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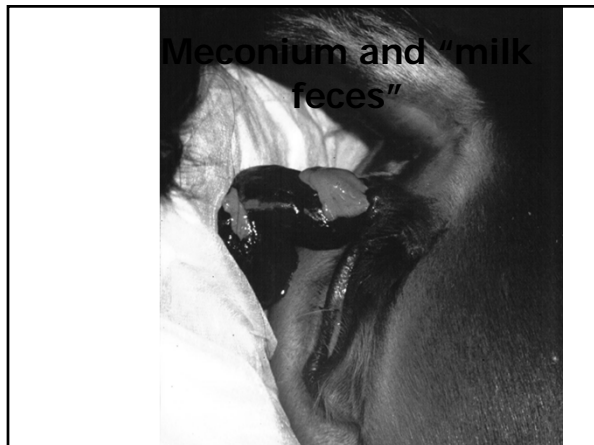
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### Meconium

- Meconium is formed from
  - Swallowed amniotic fluid
  - Intestinal secretions (e.g. bile)
  - Cellular debris
  - Other debris
- Appears during the 1<sup>st</sup> trimester
- Accumulates throughout fetal period
- Bile acids
  - Excreted by the beginning of 2nd trimester

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## Meconium

- Concentration of bilirubin in meconium
  - 50 times that of the serum
- Intestinal absorption of bilirubin
  - Icterus in the neonate
- Dark color of meconium due to bilirubin pigments
- If meconium retained
  - Its color becomes the same as "milk feces"
  - Bilirubin pigments will be absorbed/ excrete in urine

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## Meconium

- *In utero* meconium passage
- Associated with fetal distress ?
- Can occur as early as the 2nd trimester
- Late term meconium passage
  - Fetal GI innervation matures
  - Defecation controlled by parasympathetic stimulation
  - Vagal stimulation with cord or head compression

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## Meconium

- *In utero* meconium passage
- Thin meconium
  - Not associated with intranatal asphyxia
  - Result of passage from earlier fetal distress
- Thick meconium
  - Recent passage
  - Associated with MAS, fetal asphyxia

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### *In utero* Meconium Passage

- Fetal diarrhea
- Born passing profuse, liquid meconium
- Resolves within 48 hours of birth
- Associated with intrauterine insults
  - Hypoxia/asphyxia
  - FIRS/sepsis
- Manifestation of fetal enteritis?

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## Meconium Impactions

- Increase incidence in colts
  - Narrow pelvic canal
- Excessive meconium formation
- Impaired GI function
  - Asphyxia, Sepsis
- Meconium retention
  - Prematurely/Postmaturity
  - Prolong recumbency
  - Dopamine

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## Meconium Impactions Signs

- Strain to defecate - arched back
- Nurse frequently
  - Not effective
  - Dried milk on head
- Persistent colic
  - Rolling on back
  - Kicking at abdomen
  - Frantically swishing tail

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### Meconium Impactions Signs

- Abdominal distension
- Tenesmus
- Umbilicus may reopen
  - Bleed
  - Drip urine

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### Meconium Impactions Diagnosis - History

- Foal "past his meconium"
- Variable amount in each foal
- Passage of meconium easily missed
- Little or no meconium passed & colic

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## Meconium Impactions Diagnosis - Physical Examination

- Digital rectal examination
  - Rectal mucosal edema
- Enema can be diagnostic
- Deep abdominal palpation
  - Meconium is distinct
  - Caudal abdomen
  - Anterior abdomen
- Abdominal ultrasound

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## Meconium Impactions Differential Diagnosis

- Ruptured bladder
- NEC
- Intussusception
- Intestinal volvulus
- Rectal perforation
- Colonic atresia
- Lethal White Syndrome

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## Meconium Impactions Treatment - Enemas

- Soapy water gravity enemas
  - Rectal irritation - persistent tenesmus
- Lubricant enemas
- Dioctyl sodium sulfosuccinate (DSS) enema
- Glycerin enemas
- Retention enemas
  - 4% Acetyl cysteine
  - Rectal distension - stimulates motility
  - Add barium - osmotic effect (MOM)

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Meconium Impactions  
Treatment - Oral Laxatives

- Colostrum
- Mineral oil
- Milk of magnesia
- DSS
- Castor oil

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## Meconium Impactions Supportive Care

- If impaction prolonged
  - Intravenous fluids with dextrose
  - Continue nursing?
- Close attention to adequate passive transfer
  - Higher risk for sepsis
    - Damaged colonic epithelium
    - Open umbilical structures
  - Plasma transfusion

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## Meconium Retention

- Neonatal Gastroenteropathy
  - Dysmotility
  - Meconium retention
- Signs
  - Not passing meconium
  - No abdominal pain
  - No distension
  - Retains enema fluid
- Duration
  - 4-8 days
  - As long as 30 days

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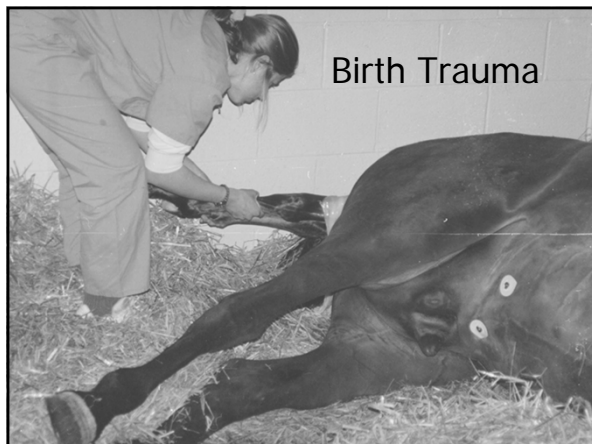
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Birth Trauma

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## Rib Fractures

### Physical Examination

- 2 - 4 cm above costochondral junction
- Involving 4 to 12 ribs in a straight line
- Any rib or set of ribs may fracture
  - Most frequently anterior chest (ribs 2-8)
- Over the heart
- Palpation - feeling click
- Auscultation - click associate with heartbeat
- Easily confirmed on radiographs, ultrasound

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## Rib Fractures

### Hemorrhage

- Primarily bleeding from intercostal arteries
- Most often diffuse chest wall/subpleural/hemothorax
- May be extensive - not evident externally
- Lung contusions - hemothorax
- Lacerations of the myocardium
  - No pericardial damage - Cardiac tamponade
  - Arrhythmias
- Trauma to other structures

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## Rib Fractures

### Clinical Signs

- Signs are variable
- From pain, anemia, cardiac arrhythmias
  - Tachycardia
  - Tachypnea
- Positional
  - Exacerbated during examination
  - Exacerbated when down
  - Weak, minimally responsive foal
    - Distressed when on one side - relief when turned
    - Exacerbated of hypotension when turned

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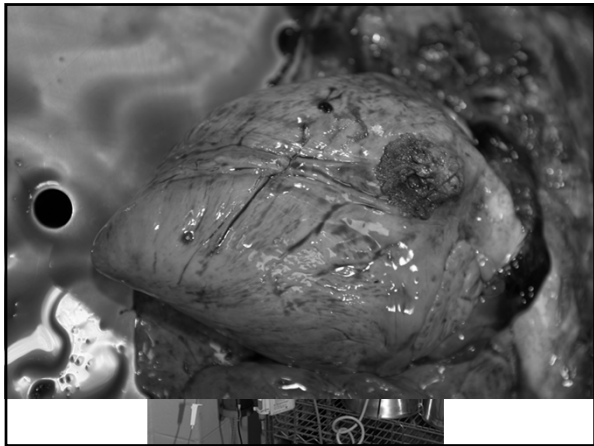
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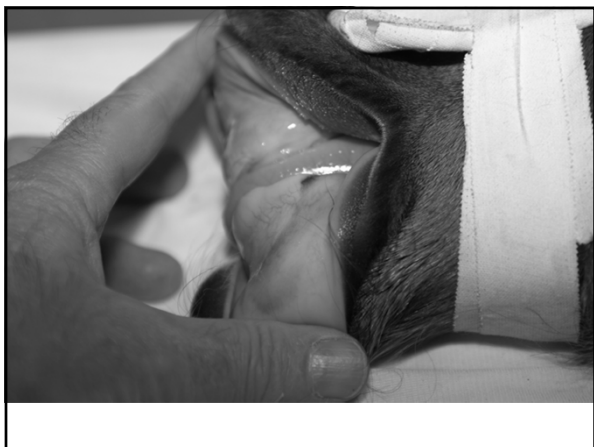
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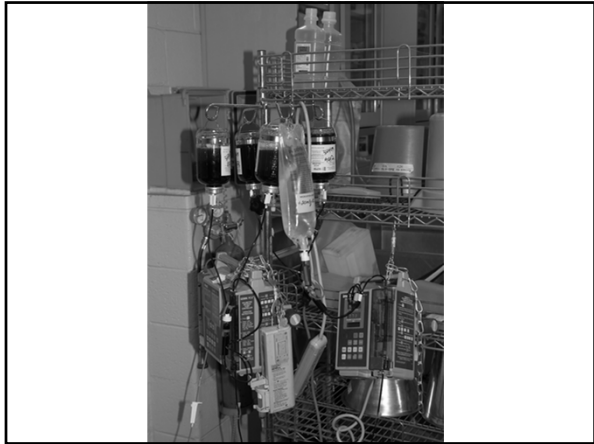
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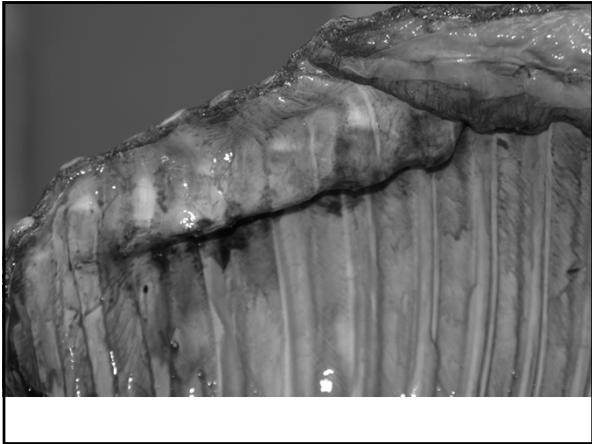
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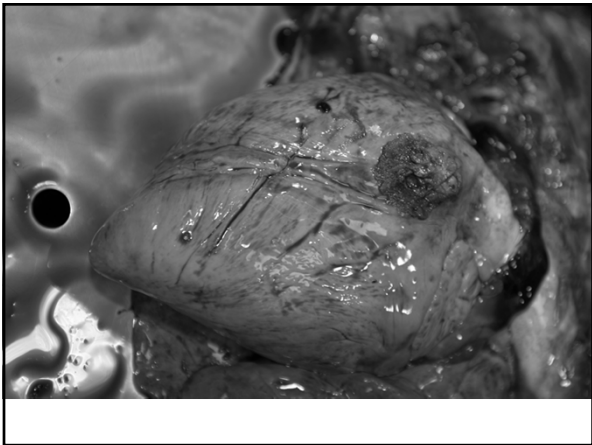
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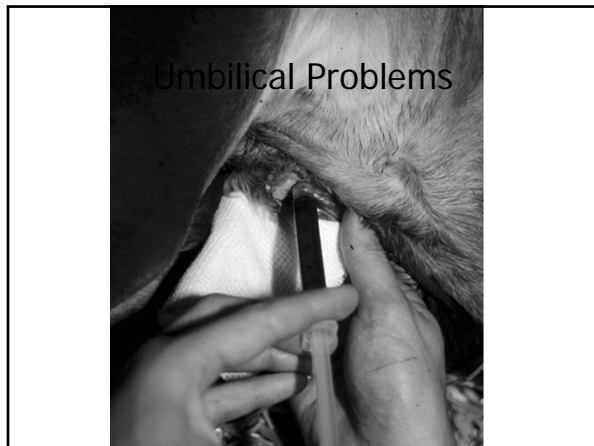
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### Umbilical Bleeding

- Can be a major source of bleeding
- External (extracorporeal) bleeding
- Internal umbilical artery ruptured
  - Commonly in calves, rare in foals
  - Large hematomas
  - Bleeding contained within fascia

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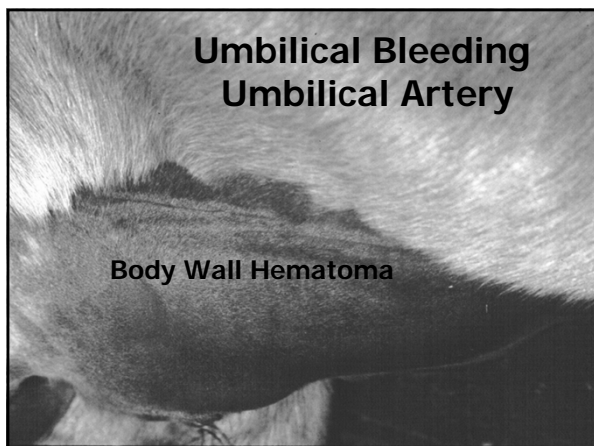
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## Umbilical Bleeding Umbilical Artery

- Artery pulls back into umbilical stump
- Attendant squeezing end of the stump
  - Not effectively stop bleeding
- Umbilical clamp or umbilical tape
  - Not effectively stop bleeding
- Leaking blood
  - Travel along fascial planes
    - Body wall hematoma
    - Internal hematoma
  - Flow through the urachus
    - Large hematoma free in bladder
    - Hematoma along the urachus

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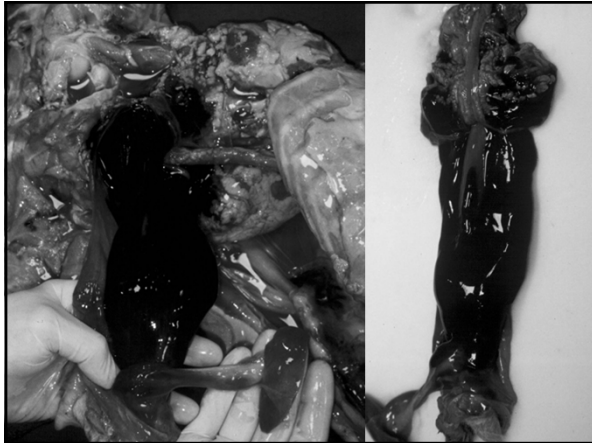
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## Umbilical Bleeding Umbilical Artery

- Often clinically inapparent
- Pass bright red urine within hours of birth
- Occasional urinary obstruction - organized clot
  - "pop-off valve" - urachus becomes patent
- Body wall hematomas - secondary edema
- Diagnosed by careful abdominal palpation
  - Sleeping or weak neonate
  - Can be as accurate as ultrasound
  - Find bladder/urachal hematomas - no clinical signs

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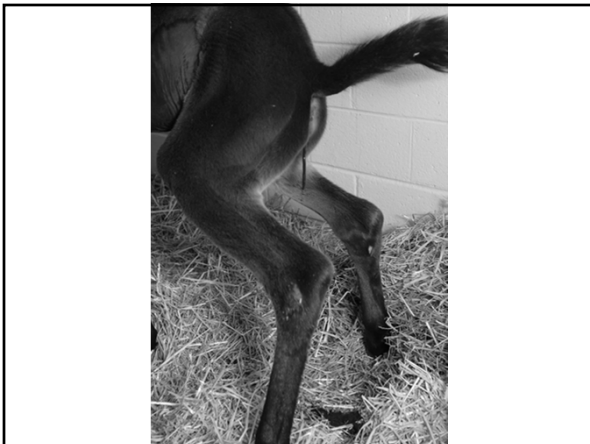
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## Umbilical Bleeding Umbilical Artery

- Some foals - extensive bleeding
  - Hemorrhagic shock
- Most foals do not bleed extensively
  - Signs of urachitis - persistent straining to urinate
  - Asymptomatic
- Icteric
- Mildly anemic

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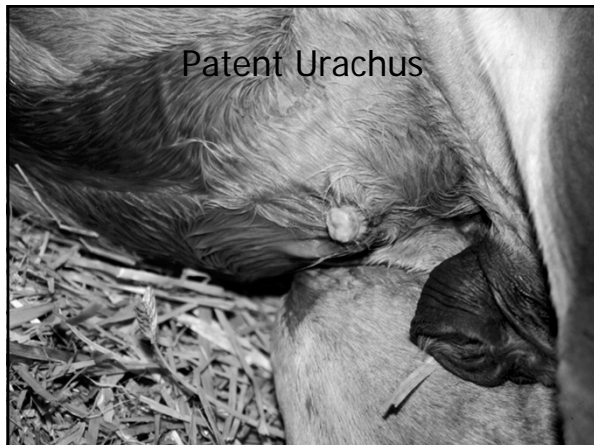
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## Patent Urachus

- Most often seen 3-5 days old
  - When umbilical "scab" falls off
- Diagnosis
  - Observe urination
  - Wet between or constant leak
  - Beware colts – not drop penis
- Treatment
  - Benign neglect
  - Antimicrobials?
  - Avoid topical therapy
  - Do not suture

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## Urachitis

- Urachal disease
  - Infection
  - Hematoma
  - Delayed atrophy
- Signs
  - Straining to urinate after normal urination
  - Repeat posturing
- Consequences
  - Usually none
  - Patent urachus
- Therapy
  - Benign neglect
  - Phenazopyridine (Pyridium)

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