Canine parturition and dystocia

Dietrich Volkmann
Normal Parturition

Prepartum:

- Variable changes to the mammary glands
- P4 < 2ng/ml 24 h pp
- Core temp. 2 deg. F down 12 h pp
Normal Parturition

First stage:
6-24 h
nesting
anorexia
Uterine Contractions
Placental separation

• Probably starts at the time when the water breaks (**2nd stage of labor**)
• Usually occurs only in those pups that are next in line to be delivered
• Probably occurs much more readily in the pups that are born last
• Only takes a few minutes to be completed!!!
• Once completed, leaves the pup without any source of oxygen
• Will occur in all fetuses if labor time becomes abnormally long (**large litters and/or dystocia**)
The longer the interval between onset of second stage labor and the actual delivery of the pup, the greater the chances for intra-partal oxygen deprivation and stillbirth.

Labor is initiated by (involuntary) UTERINE contractions, but delivery of the pup is achieved through (voluntary) ABDOMINAL pressing.

Speedy delivery is desirable and depends on the strength of uterine (myometrial) muscle contractions, as well as the strength of abdominal contractions.
Uterine contractility

Free Calcium ++

MLC Kinase binding

Actin + Myosin → Contraction

Gap Junctions

Bound Ca

Sarcoplasmic reticulum

Ca++

PgF

Oxytocin
Parathyroid Hormone

Skeleton

GI Tract

bound Ca $\leftrightarrow$ Ca$^{++}$

Lower pH

Higher pH

Free Calcium$^{++}$

Calcium$^{+}$

Oxygen

Ca$^{2+}$

MLC kinase

binding

Actin + Myosin $\rightarrow$ Contraction

GTPase activity

phosphatase
Parathyroid Hormone

Skeleton

GI Tract

Heat and Exercise

Panting

bound Ca

Ca++

Higher pH

Lower pH

Free Calcium ++
Total calcium concentrations during the periparturient period

Colony 1
Colony 2

P > 0.1 (Colony)
P > 0.1 (Time)
Ionised calcium (adjusted to pH 7.4) concentrations during the periparturient period

P<0.001 (Colony)  
P<0.05 (Time)
Concentrations of serum PTH during the periparturient period
Venous pH concentrations (adjusted to BT °C) during the periparturient period

![Graph showing pH concentrations over time]

-96.00 -72.00 -48.00 -24.00 0.00 4.00 8.00 12.00
Time (h)
pH

P<0.05 (Colony)
P<0.05 (Time)

Colony 1
Colony 2
Hypocalcemia
(inadequate circulating FREE Ca\(^{++}\))

Supply of Ca from the GI tract is limited on the day of labor, because
- Highest demand for fetal skeletal development
- Initiation of lactation
- Reduced feed intake

Skeletal calcium thus needs to be mobilized
Parathyroid gland will be “lazy” if prior dietary calcium intake was high
Prevention of hypocalcemia

• Feed maintenance level calcium during pregnancy (prevents hypothyroid from becoming “lazy”)
Avoid overheating and panting in the whelping bitch
“Hypo-oxytocinemia”
Inertia caused by large litter

- Uterine wall overstretched
- Cannot contract
- Independent of calcium status
Abdominal contractions

- Under voluntary control
- Require bitch to respond to cervical and vaginal distention
- Requires bitch in good physical health
- Allow the bitch to focus on her labor

**DO NOT INTERFERE**

**DO NOT DISTRACT HER**

**SHE (USUALLY) NEEDS NO HELP**
When both, uterine and abdominal contractions are normal …

… only obstruction in the birth canal can delay delivery of pups and cause stillbirth
Whelping management at the GEB
The Effect of Cumulative Labor Time on Puppy Death Rates

- 10 groups by cumulative labor time for each pup

<table>
<thead>
<tr>
<th>Number of Pups</th>
<th>Average Cumulative labor (min)</th>
<th>Percent Dead Puppies</th>
</tr>
</thead>
<tbody>
<tr>
<td>184</td>
<td>10.74</td>
<td>14.7%</td>
</tr>
<tr>
<td>165</td>
<td>56.55</td>
<td>2.4%</td>
</tr>
<tr>
<td>190</td>
<td>102.97</td>
<td>5.8%</td>
</tr>
<tr>
<td>171</td>
<td>148.39</td>
<td>3.5%</td>
</tr>
<tr>
<td>179</td>
<td>191.52</td>
<td>5.6%</td>
</tr>
<tr>
<td>177</td>
<td>243.24</td>
<td>4.5%</td>
</tr>
<tr>
<td>178</td>
<td>309.59</td>
<td>7.9%</td>
</tr>
<tr>
<td>176</td>
<td>389.84</td>
<td>10.8%</td>
</tr>
<tr>
<td>179</td>
<td>503.06</td>
<td>15.1%</td>
</tr>
<tr>
<td>177</td>
<td>867.24</td>
<td>29.9%</td>
</tr>
</tbody>
</table>
Pup Death Rate by Birth Order

- Overall death rate is 10.2%
- For pup numbers 1-7 the death rate is 7.7%
- For pup numbers 8-15 the death rate is 23.2%
- the “late pups” are 15.6% of the population
Pup Death Rate by Birth Weight

10 equal groups:

<table>
<thead>
<tr>
<th>weight range</th>
<th>pups</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.27 - 0.81</td>
<td>165</td>
</tr>
<tr>
<td>0.82 - 0.91</td>
<td>161</td>
</tr>
<tr>
<td>0.92 - 0.96</td>
<td>177</td>
</tr>
<tr>
<td>0.97 - 1.01</td>
<td>165</td>
</tr>
<tr>
<td>1.02 - 1.05</td>
<td>173</td>
</tr>
<tr>
<td>1.06 - 1.08</td>
<td>175</td>
</tr>
<tr>
<td>1.09 - 1.12</td>
<td>179</td>
</tr>
<tr>
<td>1.13 - 1.16</td>
<td>158</td>
</tr>
<tr>
<td>1.17 - 1.22</td>
<td>166</td>
</tr>
<tr>
<td>1.23 - 1.48</td>
<td>157</td>
</tr>
</tbody>
</table>

148 records had no weight information. They had a death rate of 20.9%
Smaller Pups tend to be in Larger Litters

![Graph showing Total Litter size by Puppy Weight]

- **Total Litter size by Puppy Weight**
  - Average Puppy Weight
  - Average Litter Size
Whelping Facility
Whelping Facility
The Whelping Room resulted in an increase in 25 min. per pup labor times and a decrease in 50 min. per pup labor times.

Old Method (142 litters), Camera (50 litters), Whelping Room (99 litters)
The new whelping approach has significantly increased the percentage of 100% live litters.

Old Method (142 litters), Camera (50 litters), Whelping Room (99 litters)
What else could we do?

• Determine litter size 2 wks before due date
• Do elective Caesarian sections on all bitches with litters > 9 pups or < 3 pups
• Manage dystocias elegantly
  – Accurate, timely diagnosis
  – Appropriate treatment/intervention
Dystocia

- Obstructive
  - Good contractions
  - Malpresented
  - Often dead fetus
  - Feto-maternal disproportion

- Non-obstructive
  - Poor contractions
  - Usually normally presented
  - Often live fetus
  - Usually enough space
Fetal viability: Ultrasonography

Patency of birth canal: Digital or vaginoscopic exam
Litter size: Radiographs
Obstructive Dystocia

• NO ecbolic therapy
  – NO calcium
  – NO oxytocin
• Resolve with SPEED!

Usually resolved by C/section unless last pup
Uterine Inertia - treatment

• Walk the bitch around the house
• Digital exam of vagina
• Stretch the vagina, using two fingers
• Deep abdominal massage
• Drive to the vet’s office

• Allow 30 minutes for birth of next pup
• Quiet setting
• No attendants
Uterine Inertia - treatment

- Calcium (give to effect!)
- Dextrose and hydration (5% dextrose)
- Oxytocin (use small doses frequently!)

In what order??

In what environment?
Stillbirths 2005 at the GEB

- 85 litters
- 662 pups
- Average litter size: 7.8
- Stillbirth rate: 4.4%
- 13 C/sections:
  - 7 elective (0/41 pups lost)
  - 4 obstructive dystocias (3/35 pups lost)
  - 2 uterine inertia (1/16 pups lost)
Elective c/section
Elective C/section

- Day of LH surge?
- Last 1 or 2 days of gestation
- Alternatively wait until
  - Temperature falls
  - Progesterone reaches baseline
  - Bitch goes into labor
- Accelerate fetal maturation with dexamethasone
Singleton pup syndrome

- Many singletons do not result in any problems!
- Singleton pup is large, because it fails to induce its own labor and continues growing
- If not delivered pup will die in utero
- Cannot use temp. drop or serum progesterone to decide on timing of c/s
- Very difficult to pick best time for elective c/s!!!