ELECTIVE CESAREAN SECTION: GOOD OR BAD IDEA?

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Small animal practitioners and breeders are familiar with emergency Cesarean sections in dogs and cats. Emergency surgical intervention (Cesarean section) for dystocia is indicated if a bitch or queen fails to respond to medical management, or if fetal distress is evidenced despite adequate to increased uterine contractility (suggesting mismatch of maternal birth canal to fetal size, or fetal malposition or malposture incompatible with vaginal delivery), or if aberrant contractile patterns are noted by uterine monitoring. Recently, practitioners are increasingly asked to perform *elective* cesarean sections in bitches and queens who have no urgent medical indication for such, most commonly because breeders are reluctant to accept the unknown risks associated with attempted natural deliveries. In some cases, this choice is quite rational, such as with singleton litters or with breeds known to have a predictable predilection for dystocia (brachycephalics, hydrocephalics such as Bostons, Frenchies). The practice has become common enough to generate debate, and is even under legislative criticism in some countries.

Well orchestrated cesarean sections result when anesthetic and neonatal resuscitative protocols are established and coordinated, and the preoperative preparation of the dam optimized. It should always be remembered that the dam may be debilitated and require careful anesthetic management, there may be little time for routine pre-anesthetic preparation and evaluation, and the dam may have been fed recently. Minimally, the hematocrit, total solids, serum calcium and glucose levels should be evaluated pre operatively. Intravenous fluid support at an operative rate minimally is indicated (5-10 ml/kg/h).

For premedication, atropine is best not given routinely, because it crosses the placenta and blocks the normal, adaptive bradycardic (slowing of the heart rate) response of the fetus to hypoxia (low blood oxygen) and causes relaxation of the lower esophageal sphincter, making regurgitation and maternal aspiration pneumonia more likely. However, the use of an anticholinergic is indicated for the dam because of the anticipated vagal (autonomic nervous system) stimulation during manipulation of the gravid (pregnant) uterus. Glycopyrrolate (0.01-0.02 mg/kg SC) does not cross the placenta and is preferred. Most dams are tractable and do not need preanesthetic tranquilization, which has a depressant effect on the fetuses. Phenothiazine tranquilizers (Ace promazine) are transported rapidly across the placenta and are potent depressants. Alpha2-adrenoceptor agonists such as dexmedetomidine and xylazine are contraindicated because of their severe cardiorespiratory depressant effects. Similarly, the respiratory depressant effect of opioids (narcotics) makes them unpopular prior to removal of the fetuses. If tranquilization is necessary with an intractable dam, narcotic

sedatives are preferable as their effects can be reversed (naloxone 1-10 µg/kg IV or IM) during neonatal resuscitation. Metoclopramide (0.10-0.20 mg/kg) can be administered subcutaneously or intramuscularly prior to the induction of anesthesia to reduce the risk of vomiting during the procedure.

Pre-oxygenation by mask (5-10 minutes) is always indicated. Initial preparation of the abdomen (clipping and first scrubbing) can be undertaken during this time. For induction of anesthesia, dissociative agents such as ketamine and the barbiturates are best avoided because they produce profound depression of the fetuses. Propofol (6 mg/kg IV to effect) appears to be most useful and safe; because of its rapid redistribution therefore have a limited effect upon the fetuses after delivery. Mask induction actually produces more maternal and fetal hypoxemia (low blood oxygen) than propofol induction. For maintenance of anesthesia, volatile (gas) agents are preferable, especially those with low partition coefficients such as isoflorane and sevoforane. These agents show rapid uptake and elimination by the animal, and it may have a better cardiovascular margin of safety than the more soluble agents such as halothane. Nitrous oxide can be used to reduce the dose of other anesthetic agents, it is transferred rapidly across the placenta and, although it has minimal effects upon the fetus in utero, it may result in a significant diffusion hypoxia (low blood oxygen) after delivery. Some practitioners prefer a continuous propofol infusion as anesthesia until the fetuses are delivered, this can work very well, transitioning to gas for the closure stage of surgery. Using a local anesthetic (Bupivicaine 2 mg/kg) line block in the skin and subcutaneous tissues prior to incising permits a more rapid entry to the abdomen while the dam is making transition from Propofol induction to inhalant maintenance, and helps with post operative discomfort.

Operative speed is important because surgical delay and prolonged anesthetic time are associated with fetal asphyxia and depression. However, care should be taken during incision of the linea alba to ensure that the gravid uterus is not also incised. Ideally the uterus should be exteriorized and packed off with moistened laparotomy sponges to prevent abdominal contamination with uterine fluid. This process should be undertaken carefully to ensure that the uterus and its broad ligament do not tear; it may be easier in some cases to exteriorize one horn at a time. The uterus should be penetrated in a relatively avascular area, and it is best to elevate the uterine wall from the fetus and to extend the incision with scissors to ensure that the fetus is not lacerated. The fetuses may be bought to the incision by gently 'milking' them along the uterus, although in some cases or in large dams it may be necessary to make more than one incision. As the fetal fluid is released it is best to remove this by suction, and then to clamp the umbilicus (twice, incising between clamps) before passing the fetus to an assistant for immediate resuscitation. After each fetus is removed the associated placenta should be detached by gentle traction, but the placentas may be left in place if they are firmly attached and their removal causes significant hemorrhage. Retained placentas can be spontaneously passed post operatively, or managed medically. It is essential that the uterine horns, the uterine body and the vagina are inspected thoroughly to ensure that all fetuses have been removed. Finally, after closure the uterus, its broad ligament and the vascular supply should be inspected carefully to

ensure that any previously unnoticed tears have been identified before closure of the abdomen.

Ovariohysterectomy (spay) at the time of cesarean section is again the option of the surgeon and owner, but results in longer anesthetic time for the dam, delayed nursing for the neonates, and increased loss of blood in the dam, so should be postponed if reasonable. Interestingly, most reports of fatal hemorrhage post cesarean section occur when an OVH has taken place as the surgery is difficult in the pregnant dog. There is some belief that estrogen acts in a permissive fashion for prolactin receptors in the mammary glands, making ovary removal at cesarean section undesirable if milk production is marginal. If uterine viability is questionable an ovariohysterectomy should be performed. In the normal dam the uterus will begin to involute shortly after removal of the fetuses, but if this is not the case oxytocin may be administered (0.25-1.0 u per dam) SC or IM to facilitate involution and arrest any hemorrhage; this also promotes milk let down.

Post surgical discomfort should be acknowledged in the dam. Once the fetuses are removed, narcotic analgesia can be administered parenterally to the dam. Post operatively, non steroidal anti-inflammatories (NSAIDS) are not advisable due to their uncertain metabolism by the nursing neonates with immature renal (kidney) and hepatic (liver) metabolism. Narcotic analgesia is preferable. Oral narcotics such as Tramadol, 10 mg/kg/day in divided doses provide excellent post operative analgesia for nursing bitches with minimal sedation of the neonates. In all cases, clients should be advised to closely monitor bitches post operatively until normal maternal behavior emerges. Post cesarean section, bitches can be clumsy and inattentive to the neonates, and can even become aggressive, as the normal mechanisms of maternal bonding have been bypassed. Nursing should be supervised and neonatal care ensured.

THE DEBATE

Pros

More predictable outcome in most cases
Scheduled not emergency time frame
Single method of delivery
Sometimes more cost effective
Proactive pain management
Increased veterinary involvement
Veterinary revenue
Promotes ovulation timing for gestational aging
Avoids complications of unrecognized dystocia
Immediate veterinary evaluation of neonates

Cons

Anesthetic risks
Surgical risks

Invasiveness
Pain, pain management, Rx of neonates
Problems with maternal behavior
Expense
Exposure to infectious disease
Loss of selection for natural breeders
Maternal stress
Multiple litters?
Litigation
No “baby’s first bugs”