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Elective Cesarean Sections: Risks, Planning, and Timing

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INTRODUCTION

Elective cesarean sections (C-sections) have become recognized as a successful method to increase neonatal survival. It is a common surgical procedure that can be useful and rewarding to both the client and the veterinarian.

The primary cause of neonatal death is prolonged labor, dystocia, and the resulting hypoxia. Two factors control the intrauterine oxygenation of the fetus: 1) the fetal heart rate and 2) the uterine blood pressure. Any handling, drugs, anesthetics or physiological changes that may jeopardize these two factors must be avoided.

REASONS TO PERFORM A CESAREAN SECTION

1. **Pelvic problem.** Any sign that whelping progress is being inhibited by the pelvis becomes a concern for placental separation and needs to be aggressively evaluated.
2. **Uterine inertia.** Evidence of uterine inactivity and tiring requires close monitoring. Doppler/ultrasound evidence of fetal bradycardia requires immediate action. Oxytocin (2 units/10# bitch weight pre-breeding) can

be tried to stimulate uterine contractions, especially if only a small number of puppies remain in utero. Calcium may or may not be needed depending on the bitch's serum calcium levels. Continued use of oxytocin causes vasodilation of the blood vessels to the uterus, lowering the uterine blood pressure and jeopardizing the remaining puppies. No more than two doses of oxytocin should be used to deliver a puppy.

3. **In utero fetal death.** Ultrasound or radiographic indication that fetal death is occurring or becoming more likely requires aggressive invasive action if the fetuses are of an age that they can survive outside the uterus. No surgical action should be taken if the puppies are not term.
4. **Pre-partum colored vaginal discharge.** Black, red or dark green vaginal discharge pre-whelping is evidence of placental separation. The puppies' heart rates should be evaluated for fetal stress. If the fetal heart rates are >200 bpm, then conservative action can be considered. Slowing of the fetal heart rates indicate more aggressive action is needed (**Figures 1 and 2**).

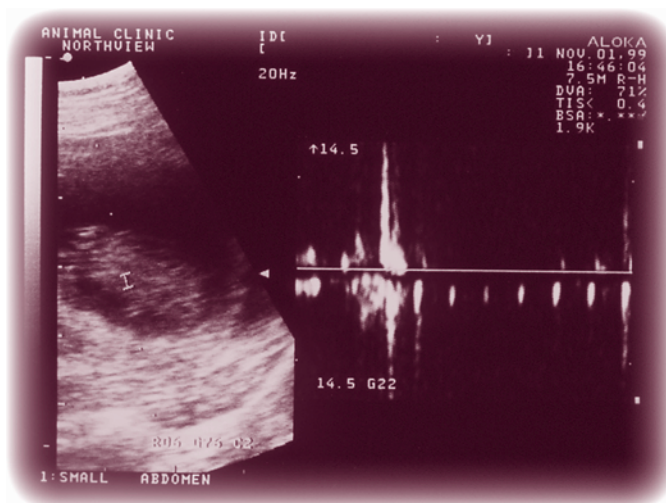


Figure 1. Ultrasound and doppler of fetal heart in nonstressed puppy in utero.

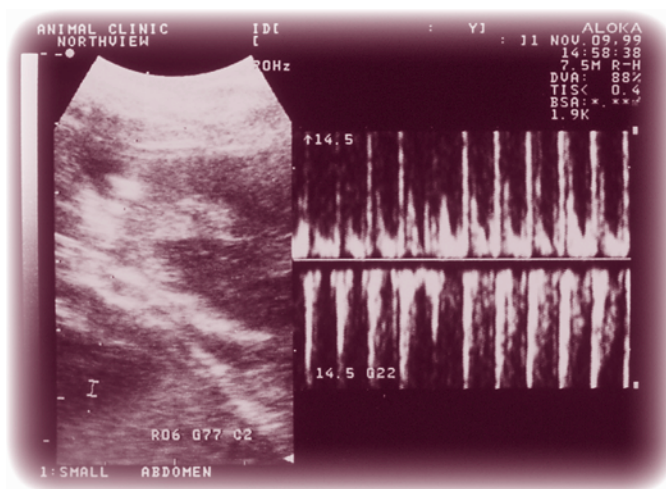


Figure 2. Ultrasound and doppler of fetal heart in a severely stressed puppy in utero.

5. **Convenience.** Veterinarians and breeders can now focus on a given date as a “due date” when the puppies are mature enough to easily survive.

PLANNING A CESAREAN SECTION

Puppies in utero double in size the last two weeks of gestation. Premature removal from the uterus even by a day or two, can jeopardize the chances of their survival. Lung problems, prolonged clotting times, inability to nurse, and lack of bitch colostrum production are only a few of the issues confronted when dealing with premature neonates. One should constantly strive to not “make” premature puppies. If there is any doubt in one’s mind, waiting until a progesterone test can be obtained or until active labor begins is suggested.

Timing the C-Section

- 3 days post ovulation — 63 days after progesterone rises above 5 ngs or 65 days post-luteinizing hormone (LH) spike
- Temperature less than 99° F. — temperature drop reflects the progesterone drop
- Serum progesterone levels below 2.5 ng — indicates the bitch should be progressing into active labor
- Active labor

ANESTHESIA

Since all anesthetics cross the placenta, it is a challenge for the veterinarian to choose an appropriate drug for maternal puppy control and comfort, but not so depressive as to cause puppy lethargy or death. For an anesthetic to be considered, it must be:

1. An even, rapid induction
2. Safe for the bitch
3. Safe for the puppies
4. Rapid, smooth recovery
5. No lingering side effects

PREPARATION FOR SURGERY

Standard pre-surgical evaluations are performed. Pregnant bitches have a normal physiological anemia and WBC is normally between 16,000 and 22,000. Increased renal blood flow lowers the BUN and creatinine levels. The bitch is pre-treated with atropine sulfate at standard dosages. Atropine crosses the placenta and maintains the fetal heart rate. Glycopyrrolate does not cross the placenta as easily due to its larger molecular structure.

Butorphenol is the least respiratory suppression of the narcotics and can be given to a nervous or fractious bitch.

An intravenous catheter is inserted and a standard fluid rate is maintained. It is essential that the bitch be on intravenous fluids to maintain the intrauterine blood flow and oxygenation of the puppies.

Anesthetic Drugs Available

Information and Cautions

Tranquilizers	• Due to the hypotensive effects, tranquilizers should not be used for C-section induction or anesthesia.
Local/epidurals	<ul style="list-style-type: none"> • Due to reduced epidural area in the pregnant bitch, more local anesthesia is absorbed than previously thought. • Local anesthetics will cross the placenta. There is also an increased risk of aspiration pneumonia in the bitch as she is not intubated. • The gastric contents of a pregnant bitch have increased acidity due to gastric production by the placenta, making aspirate pneumonia a significant mortality risk. • <i>Local/epidural anesthetics for C-sections are not recommended.</i>
Disassociatives	• Dissociative anesthetics increase uterine blood flow but must be used with tranquilizers causing cardiopulmonary suppression.
Opiates	• Opiates cross the placenta. The narcotics can be reversed using products such as Naloxone. Often the narcotics have a longer life than the Naloxone, resulting in re-narcotization of the puppies, which causes neonatal depression.
Inhalants	• Isoforane and Sevothane are ideal as they clear the puppy and bitch very quickly. A coning technique can be used as long as the bitch does not struggle or fight.
Propofol	• Propofol is a hypnotic sedative that does cross the placenta, but is cleared from the bitch’s and puppies’ system very quickly. It is currently one of the drugs of choice for cesarean induction.
Barbiturates	• At induction doses, barbiturates can be respiratory and cardiac suppressive.

QUESTIONS & ANSWERS

The following questions from dog breeders were addressed by Dr. Hutchison at The Iams Company Breeders Symposium held at the AKC/Eukanuba® National Championship in Long Beach, California, December 2, 2003. These reflect common concerns voiced by both novice and experienced breeders.

Q: I have a bitch that is pregnant with only one puppy. Is a routine C-section advised?

A: If the female goes into labor by her anticipated due date, then I usually do not perform a C-section. However, it is not uncommon for a bitch with a single-puppy litter to go beyond her due date. Normally, the size of the litter is what triggers the bitch to go into labor, and one puppy does not trigger the bitch the way seven or eight puppies would. If the pup gets too large and outgrows the placenta, it could jeopardize the puppy's health. So, I am very watchful of the due date to determine if a C-section is best.

Q: What is the best day for a planned C-section?

A: The best day to plan a C-section is on her actual due date. The bitch's due date is 63 days after her progesterone went above 5 nanograms. When planning a C-section, I determine the due date, if she has milk, and monitor her temperature drop. Many times we look at progesterone levels as well. The bitch actually goes into labor when she drops below 2.5 nanograms of progesterone. If she is below 3 nanograms she's ready to have the C-section performed. I try to never deliver premature puppies. I put all the criteria together and decide when is best.

Q: Do you recommend trying to let a bitch have her first litter naturally?

A: There is no critical reason why a bitch having her first litter can't deliver naturally. However, I would not jeopardize a litter on a first-time bitch if she is having problems just so she can have the litter naturally.

Q: What are the statistics for successful natural whelping after a C-section?

A: Natural whelping after a C-section is not a problem. A C-section heals very quickly and does not mean a bitch cannot whelp naturally in the future. A well-executed C-section should make the bitch ready for the next cycle.

Q: Can intra-uterine insemination affect the timing of C-sections?

A: Intra-uterine insemination should have no affect on the whelping process. Intra-uterine insemination is strictly injecting the semen into the uterus and the process has no tendency to make the uterus or the abdomen weaker.

Q: Most vets now do mid-line incisions. Do you ever take pups from the side? What are the advantages? I had a "country vet" who always did that. He said bitches were always more comfortable nursing and recovered faster.

A: Performing mid-line incisions because of a high number of puppies is usually the best way in the bitch. Some country veterinarians will use a flank incision because this is the way they perform C-sections in sheep and goats. There are three drawbacks to flank incisions for bitches. One is that the ovaries are tight. It is hard to actually get the uterus exposed. Bitches many times have a lot more puppies than a goat or a sheep, so you have a little more uterine stretching. In many small bitches, the flank incision just does not provide the access that a mid-line incision does. Even though theoretically it makes a lot of sense for nursing and healing, flank incisions in the bitch are not ideal and not as easily done as in a sheep or a goat.

Q: What is your opinion of a uterine monitor?

A: Uterine monitoring can be of value, especially if your veterinarian does not have access to ultrasound. A uterine monitor offers valuable information; but this information is no more or less important than a temperature drop, your observations, how the bitch is acting, and the due date. The uterine monitor removes a lot of the responsibilities, which is nice, but it can also invite trouble if used as the sole information source.