Trauma in pregnancy (abdominal)

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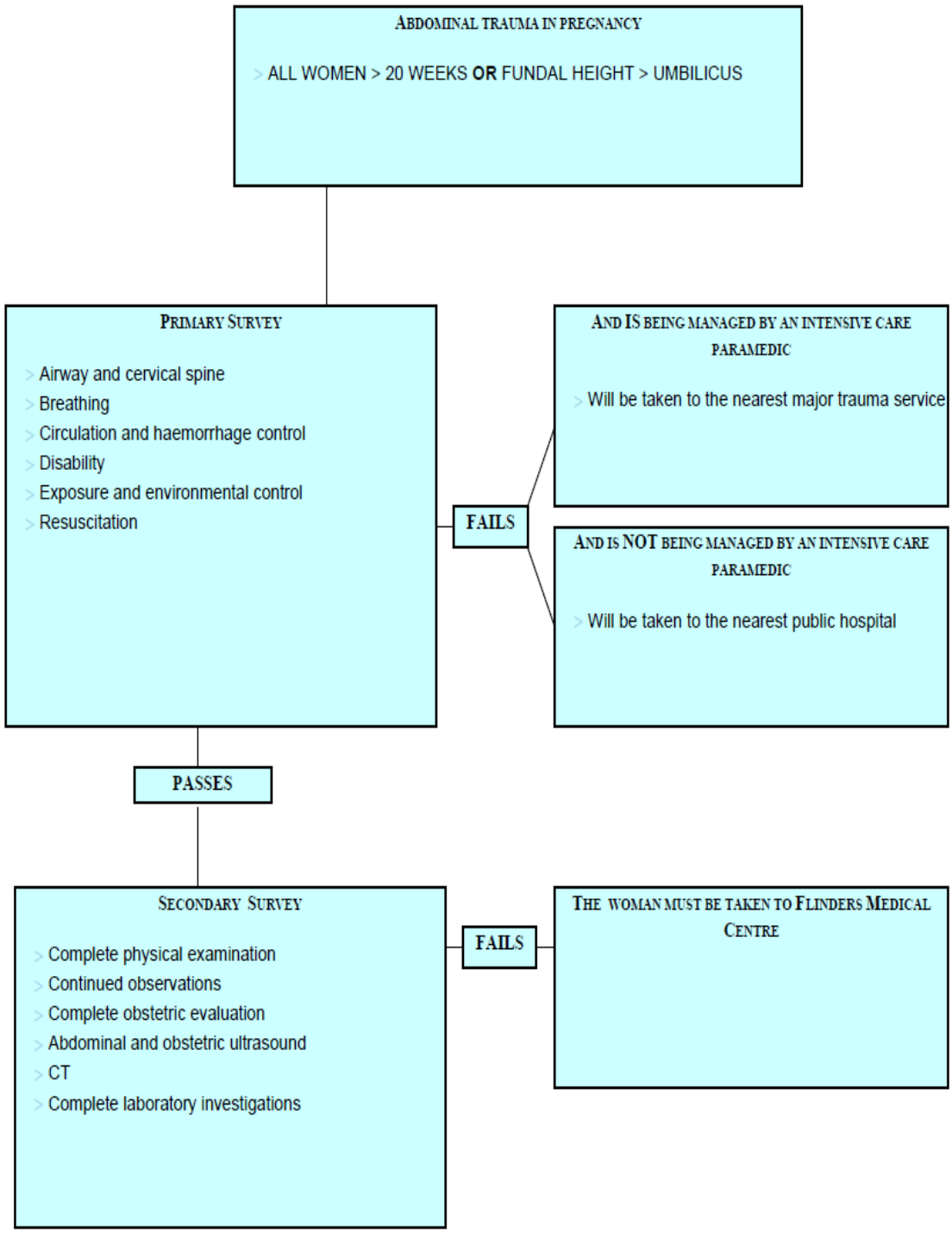
Trauma in pregnancy flow chart



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Introduction

- Trauma in pregnancy is usually the result of motor vehicle crashes, falls or direct assault. Both blunt and penetrating (gunshot or knives) trauma is encountered in Australia, but blunt trauma is the most common (Connolly et al. 1997; Colburn 1998)
- The management of blunt trauma is difficult and is best performed by the most experienced team available, following a standardised approach to ensure that all life threatening conditions are recognised and treated. The standardised guideline generally followed is the Early Management of Severe Trauma (EMST) system of the Royal Australian College of Surgeons
- The reason a standardised approach is heavily emphasised is that during trauma management there are often distractions, which can divert the trauma team away from the identification and correction of life threatening conditions. The pregnant woman is a classical example where issues with the pregnancy can distract the trauma team
- Trauma is best managed by a multi-specialty team and in the case of the pregnant woman an obstetrician must be added to the team to provide obstetric expertise
- MOET is an Obstetric Trauma course derived from EMST in the UK and the additional emphasis in pregnancy is on avoiding Aorto-caval compression
- South Australian trauma system
- This has been progressively developed since the mid 1990's and has been responsible for a significant decrease in the risk of death from trauma in South Australia (Brennan et al. 2002). The management of pregnant women with severe trauma was specifically addressed with Flinders Medical Centre (FMC) being designated the major trauma centre with state responsibilities for women with trauma who are more than 20 weeks pregnant. This means that all women who are pregnant with significant trauma should be managed ultimately at FMC

Metropolitan pre-hospital trauma bypass

- Guidelines have been developed by the major trauma services and the SA Ambulance Service and supported by the Department of Health. Individuals with severe trauma in the Adelaide metropolitan area are taken directly to one of the three major trauma services, FMC and Royal Adelaide Hospital (RAH) for adults and Women's and Children's (WCH) for children, bypassing urban hospitals
- However, in rural areas trauma individuals are taken to the nearest hospital for assessment and then triaged in conjunction with advice from major trauma centres

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Obstetric bypass

- A similar system has been developed for women who are more than 20 weeks pregnant or whose fundal height is higher than the umbilicus. It depends on two main factors, the mother's injuries and the skill level of the paramedic attending the trauma incident
- If the woman fails the primary survey (see below), and is being managed by an intensive care paramedic, she will be taken to the nearest major trauma service. If no intensive care paramedic is available, the woman will be taken to the nearest public hospital
- If the woman passes the primary survey but fails the secondary survey (see below) she will be transported direct to FMC
- If the woman has very minor or no injury but an assessment of the baby is required she will be taken to the nearest public hospital with an obstetric unit
- For pregnant women failing a primary survey and taken to the RAH, there is an arrangement for WCH obstetric involvement

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 mother
- Obstetric assistance is added to the trauma team, by either an obstetrician attending the resuscitation, the ideal situation or giving telephone advice. 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 at a very late stage, when any other injuries have been excluded and only ongoing external fetal monitoring (EFM) is required, can the woman be moved to the labour ward
- EFM should be instituted as soon as practicable but must not interfere unduly with treatment of the mother. EFM is recommended to continue for at least 4 hours

Ongoing management.

- Once the mother has been resuscitated and stabilised the next step is for her transfer to FMC for ongoing monitoring and management

Incidence

- Abdominal trauma and / or accidental injury during pregnancy account for < 1 % of all trauma admissions in Australia (Short 2003)
- Almost all trauma in pregnancy in Australia is blunt trauma. Motor vehicle crashes account for the majority and 1 to 10 % of cases are attributed to assault (Short 2003)

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Clinical presentation

- The symptomatology of abdominal trauma may be affected by the gestational age
- Potential damage to the fetus, the uterus and maternal abdominal organs needs to be considered
- Physiological changes of pregnancy affect the maternal response to trauma
- Pregnant women with minor injuries must receive medical treatment for their injuries and appropriate fetal assessment

Management

- The management of pregnant women with moderate to severe injuries can be divided into:
  - Primary survey
  - Resuscitation
  - Secondary survey
  - Definitive treatment
- Many of the steps will occur simultaneously once the woman is received in the trauma centre or an emergency department

Primary survey

- The primary survey is to identify and treat life threatening conditions

Airway and cervical spine

- Any woman with trauma who is unconscious or has a neck injury above the clavicle should be regarded as having a cervical neck injury until proven otherwise

Breathing

- Oxygen should be administered at rates of at least 10 litres per minute

Circulation and haemorrhage control

- Assess peripheral circulation, skin colour and pulse rate and character
- Control obvious external haemorrhage
- Position woman on her left side with lateral tilt 15˚ to 30˚
- If lateral tilt is not possible because of spinal injuries or other trauma, the uterus should be manually displaced to alleviate aorto caval compression
- Establish intravenous access with at least two large bore 16 gauge cannulae or larger in peripheral veins. Central veins are not the first choice of venous access
- Treat hypovolaemic shock with intravenous fluid or blood as indicated. The assessment of shock in young women is difficult and must not be based on blood pressure (BP). A normal BP does not mean a normal circulation. In shocked young people BP is maintained well until very late and in the pregnant woman mild hypotension is commonly encountered. The pulse rate and its character, peripheral perfusion and skin colour provide a more accurate assessment of the circulation. Sufficient intravenous fluid should be administered to improve these parameters in women with blunt injury. If the woman remains unstable despite ongoing resuscitation operative intervention is indicated.
- An unstable woman must not be taken to the CT scanner

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- With penetrating trauma, haemorrhage can only be controlled effectively by surgery. Resuscitation to normal BP results in an increase in mortality (Bickell et al. 1994). Until an operating theatre and surgeon can be organised, IV fluid administration should be limited to that sufficient to maintain a palpable radial pulse

Disability

- Initial neurological assessment using Glasgow coma scale and pupillary response

Exposure and environmental control

- The woman must be undressed to allow for a full physical examination
- The woman must always be kept warm or rarely cooled. Hypothermia is one of the main dangers in trauma contributing to worsening acidosis, coagulopathy and infection

Resuscitation

- Monitor response to initial treatment with pulse rate and peripheral perfusion. Blood pressure can be a distraction; if low it confirms the woman is significantly hypovolaemic but a normal BP does not necessarily imply a normovolaemic, fully resuscitated woman
- Radiology
- The following plain films must be taken
  - Chest
  - Pelvis
  - Lateral C spine

Secondary survey

- A complete physical examination is performed to identify all other injuries. Orogastric tube and urinary catheter are inserted
- Continue to regularly assess maternal pulse, blood pressure, urine output as appropriate
- Obstetric evaluation
  - Fundal height
  - Uterine tone, contractions, and tenderness
  - Fetal heart rate
  - Vaginal bleeding or evidence of spontaneous rupture of the membranes
  - Pelvic examination
  - Cardiotocography for at least 4 hours if **24 weeks** or more (see below)
- Abdominal and obstetric ultrasound
- Radiographic imaging (CT scan) as indicated when the woman is stable
- Laboratory investigations for all trauma in pregnancy should include:
  - Complete blood picture and coagulation studies
  - Group and save
  - Biochemistry

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  - Kleihauer test
- Laboratory investigations for women with moderate to severe trauma in pregnancy:
  - Group and cross-match
  - Coagulation studies
  - Serum electrolytes
  - Renal function test
  - Serum glucose
  - AST and ALT
  - Amylase
  - Arterial blood gas analysis
  - Kleihauer test – quantify with flow cytometry, if the Kleihauer test indicates significant feto-maternal haemorrhage
  - Urinalysis

Definitive care

- Ongoing management of any further injuries should be undertaken at FMC. The pregnant woman should be retrieved or transferred to FMC as soon as possible
- In the presence of abdominal trauma (particularly with ultrasound evidence of intra peritoneal fluid), persistent hypotension and tachycardia despite appropriate fluid resuscitation is an indication for immediate midline laparotomy to definitively control intra abdominal bleeding (abruption, uterine rupture, splenic rupture, vascular injury etc)
- The first point of contact is medSTAR (South Australia's emergency medical retrieval service), telephone 8222-4222.
- MedSTAR will liaise with the Flinders Medical Centre (FMC) Critical and Intensive Care Unit, telephone 8204-5542 and the South Australian obstetrician and paediatrician rostered on call for retrieval to arrange retrieval as required
- If retrieval is required, medSTAR will also notify the on call obstetric registrar at FMC of the impending arrival (as the SA on call obstetrician may not be from FMC). All pregnant women being retrieved by air should be transported to FMC
- If a caesarean section is necessary trauma surgeons should be present to assess and treat any maternal injuries
- Consider venous thromboembolism prophylaxis
- Administer Rh (D) immunoglobulin (625 IU CSL for gestation > 12 weeks) if the woman is Rh negative and has no pre-existent Rh (D) antibodies
- Women suffering trauma in pregnancy should be admitted for fetal assessment if the gestational age is thought to be ≥ 20 weeks

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Cardiotocography

- If the gestation is known to be or could be 24 weeks or more, electronic fetal monitoring (EFM) should be continued for a minimum of 4 hours following the initial abdominal trauma
- Maternal trauma may be associated with placental abruption
- In severe maternal trauma, CTG may be important, primarily as a monitor of maternal wellbeing. Placental circulation may be compromised before hypovolaemia is otherwise apparent.
- If the gestational age is unknown, a fundal height at the level of the umbilicus (20 centimetres or more) can be used as a guide until more accurate dating is possible
- Medical review after 4 hours continuous EFM
- If discharge criteria (see below) are not met, intermittent EFM should be continued for 24 hours (at least one 20 minutes trace every 4 hours)
- Indications for more extensive 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 or cord abnormality
  - Any evidence of serious maternal injury

Discharge

- Review after 4 hours of initial electronic fetal monitoring
- Discharge criteria:
  - No signs of fetal compromise
  - No uterine activity
  - No ruptured membranes
  - No vaginal bleeding
  - No evidence for feto-maternal haemorrhage on Kleihauer test
  - Normal ultrasound findings
  - Ensure all Rh (D) negative women with abdominal trauma have received a dose of 625 IU CSL Rh D immunoglobulin even if the Kleihauer test is negative
- 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

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Abbreviations

EMST	Early management of severe trauma
et al.	And others
FMC	Flinders Medical Centre
SA	South Australia
RAH	Royal Adelaide Hospital
WCH	Women's and Children's Hospital
EFM	External fetal Monitoring
%	Percent
et al.	And others
e.g.	For example
°	Degree
BP	Blood pressure
CT	Computed tomography
IV	Intravenous

Version control and change history

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2.0	07 May 07	27 Sept 10	Reviewed
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