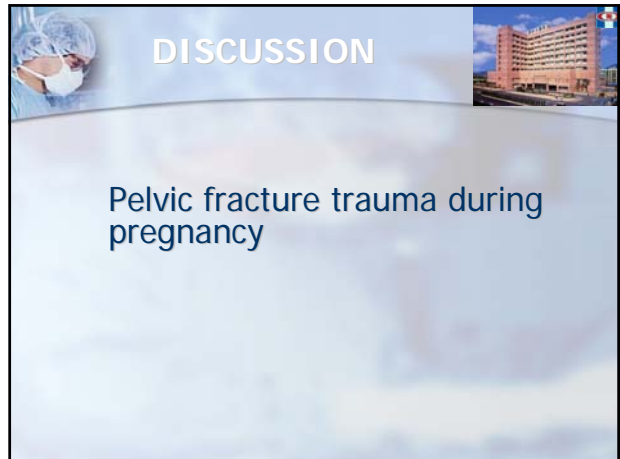




Case Conference

Presenter : PGY 陳桂銓
 Supervisor : VS 楊毓錚
 2011. 3. 22



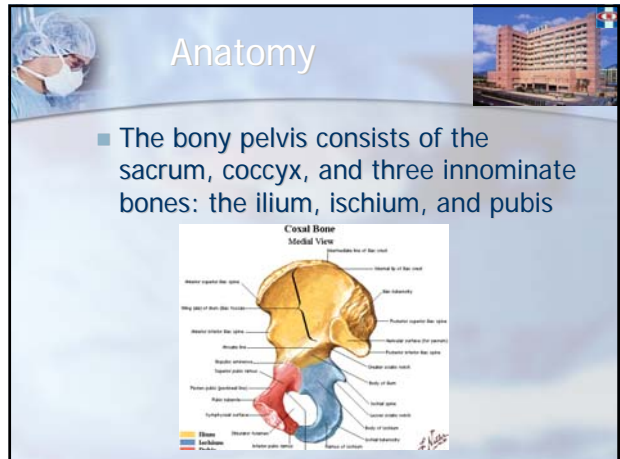
DISCUSSION

Pelvic fracture trauma during pregnancy



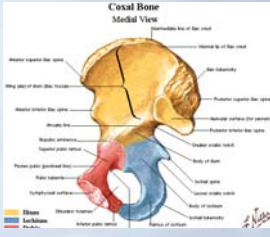
Pelvic fractures

- Pelvis injuries range from the benign to life threatening
- Pelvic ring fractures, Acetabular fractures ,Avulsion injuries....
- High energy trauma



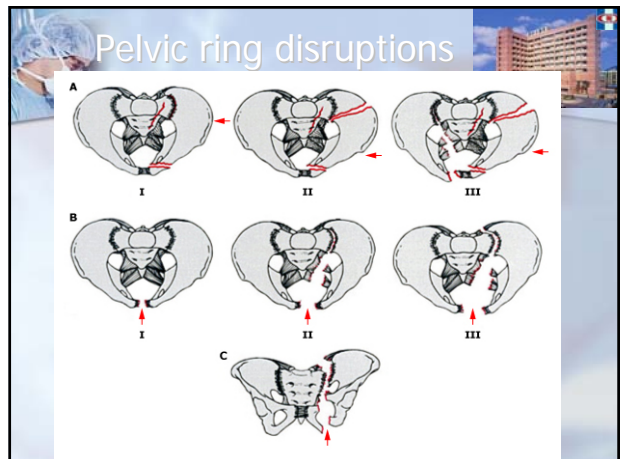
Anatomy

- The bony pelvis consists of the sacrum, coccyx, and three innominate bones: the ilium, ischium, and pubis

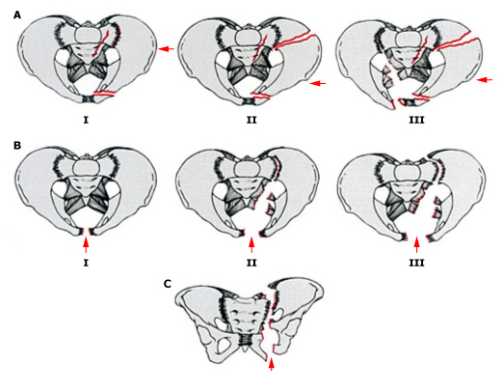



Fracture types

- Pelvic ring disruptions
- Sacral fracture
- Acetabular fractures
- Avulsion fractures



Pelvic ring disruptions



Pathophysiology

- Stable or Unstable, what types fracture
- Sources of bleeding
 - arterial bleeding
 - venous bleeding
 - bleeding directly from fractured cancellous bone
- Haemodynamics instability

Management of trauma during pregnancy

- Optimal resuscitation of mother & early assessment of the fetus
- Early consultation : surgeon, obstetrician, and pediatrician
- Pregnancy-related anatomic and physiologic changes
- Incidence : 1.1%

Causes

Cause	Percentage
Motor Vehicle Accidents	~55%
Assault	10%
Falls	10%
Domestic Violence	~5%

FIGURE 1. Most common causes of maternal injury. It is well established that the majority of all maternal injuries in trauma are known to be caused by motor vehicle accidents. The range of reported incidence in the literature is represented by the brackets.

Fractures and blood loss

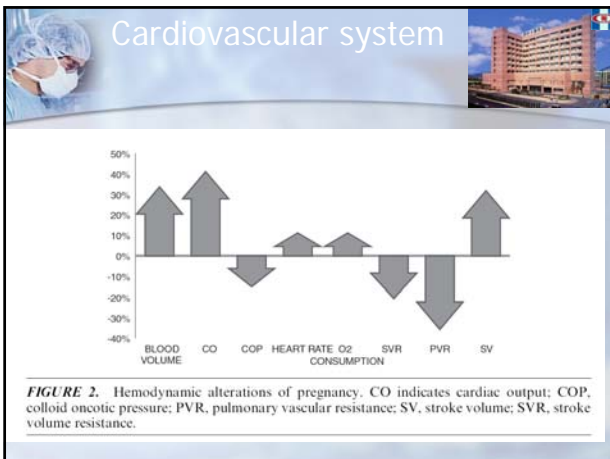
- Radius and ulna: 150-250cc
- Humerus: 250cc
- Tibia and fibula: 500cc
- Femur: 1000cc
- Pelvis: 1500cc-3000cc

Stages of hypovolemic shock

Blood loss	<750	750-1500	1500-2000	>2000
Blood loss (%bw)	<15%	15-30%	30-40%	>40%
Pulse	<100	100-120	120-140	>140
BP	>100	>100	<100	<100
Pulse volume	normal	↓	↓	↓
Respiration rate	14-20	20-30	30-35	>35
Hourly urine output	>30	20-30	<20	<20
Mental status	Marked anxiety	Mild anxiety	Anxiety/ confusion	Confusion/ Drowsines
Fluid therapy	Crystalloids	Crystalloids	Crystalloids/ Colloids/ Blood	Crystalloids/ colloid/Blood

Pregnancy and shock

- Increased intravascular volume
- A significant blood loss before tachychardia, hypotension, and other signs of hypovolemia shock
- Fetus may be in distress while maternal was stable.
- Early Crystalloid fluid resuscitation and early blood transfusion
- Do not use vassopressors



Arterial blood gas values in pregnant and nonpregnant women

Parameter	Pregnant, mmHg	Nonpregnant, mmHg
pCO ₂	27 to 32	39 to 40
pO ₂	100 to 108	95 to 100
pH	7.40 to 7.45	7.40
Bicarbonate	18 to 21	24 to 29

- ### Assessment and treatment
- primary survey & resuscitation
 - secondary survey & resuscitation
 - definitive care

- ### Primary survey & resuscitation
- Mother first
 - Airway, adequate ventilation, oxygenation, circulation
 - Due to uterus compression-> 將病人左傾15度
 - Early Crystalloid fluid resuscitation and early blood transfusion
 - Do not use vassopressors->reduce uterine blood flow->fetal hypoxia
 - Lab study, toxicology, fibrinogen level
-

- ### Fetus
- maternal shock or death
 - Uterine Sonography
 - Abruptio placentae
 - Uterine rupture
 - Abnormal fetal lie
 - On Fetal monitor for 6hrs(no risks of fetal loss)
 - Or on Fetal Monitor for 24 hrs
 - Risk factors: M HR>110, Injury score>9
 - or F HR>160 or <120 or MV accident
 - Consult GYN

- ### secondary survey & resuscitation
- CT
 - FAST
 - DPL(cather above umbilicus)
 - PV by GYN
 - Rupture chorioamniotic membranes
 - Cervical effacement, dilatation
 - Fetal presentation
 - Bleeding

Pregnancy w/ Vaginal bleeding

- D/Dx
 - Ruptured uterine(guarding)
 - Placental abruption(Painful)
 - Placenta previa(Painless)
 - Vaginitis, trauma, cancer, warts, polyps, fibroids, Ectopic pregnancy, Cervical insufficiency
 - Management:
 - 若是需緊急CS, CS後視是否能夠止血,若是不能則 hysterectomy

Definitive care

- Abruptio placentae
- Amniotic fluid embolization
- Widespread intravascular clotting
 - (Fibrinogen<250mg/dl), other clotting factors, PLt
- Fetomaternal hemorrhage(Rh-negative mother->Rh immnoglobulin therapy<72hrs)
- Pelvic fracture->Operation

Other obstetrical issues

- Uterine rupture
- Penetrating abdominal trauma
- Preterm labor and premature rupture of membranes


Management of pelvic fracture during pregnancy

- Open-Book Pelvic Fracture in Late Pregnancy (Pediatr Emer Care 2009;25: 586~587)




FIGURE 1. Pelvic radiograph showing bilateral rami fractures and separation of the pubic symphysis. Fetus is seen in the vertex position (white arrows).

- Trauma is the leading cause of nonobstetric deaths in pregnancy
- Mortality rate of pelvic fractures:
 - 9% maternal
 - 35% fetal
- hormonal changes : an increase in elasticity and weakening of the pubic symphysis ligaments




Indication for emergent cesarean delivery

- signs of fetal distress,
- fetal heart rate of less than 100 beats per minute,
- prolonged decelerations, or recurrent late decelerations in fetuses older than 26 weeks



Radiation exposure of fetus


- a fetus receiving no more than 0.05 Gy of radiation during the pregnancy
- 0.5 Gy are thought to cause a high likelihood of complications
- a plain radiograph of the pelvis will give approximately 0.002 Gy of radiation to the fetus
- CT 0.02 to 0.05 Gy



**TABLE 3
Radiation Exposure for the Unshielded Uterus in Various Imaging Studies**


Imaging study	Uterine radiation dose (rads)
Plain-film radiography	
Abdomen (AP)	0.133 to 0.92
Abdomen (PA)	0.064 to 0.3
Cervical spine	Undetectable
Chest (AP)	0.0003 to 0.0043
Chest (PA)	< 0.001
Femur (AP)	0.0016 to 0.012
Hip (AP)	0.01 to 0.21
Pelvis (AP)	0.142 to 2.2 (mean: 0.2)
Full spine (AP)	0.154 to 0.527
Lumbar spine (AP)	0.031 to 4.0
Thoracic spine (AP)	< 0.001
Computed tomography	
Upper abdomen	3.0 to 3.5
Entire abdomen	2.8 to 4.6 (depends on trimester)
Head	< 0.05
Pelvis	1.94 to 5.0 (depends on trimester)
Thorax	0.01 to 0.59

Rads = radiation-absorbed doses; AP = anteroposterior; PA = posteroanterior.
Information from references 6, 22, 35, and 36.



Conclusion

- not delay radiographic evaluation for trauma of the pregnant patient with severe injury because this can correlate morbidity and mortality of both the patient and the fetus and allow for proper dispositions.



Q&A

The End~