

Perinatology

Care of the mother and fetus during pregnancy, labor, delivery, and early neonatal period, particularly when the mother and/or fetus are at a high risk for complications.



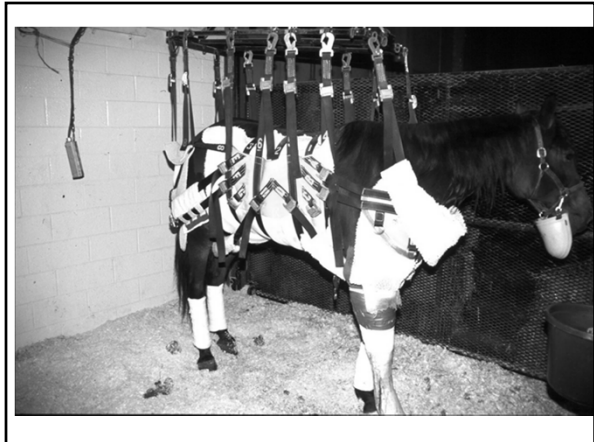
High Risk Pregnancy

- ❖ History of previous problems
- ❖ Development of problems during current pregnancy











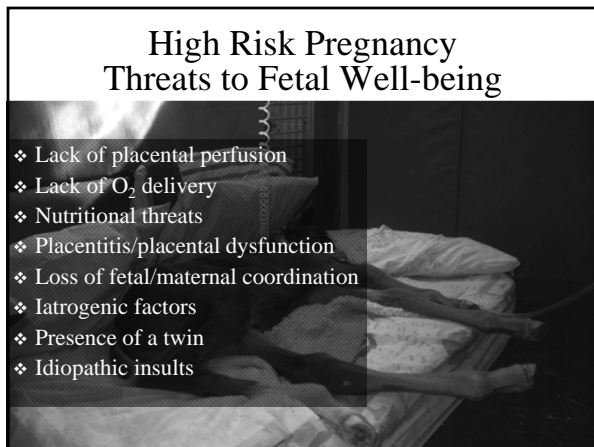
Perinatology

- ❖ What is the threat to the fetus/neonate?
- ❖ How can the threat be eliminated?



Fetal Resuscitation

- ❖ Identify the fetal problem
- ❖ Direct therapy at the problem's source



High Risk Pregnancy Threats to Fetal Well-being

- ❖ Lack of placental perfusion
- ❖ Lack of O₂ delivery
- ❖ Nutritional threats
- ❖ Placentitis/placental dysfunction
- ❖ Loss of fetal/maternal coordination
- ❖ Iatrogenic factors
- ❖ Presence of a twin
- ❖ Idiopathic insults

Threats to Fetal Well-being Lack of Placental Perfusion

- ❖ Late term fetus
 - ❖ High oxygen demand
 - ❖ Must receive constant perfusion
 - ❖ Margin of safety in late pregnancy small
- ❖ Maternal compromise
 - ❖ Dehydration/Shock
 - ❖ Decreased perfusion for any reason
- ❖ Placental response limited
- ❖ Compromised placental circulation
 - ❖ Hypoxic ischemic insult



Fetal Resuscitation Maintenance of Placental Perfusion

- ❖ Aggressively treat hypovolemia in dam
- ❖ Aggressively treat hypotension in the dam
- ❖ Avoid anesthesia in late term mares

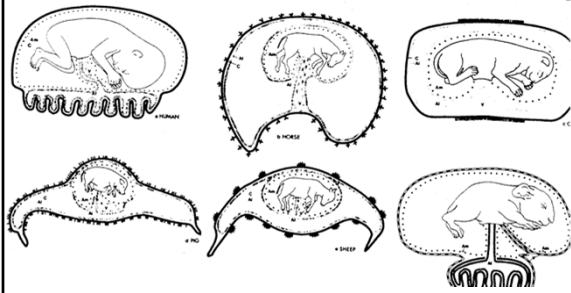


Threats to Fetal Well-being Lack of O₂ Delivery

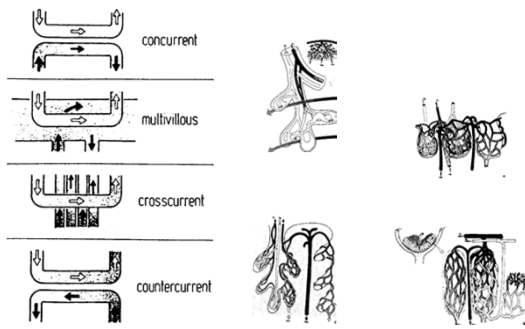
- ❖ Maternal threats
 - ❖ Maternal anemia
 - ❖ Maternal hypoxemia
 - ❖ Decreased perfusion
- ❖ Fetal response
 - ❖ Unique aspect of placentation
 - ❖ Placental oxygen transport mechanisms



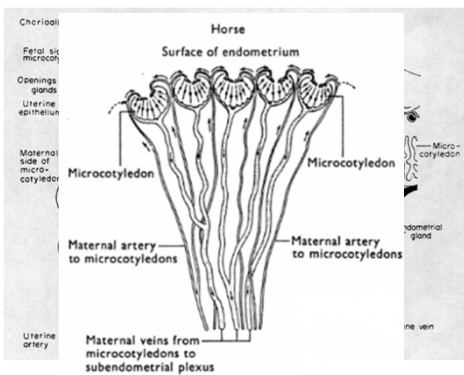
Placentation



Placental Circulation



Equine Placentation



Effect of Maternal Oxygen Therapy

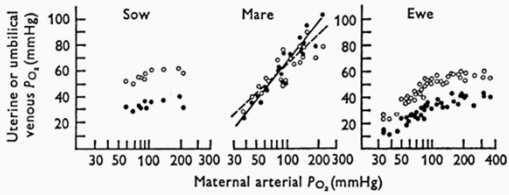
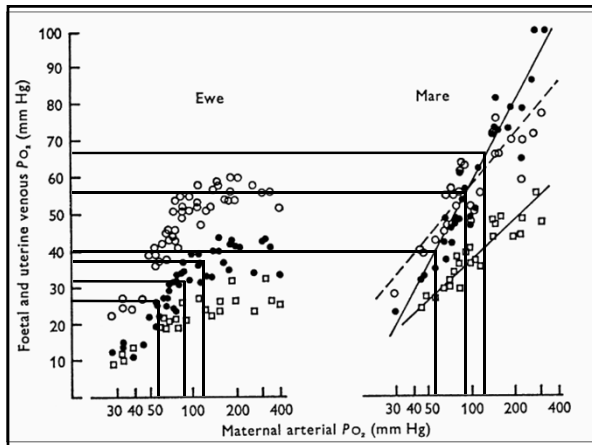


Fig. 4. The relationship between P_{O_2} in maternal arterial blood (log scale) and that in the uterine vein (\circ) and umbilical vein (\bullet) in seven ewes and seven mares (data from Comline & Silver 1970b), and in five sows.



Placental Blood Gas Transport Fetal Blood Oxygen Affinity

- ❖ Higher than maternal blood
 - ❖ Umbilical blood becomes highly saturated
 - ❖ Even at a low P_{O_2}
- ❖ Fetal Hemoglobin - in ruminants
- ❖ Erythrocyte Concentration of 2,3-DPG (lower)
 - ❖ Fetal pig
 - ❖ Fetal Foal - small effect (2 torr)

Fetal Resuscitation Lack of O₂ Delivery

- ❖ Fetal hypoxemia - supplement with INO₂
 - ❖ Take advantage of the countercurrent system
 - ❖ Even if normal Pao₂ in mare, foal may benefit
 - ❖ Could be important with placental edema
 - ❖ May see improved FHR parameters

Maternal Oxygen Therapy



Placental Functions Glucose Transport

- ❖ Predominant source of energy for fetus
- ❖ Glucose transport
 - ❖ Carrier mediated passive transport
- ❖ Low or high maternal glucose levels
 - ❖ Fetus is protected



Nutritional Threats Glucose Utilization



- ❖ The placenta
 - ❖ Actively metabolic tissue
 - ❖ High glucose utilized by placenta in horse
 - ❖ Glucose for placenta also comes from fetus
- ❖ Maternal distress – less glucose
 - ❖ More glucose delivered from fetus
 - ❖ Can lead to negative net glucose transport to fetus

IUGR Intrauterine Growth Restriction



Threats to Fetal Well-being Nutritional Threats

- ❖ Chronic malnutrition of the dam
 - ❖ Lack of intake
 - ❖ Malabsorption
 - ❖ Tumor cachexia
- ❖ Acute fasting of the dam
 - ❖ Forced fasting
 - ❖ Capricious appetite - late gestation



Threats to Fetal Well-being Nutritional Threat of Acute Fasting

- ❖ Fasting the mare for 30-48 hr
 - ❖ Decreased glucose delivery
 - ❖ Rise in plasma FFA
 - ❖ Increased PG's in uterine and fetal tissues
- ❖ Increased risk of preterm delivery
 - ❖ Within one week of ending the fast
 - ❖ Associated with myometrial sensitivity to hormones

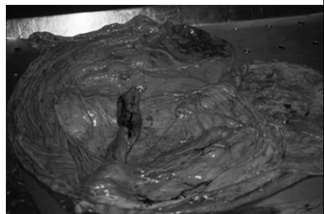
Fetal Resuscitation Nutritional Threats



- ❖ Support the mare's nutritional needs
 - ❖ Enteral supplementation
 - ❖ Parenteral supplementation
 - ❖ Encourage a high plain of nutrition
- ❖ Avoid acute fasting
 - ❖ Avoid elective procedures requiring fasting
 - ❖ Encourage anorexic late term mares to eat
- ❖ If acute fasting is unavoidable – colic, anorexia
 - ❖ Supplement with intravenous glucose therapy
 - ❖ Consider flunixin meglumine therapy

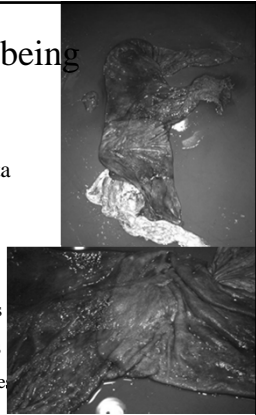
Threats to Fetal Well-being Placentitis/Placental Dysfunction

- ❖ Premature placental separation
- ❖ Infection
- ❖ Inflammation
- ❖ Degeneration
- ❖ Edema
- ❖ Hydrops



Threats to Fetal Well-being Placental

- ❖ Percentage of abnormal placenta
Not a predictor of fetal outcome
- ❖ Presence of abnormal placental tissue
Is enough to cause serious problems
- ❖ Fetal foals born with placentalitis
More likely to have neonatal disease



Fetal Resuscitation Placentalitis/Placental Dysfunction

- ❖ Treat as infectious
 - ❖ Trimethoprim potentiated sulfa drugs
- ❖ Try to minimize PG formation
 - ❖ NSAIDs - flunixin meglumine
- ❖ Hormone supplementation therapy
 - ❖ Altrenogest (ReguMate)

Threats to Fetal Well-being

- ❖ Iatrogenic Factors
 - ❖ Early delivery
 - ❖ Drugs
- ❖ Presence on a Twin
- ❖ Other peripartum hypoxic ischemic asphyxial events

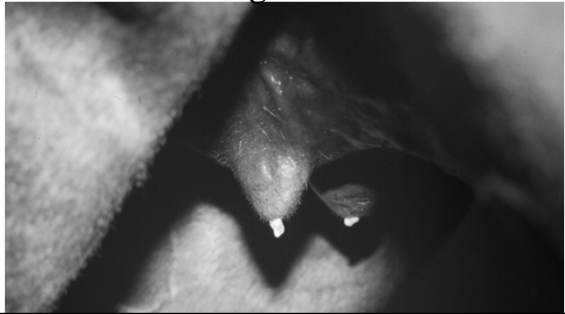


Fetal Monitoring History

- ❖ Intrapartum fetal monitoring
 - ❖ Rational decision to hasten parturition - C-section
 - ❖ Explosive nature of parturition in the mare
- ❖ Prepartum fetal monitoring
 - ❖ Allow prediction of intrauterine hypoxia and distress
 - ❖ Result in effective fetal resuscitation
 - ❖ Rational decision about early delivery



Early Udder Development Precocious Lactation Most reliable sign of fetal distress



Fetal Monitoring Biophysical Profile

- ❖ A collection of ultrasound derived observations
- ❖ Correlate with fetal health or fetal distress
- ❖ In man fetus with abnormal profiles
 - ❖ Clearly in trouble
- ❖ In man fetus with normal profiles
 - ❖ Usually normal
 - ❖ May have life threatening hypoxemia, other problems
- ❖ Not sensitive enough for all problems

Fetal Monitoring Equine Biophysical Profile



- ❖ Fetal heart rate
- ❖ Fetal aortic diameter
- ❖ Maximum fetal fluid depths
- ❖ Utero-placental contact
- ❖ Utero-placental thickness
- ❖ Fetal activity

Fetal Monitoring Equine Biophysical Profile

- ❖ Not sensitive
 - ❖ Fetus with normal profiles may be suffering from life threatening problems



- ❖ Not specific
 - ❖ Occasionally extreme values in normal fetuses

Fetal Monitoring Fetal Heart Rate

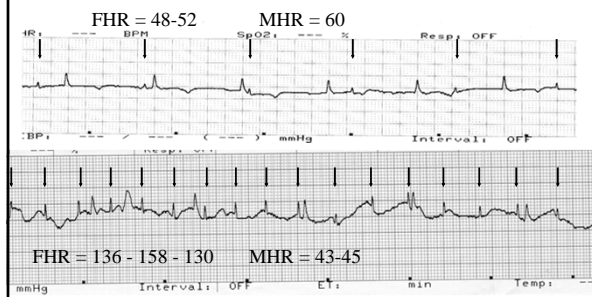
- ❖ Intrapartum measurements
 - ❖ Scalp electrode of FHR via ECG
 - ❖ Transvaginal uterine catheter - contractions
- ❖ Prepartum measurements
 - ❖ Doppler technique for FHR
 - ❖ Tocodynamometer - contractions

Fetal Monitoring Fetal Heart Rate

- ❖ Methods of measurement
 - ❖ Transabdominal fetal ultrasound
 - ❖ Fetal Doppler
 - ❖ Fetal ECG
- ❖ Fetal ECG
 - ❖ Any ECG with recording capabilities



Fetal heart rate measurements Fetal ECG



Fetal Resuscitation If Fetus Clearly in Distress

- ❖ Consider early induction, early delivery
 - ❖ Oxytocin induction
 - ❖ C-section



❖ **These should be considered high risk procedures for the fetus and mare**

No way back