal and consideration of a rectal examination, should be performed as soon as is practical regardless of whether serious injury is suspected.

Note the presence of uterine contractions, the presence of amniotic fluid in the vagina, cervical effacement and dilatation and the relationship of the fetal presenting part to the ischial spines.

Check the fetal heart early when women have abdominal pain. After 26 weeks gestation, a CTG should be applied and fetal assessment continued throughout the assessment of the woman.

An ultrasound machine will also allow a focussed assessment sonography for trauma (FAST) examination to be carried out.

Even limited musculoskeletal trauma may affect the progress of the pregnancy and delivering the baby may make management easier. Regular obstetric evaluation will be required.

'Head-to-toe' Assessment

Women should be fully examined to assess and manage non-life threatening injuries or identify other potential causes for abdominal pain.

Investigations

- Urinalysis
- Group and cross matching
- CBP
- Kleihauer
- Also consider BGL, CRP, LFTs, EUC, Lipase, coagulation studies + ROTEM
- In centres where possible, early mobilisation of cell-salvage is recommended.

Assessment of fetal wellbeing and viability

Assessment of the fetus should occur after the primary survey (and any required maternal stabilisation) and ideally as part of the secondary survey.

In maternal abdominal trauma maternal outcomes are similar to those for non-pregnant women but there is a high likelihood of fetal loss.

The best way of achieving a good fetal outcome is by thorough evaluation and resuscitation of the woman, thereby ensuring good placental perfusion and fetal oxygenation.

Once maternal stability has been achieved and life-threatening injuries have been dealt with, birth may be expedited if fetal wellbeing is in question. A resuscitative laparotomy may be indicated for both fetal and maternal reasons.

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Cardiotocography (CTG) may be a useful surrogate marker of maternal condition as well as an assessment of fetal wellbeing.

If the maternal condition is stable Doppler US may help in the detection of feto-maternal transfusion resulting in acute fetal anaemia.

CTG monitoring should be instituted as soon as practicable but must not interfere unduly with treatment of the woman. CTG monitoring is recommended to continue for at least 4 hours in trauma cases.

Aids to diagnosis for both abdominal pain and trauma

The most common investigations to detect intra-abdominal injury are FAST, abdominal CT scanning with intravenous contrast and MRI. While the way in which these are used varies in different institutions, and will also depend on the clinical condition, the following principles generally apply⁶:

Ultrasound

A careful ultrasound examination of the left and right upper quadrant, the pelvis and the pericardium (FAST) by an experienced operator is the initial investigation of choice.

Precise information can be obtained concerning the nature and extent of intra-abdominal bleeding and the examination is non-invasive and is easily repeatable. It may, however, fail to identify small amounts of intraperitoneal fluid, bowel or pancreatic injuries and a negative examination should be viewed with caution after a major trauma.

It will also visualise the fetal heart to obtain an accurate fetal heart rate, but is not good at diagnosing an early or evolving abruption.

CT scan

CT scanning provides a highly sensitive and specific examination in suspected abdominal injury.

CT should only be used for stable patients where further clarification of the precise injuries is required. In the unstable patient with a viable pregnancy, birth via caesarean section followed by a trauma laparotomy is likely to be the safer option for both the woman and her baby.

Pregnancy is not a contraindication to CT scanning where a clinical indication for CT scan exists.

MRI scan

MRI is expensive, time consuming and can be uncomfortable for pregnant women.

It is now considered the preferred test after an inconclusive ultrasound scan in the evaluation of abdominal pain in pregnancy particularly with right lower quadrant pain due to the lack of ionizing radiation.

It may be of particular benefit in defining the specific characteristics of an adnexal mass or aiding the diagnosis of nephrolithiasis.

Additional considerations for abdominal trauma in pregnancy

General management principles

The pregnant woman must be managed by the receiving hospital's usual trauma team following EMST principles. Initial emphasis must be on the assessment and resuscitation of the woman.

Consideration should be given to cervical spine stabilisation as indicated.

Obstetric assistance is added to the trauma team, by either an obstetrician attending the resuscitation (the ideal situation) or giving telephone advice (generally via the Perinatal Advice Line on telephone 137827). The obstetrician must not manage the woman in isolation.

The woman should be treated in the usual location where all trauma is managed, e.g. emergency department, resuscitation room etc. Only when any other injuries have been excluded should she be moved to a perinatal area for ongoing external fetal monitoring.

A CTG should be applied as soon as practicable but must not interfere unduly with treatment of the woman. It should be continued for 4 hours.

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Admission Criteria

Indications for more extensive maternal and/or fetal monitoring are:

- Uterine contractions > 1 every 15 minutes
- Uterine tenderness
- Signs of fetal compromise on cardiotocography
- Evidence of vaginal bleeding
- Rupture of the membranes
- Positive Kleihauer test
- Ultrasound suggestive of placental abnormality
- Any evidence of serious maternal injury

Discharge criteria

- No signs of fetal compromise after 4 hours of initial electronic fetal monitoring
- No uterine activity
- No ruptured membranes
- No vaginal bleeding
- No evidence for feto-maternal haemorrhage on Kleihauer test. Note: Ensure all Rh (D) negative women with abdominal trauma have received a dose of 625 IU Rh D immunoglobulin even if the Kleihauer test is negative (see *Anti-D Prophylaxis* PPG available at www.sahealth.sa.gov.au/perinatal)
- Normal ultrasound findings (if requested)

Discharge home with instructions for the woman to return if:

- Any signs of preterm labour
- Abdominal pain and / or vaginal bleeding
- Change in fetal movements

Acute abdominal conditions presenting in pregnancy

Abdominal pain is common in pregnancy.

Heartburn, indigestion, upper abdominal discomfort, nausea, vomiting, constipation and diarrhoea frequently occur.

However, sudden onset of these symptoms accompanied by pain should ring alarm bells.

History taking (including pre-existing conditions) can help direct further examination and investigations.

Women may be discharged if their condition is stable with a diagnosis of the source of abdominal pain identified. A woman may still be suitable for discharge without a clear diagnosis of the source of pain but only after consultation with a senior medical officer.

Nature of the Pain

The acute onset of abdominal pain suggests rupturing or tearing including ruptured ectopic, ruptured uterus, ruptured aneurysm (splenic, renal, epigastric or aortic), rupture of an abscess or perforation of an ulcer. Acute abruption also presents with severe abdominal pain and should be the presumptive diagnosis until ruled out.

Pain which increases over a comparatively short time is more characteristic of acute red degeneration of a fibroid, acute cholecystitis, acute pancreatitis, strangulated hernia, ureteric colic, strangulation or infarction of the bowel⁶.

Site of the pain

Right upper-quadrant (RUQ) pain is relatively common in pregnancy and may be caused by a variety of conditions including, most seriously, rupture of the capsule of the liver (rarely diagnosed preoperatively) which can be associated with preeclampsia, hepatitis, cholecystitis and pyelonephritis.

Left upper-quadrant (LUQ) pain is unusual but should always be taken seriously and splenic rupture, infarction and splenic artery aneurysm rupture (RSAA) need to be excluded.

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These conditions occur more frequently in pregnancy. RSAA is a rare complication of pregnancy with a high risk of mortality. A woman presenting with LUQ pain should be viewed with a high index of suspicion for the diagnosis to be made prior to a catastrophic rupture. RSAA can occur in any trimester of pregnancy⁶.

Back pain is common in pregnancy.

Pain from pancreatitis is felt in the back and may be partially relieved by leaning forward.

Pain from cholecystitis is commonly referred to the area of the lower ribs posteriorly or between the shoulder blades; hyperaesthesia may be present over the lower ribs to the right (Boas's sign).

Pain from renal pathology is usually felt in the loin.

Low abdominal pain is often difficult to diagnose and is often never satisfactorily explained.

Management of specific surgical conditions in pregnancy

Appendicitis

Appendicitis is more common in the first two trimesters of pregnancy but perforation is more common in the third.

There is a higher morbidity for the woman and her baby in pregnancy from unrecognized appendicitis and therefore a relatively high negative laparotomy or laparoscopy is acceptable.

Ultrasonography is the first choice in pregnant women. If ultrasound is inconclusive, magnetic resonance imaging is the next step if available⁷.

Laparoscopy may be helpful adjunct to diagnosis in early pregnancy and laparoscopic appendectomy may be feasible up to 26 weeks gestation however open appendectomy may be a safer approach after a multi-disciplinary consultation⁸. In some circumstances, after consultation with surgical colleagues, conservative management with antibiotics may be considered.

Cholecystitis

Cholecystitis should be treated in the same way in the pregnant woman as in the non-pregnant. The trend is away from conservative management towards surgical treatment. Laparoscopic approach i.e. cholecystectomy, is possible up until 26 weeks gestation.

Pancreatitis

Acute pancreatitis carries 10% mortality in pregnancy but it is fortunately uncommon. Acute pancreatitis is estimated in 1:10,000 pregnancies⁹. Most cases of acute pancreatitis in pregnancy are associated with gallstone disease, but consideration should be given to medications, alcohol, reactive pancreatitis to infection, acute triglyceride elevations, or obstructive causes such as malignancy.

The treatment of acute pancreatitis is similar to that of non-pregnant women but should be carried out as a multi-disciplinary team approach.

Intestinal obstruction in pregnancy

Intestinal obstruction in pregnancy is increasing due to the increasing incidence of surgical interventions in young women leading to adhesions, with a suggested incidence of 1/3000¹⁰.

Causes of Intestinal Obstruction in Pregnancy^{10,11}	%
Adhesions	60-70
Volvulus	25
Ileus	8
Intussusceptions	5
Hernia	3
Colorectal carcinoma	1
Other	10



Abdominal pain and trauma in pregnancy

Typical presentation

- Colicky abdominal pain
- Nausea and vomiting
- Abdominal distention secondary to bowel distention
- Hyperactive bowel sounds

Investigations

- CBP, EUC, LFTs, CRP
- Consider ABG if systemically unwell
- Plain abdominal X ray
- CT abdomen and pelvis

Sigmoid volvulus

The incidence of volvulus is increased in pregnancy.

The symptoms of intestinal obstruction, absolute constipation, vomiting and colicky abdominal pains are the same in the pregnant and the non-pregnant woman. Fetal assessment should be carried out to determine if the baby should be delivered at the time of laparotomy.

Colonic pseudo-obstruction (Ogilvie's syndrome)

Colonic pseudo-obstruction, so called Ogilvie's syndrome, can be a complication of caesarean section, as well as other abdominal operations.

There is increasing abdominal distension, which may be dramatic. Bowel sounds may sound obstructive or be absent. Abdominal X-rays will show distension of the caecum with or without ascending and transverse colon dilatation. The critical diameter of the caecum is suggested to be 9 cm. Dilatation greater than this diameter markedly increases the risk of spontaneous perforation.

Water-soluble contrast enemas can aid diagnosis and colonoscopy may be used to decompress the bowel if simple measures to manage ileus are not successful. A nasogastric tube should be considered to prevent aspiration risk and may help to relieve some symptoms.

Solid and hollow visceral injury

Injuries to the liver and spleen are less common with the protection of the gravid uterus in late pregnancy but they still occur.

There should be a low threshold for laparotomy and caesarean section. Hollow visceral injuries can be very difficult to detect and a high index of suspicion is required to diagnose these injuries.

Injuries to the genitourinary tract, the pancreas and retroperitoneum can be difficult to detect and specialised radiological investigations may be required.

A careful maternal and fetal examination and ultrasound examination should reveal significant uterine injuries if present.

Fatal abdominal problems in pregnancy

Intra-abdominal pathology (including bowel perforation, and blood vessel rupture/thrombosis) is an infrequent contributor to indirect maternal deaths.

Previous CEMACH (Confidential enquiry into maternal and child health) reports from the UK have highlighted the tendency of blood vessels to spontaneously rupture in pregnancy¹².

The early detection of severe illness in pregnant women remains a challenge to all involved in their care. The relative rarity of such events combined with the normal changes in physiology associated with pregnancy and childbirth compounds the problem¹².

Splenic artery aneurysm rupture (RSAA)

RSAA remains a rare cause of acute collapse in pregnancy particularly in comparison to other vascular causes of acute abdomen incidental to pregnancy which include superior mesenteric artery syndrome, thrombosis/infarction and ruptured visceral artery aneurysm.

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Ruptured Splenic Artery Aneurysm is associated with high maternal and perinatal mortality: Estimated mortality rate of 25% with a disproportionately high risk of up to 75% in pregnant women and fetal mortality of 95%¹³. Splenic artery aneurysm and associated rupture is more common in pregnancy due to relative increases in arterial pressures and intra-abdominal pressures and contributions of hormonal influence weakening vessel walls¹⁴.

A diagnosis of ruptured splenic artery aneurysm should be considered in any pregnant woman who complains of sudden onset of severe epigastric or left upper-abdominal pain with associated pain in the tip of the shoulder (Kehr's sign) regardless of whether pain or shock is prominent at the time of evaluation. Diagnosis is difficult and therefore a high degree of suspicion is required.

Placental abruption is a common misdiagnosis as is uterine rupture.

The woman may not have abdominal guarding and rigidity and the pain may respond to analgesia in the presence of a RSAA. LUQ pain may be relieved by sitting or bending forward.

Presentation of SAA rupture can either be sudden or a two-stage rupture (The double rupture phenomenon) which is present in 20 – 25% of cases¹⁵. The initial rupture within the lesser sac is associated with acute abdominal pain but containment by the omentum and/or blood clot that blocks the foramen of Winslow may prevent features of haemodynamic compromise being found on physical examination. Free rupture into the greater sac when the tension increases is associated with severe pain and sudden collapse^{15,16}.

Diagnostic tests for RSAA

Biochemical and blood film evaluation provide little additional diagnostic value. But in suspected rupture mobilise Full Blood Count, ROTEM, X-Match and/ or massive transfusion protocol early.

Radiology is helpful in both emergency and elective settings however sensitivity and specificity vary in pregnancy. Radiology should not delay immediate resuscitation and control of haemorrhage.

Ultrasound

- The presence of free fluid in the abdominal cavity late in pregnancy by ultrasound is often difficult to detect and is usually inconclusive in this context due to the presence of the gravid uterus.
- Bleeding into the lesser sac of the peritoneum may make it difficult for ultrasound to detect free fluid in the abdomen.
- Its' utility can be limited by operator experience, obesity, bowel shadowing and arteriosclerosis.

CT angiogram scan

- This is the investigation of choice in RSAA but requires a high level of suspicion for it to be initiated.
- Teratogenesis is not a major concern after diagnostic CT studies in pregnancy. Abdominal CT delivers 1.3 – 35 mGy fetal exposure which is well below the threshold for defects in fetal organogenesis, intrauterine growth restriction and developmental delay but the effect of prenatal radiation exposure with childhood cancer may need to be considered although the urgency of the situation may dominate.

X-Ray

- While not a first line diagnostic investigation, calcified SAA may be revealed during plain film evaluation for other abdominal pathology¹⁷.

MRI

- This is less conclusive in diagnosing vascular lesions in larger areas such as the abdominal cavity.
- MRI should be avoided if possible in the first trimester¹⁸

Management

Involve a consultant obstetrician at an early stage.

Seek opinions from consultants in relevant specialities, including general surgeons, vascular surgeons and radiologists regarding the appropriate imaging for a pregnant woman where RSAA is a part of the differential diagnosis.



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Continual and detailed observation is required. However standard maternal observations may not be helpful because cardiovascular collapse is a late, often precipitous event.

In the case of rupture, immediate resuscitation and control of bleeding is necessary usually by way of caesarean section laparotomy.



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Write Group Leads

Dr Steve Scroggs
A/Professor Rosalie Grivell
Dr Sarah Cash
Rebecca Smith

Write Group Members

Dr Feisal Chenia
Professor Jodie Dodd
Dr Simon Kane
Dr Anupam Parange

SAPPG Management Group Members

Sonia Angus
Lyn Bastian
Dr Elizabeth Beare
Elizabeth Bennett
Corey Borg
Dr Feisal Chenia
John Coombas
Prof Jodie Dodd
Dr Vanessa Ellison
A/Prof Rosalie Grivell
Jackie Kitschke
Dr Kritesh Kumar
Dr Anupam Parange
Rebecca Smith



Abdominal pain and trauma in pregnancy

Document Ownership & History

Developed by: SA Maternal, Neonatal & Gynaecology Community of Practice
Contact: HealthCYWHSPerinatalProtocol@sa.gov.au
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has been absorbed into this new PPG

Approval Date	Version	Who approved New/Revised Version	Reason for Change
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