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Common Post Whelping Diseases and Disorders in the Bitch

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There are a number of common disorders of the post whelping period in the bitch. Breeders should be aware of their clinical symptoms, methods of diagnosis, treatment, and the effects on both the bitch's and neonate's lives, and impact on future fertility. The diseases/disorders to be discussed include low calcium levels (called eclampsia), infection of the mammary gland(s) (called mastitis), low or no milk production (called hypogalactia or agalactia, respectively), uterine infection (called metritis), retained fetal membranes, expulsion of the uterus through the vulvar lips (called uterine prolapse) and persistent invasion of placental cells into the uterine wall (called sub-involution of the placental sites or SIPS).

Eclampsia (low intracellular calcium concentrations)

Eclampsia is also known as puerperal tetany or hypocalcemia. It is caused by depletion of calcium stores from outside the cells, which then prevents adequate calcium from entering the cells, resulting in failure of the cells to function properly. Muscle cells are the most significantly affected because they require calcium for normal function; however, nerve cells can also be affected, resulting in erratic behaviors. The lack of calcium being bound to the cell membrane of the muscle cells, makes it easier for the cell to contract, and repeated contraction of the muscle cells results in continuous contraction of the cells, called tetany.

Eclampsia typically occurs within the first 2 weeks post whelp, as lactation is reaching it's peak, but may also occur prior to whelping, during whelping, immediately after whelping or up to 4-6 weeks later. If it occurs during parturition, it is typically called uterine inertia and involves either labor never starting (called primary inertia) or labor ceasing after progressing normally for a period of time (called secondary inertia). In this situation, there is inadequate calcium available to initiate or maintain normal smooth muscle contraction patterns. If it occurs prior to the onset of labor, it may present as signs of false Stage 1 labor, with panting and muscle trembling, which may progress to seizures, if not treated and calcium levels continue to drop, or to uterine inertia if it continues to develop gradually and the onset of labor begins soon after eclampsia develops.

Bitches with large litters, those that are obese, or those that have poor nutrition may be predisposed to eclampsia prior to whelping. In post-whelping eclampsia cases, smaller breeds are more commonly affected, as are maiden bitches. Signs may be subtle to obvious. Initially bitches may grimace, whine, have an itchy face and a dry mouth. Behavioral abnormalities may be noted such as nervousness, decreased mothering, distracted behaviors, sudden aggression towards pups, or other strange behaviors. As the condition progresses, drooling, staggering, trembling, seizures, fever (often >107°F), pupil dilation, stiffness, collapse and finally continuous muscle contraction develop.

Diagnosis involves documentation of clinical signs plus confirming a low blood calcium concentration. A special blood test is needed to accurately diagnose hypocalcemia, called ionized calcium. Not all clinics will have this test available but will likely have a different test called total serum calcium. Because 40% of the calcium that is in peripheral blood is bound to proteins, it is necessary to adjust total serum calcium with the amount of protein in the blood. This adjustment

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tends to underestimate low calcium concentrations and overestimate normal calcium levels, so it should be used cautiously as a guide; however, if clinical signs point to hypocalcemia and the corrected calcium is within normal ranges, the condition should likely be treated with either subcutaneous or oral therapy, and clinical response to treatment used to determine if the diagnosis is correct.

Bitches that are tremoring, seizuring or are tetanic, should be treated with IV calcium. This can be a dangerous treatment and requires careful monitoring of heart rate and rhythm to prevent complications. The treatment is slowed or stopped if abnormalities occur, until they return to normal and then treatment can be reinstated.

When clinical signs resolve, the bitch should be switched to oral calcium carbonate supplementation divided two to four times daily. Tums® provides a readily available source of oral calcium carbonate. Tums® Regular strength has 500 mg/tablet; XS has 750 mg/tablet and DS has 1000 mg/tablet. Bitches should remain on supplementation throughout lactation. Initially puppies should be removed for a minimum of 24-48 hours. At that time, they may be slowly reintroduced to nursing, limiting the amount of nursing time initially to short periods (5 – 10 minutes), 2-3 times daily. If no signs of eclampsia return, the amount of nursing time can be slowly increased over the next few days. Should signs of eclampsia return, puppies should be permanently weaned. In some cases, partial supplementation and partial nursing may be an acceptable option.

Most bitches that develop uterine inertia during whelping will not continue to have signs after whelping is complete and thus they usually require no other supplementation. While bitches that develop symptoms either pre or post-whelping, typically require long term supplementation.

Prevention includes feeding a balanced diet with a calcium:phosphorus ratio of 1:1 – 1.2:1. Products high in calcium (dairy products or supplements) should be avoided during the last half of pregnancy and during the entire lactational period. Diets high in legumes (soybean or bran) should also be avoided as they are high in phytates which can bind dietary calcium. Relapses on subsequent pregnancies are common unless the cause for the hypocalcemia is identified and corrected.

Mastitis (infection/inflammation of one or more mammary glands)

Mastitis is inflammation of the mammary gland(s). It may involve only a portion of a single gland, one entire gland, multiple glands in a chain, or an entire chain of glands. There are multiple teat orifices on each teat and infection may involve one or more of them. Common bacteria causing infection include *Escherichia coli*, staphylococci, streptococci, pseudomonas, klebsiella, pasteurella, and clostridium species. Normal milk appears yellow to white during the first 24 hours when colostrum is present, and then turns completely white and should remain so for the remainder of lactation. Any green, red, or brown milk is abnormal. It should be noted that after weaning or during false pregnancy, bloody discharge may be noted from one or more teat orifices. Thus, if blood is noted during these times, other signs of mastitis should be documented prior to making a diagnosis of mastitis based on color of discharge alone.

Signs of mastitis may include depression, anorexia, fever, decreased mothering (not wanting to be in the box or wanting to allow pups to nurse), trembling, irregular or stiff gait especially affecting the hind legs, discolored milk (red, brown, green, yellow or any combination thereof), redness, hardening, or pain in the affected mammary gland(s). Bruising and abscessation of the gland may also occur. These abscesses may rupture and expel dead tissue. If bruising is noted and it does not rupture within 12 hours, sedation, drainage and removal of the

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dead tissues should be considered. Failure to achieve rapid drainage could result in toxins in the bloodstream of the bitch and illness in the pups following consumption of toxins in the milk. Puppies should be removed (or the affected gland should be covered when puppies are with the bitch) when there is a draining abscess to minimize their contact with the bacteria.

Diagnosis is based on clinical signs and evaluation of the affected milk for increased white blood cells and bacteria. Culture is recommended to ensure correct antibiotic selection has been made. Bloodwork is recommended for bitches who are clinically ill, to assess for signs of kidney or liver dysfunction, that may require additional treatment beyond simply antibiotics.

Treatment involves appropriate antibiotic therapy, IV or SQ fluids, pain medication, and in some cases, short term non-steroidal anti-inflammatory therapy, if fluid therapy alone isn't enough to lower the bitch's fever. Antibiotics should be chosen that are effective against the type of bacteria present and that are safe for nursing pups unless the puppies are to be weaned. Good initial antibiotic choices include amoxicillin-clavulanic acid or cephalosporins. Caution should be taken with the use of NSAID's and nursing puppies. There are no clinical studies evaluating the effects of NSAIDs on adult kidney function when young neonates nurse dams taking NSAIDs. Bitches that need repeated doses of NSAIDs should have the puppies weaned and fostered or hand-reared, at least until the NSAID is no longer needed.

Puppies may be allowed to nurse the mastitic gland as long as toxic bacteria (typically E coli or clostridium) are not present, since this will result in better drainage than can be accomplished via hand stripping. Unfortunately, puppies often will not nurse from the affected teat since the mastitic milk has a different taste than normal milk. If they will not nurse, the gland should be hand-stripped at least 2 - 3 times daily. Hot packing is also beneficial to reduce swelling and discomfort. Following warm compresses, a cool cabbage leaf compress can be applied for 10-15 minutes. White cabbage is preferred and should be steamed and then layered in the refrigerator with wet paper towels between each leaf or two and placed in a sealed ziplock baggie. This cabbage leaf compress helps to reduce the swelling associated with the inflammation present.

Chronic mastitis is uncommon and typically presents as failure to thrive in the puppies despite apparently adequate nursing. There may be no obvious signs in the bitch, other than the presence of discolored or abnormal appearing milk on cytology. Treatment involves appropriate antibiotic therapy and either supplementation of the puppies or cross-fostering.

Abnormalities of Milk Production

Agalactia, or the absence of milk, is uncommon in the bitch. It may be primary or secondary, with the latter being much more common. Causes include poor nutrition or body condition, premature labor, progesterone administration during pregnancy, infections or illnesses during pregnancy, and abnormal mammary development. Hypogalactia, or decreased milk production, occurs more commonly and may be caused any of the above, or may be due to presence of either small litters (inadequate stimulus), very large litters (inadequate supply), or be behavioral (anxiety). If the bitch is a maiden and is anxious about her litter, administration of small doses of injectable oxytocin, every 2 – 4 hours (15 – 30 minutes prior to nursing) for 1 – 2 days may facilitate letdown. It is also important to ensure the puppies do not nurse constantly to allow refilling of the mammary glands holding areas, called teat cisterns. Tranquilizers (particularly acepromazine) may be beneficial by both reducing anxiety and increasing mammary development.

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If puppies are not gaining 10 – 20% of their body weight/day, administration a medication called a dopamine antagonist (metoclopramide or domperidone) may be used to increase mammary development. These medications should be continued for at least 5 - 7 days, and up to 10 days, ensuring that they are continued for at least 2 days beyond the time that milk production is considered adequate. Moving the bitch to a quiet area of the home or kennel and keeping other people and animals away from the whelping area, may also help. Use of Dog Appeasing Phermone (DAP®) diffusors or sprays may also help calm anxious bitches.

Galactostasis (stagnant milk) is failure of milk to move out of the gland holding area (teat cistern) and into the teat canal. Causes may include inadequate emptying of the glands due to small litter size, inadequate suckle strength, poor rotation of pups along all teats, inverted nipples, false pregnancy, maternal illness with sudden weaning of puppies or anatomic abnormalities of the teat canals or teat openings. This condition commonly causes mammary gland swelling with or without discomfort, but no fever, redness, discolored milk, or increased numbers of inflammatory cells or bacteria in the secretions, which differentiates it from mastitis. Usually, the bitch is clinically normal with this condition, but the owner finds a swollen and possibly hard gland. If left untreated, mastitis may develop. Treatment usually involves hot packing, cabbage leaf compressing and massaging the gland multiple times daily until softening and milk ejection occurs.

Retained Fetal Membranes or Metritis (uterine infection)

Retained fetal membranes are not uncommon in the bitch, but they are typically not cause for significant concern. Fetal membranes that are not released at the time of delivery will usually degrade over the next few hours - days and the necrotic debris passes with the lochia. Normal lochia starts out dark green-black and then becomes brick red and mucoid and ultimately light pink and mucoid. It is not malodorous. While it is unusual for retained membranes to cause infection or inflammation, they can occur along with a concurrent infection and may be confused to be the cause, rather than just coincidental. Metritis may also be caused by retention of dead fetuses or fetal parts, or by ascension of bacteria from the vagina through the open cervix at the time of delivery or in the immediate post-whelping period. The empty placental sites are preferred locations for bacterial proliferation due to the breakdown of the lining of the uterus following placental detachment. Bacteria that commonly cause metritis include *Escherichia coli,* klebsiella, pseudomonas, staphylococci., streptococci, proteus, and Pasteurella species.

Metritis usually occurs within the first week or two postpartum. Bitches with metritis are usually febrile, depressed, anorexic, dehydrated and show poor mothering. They may become very ill and present in shock. They often have high white blood count, increased kidney enzymes from toxins and dehydration, electrolyte imbalance, and/or increased liver enzymes. There is normally a very foul-smelling vaginal discharge. Culture is recommended to ensure correct antibiotic selection has been made.

Treatment involves use of IV or SQ fluids, NSAIDs, and appropriate antibiotic therapy. If a dead fetus or fetal parts remain in the uterus, surgery to remove them may be necessary once the bitch is stabilized. Drugs to enhance uterine clearance may be considered but are often not needed. Oxytocin can be used if the condition occurs in the first 7 days postwhelping. After this time, prostaglandins may be more effective but should be used with caution in bitches that are dehydrated or have impaired kidney function. Care should be taken with the use of NSAID's and nursing puppies (see Mastitis section). Puppies may be removed and fostered or hand-reared if the bitch is systemically ill to prevent transmission of bacteria to the puppies.

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Uterine Prolapse

Uterine prolapse is uncommon in the bitch, but when it occurs, it typically occurs within the first 24-48 hours after whelping. It is often the result of a difficult birth or following multiple retained fetal membranes, where excessive straining occurs. It may also occur as a result of vaginal trauma. Uterine prolapse is a very serious condition because the uterus becomes devitalized quickly due to lack of blood supply. Bitches may present in shock, commonly with hemorrhage from the devitalized tissues. In some cases, replacement is possible using a combination of manual massage and abdominal surgery. If the tissue is too devitalized or cannot be replaced, uterine amputation and ovariohysterectomy may be necessary.

Subinvolution of the Placental Sites (SIPS and SIPS-like conditions)

Return of the uterus to its normal condition is normally complete by 12 weeks post-whelping. When the fetal membranes detach, some of the cells remain within the uterine wall. These cells may continue to invade into the wall of the uterus, causing bleeding due to damage to the uterine blood vessels and failure of these vessels to clot. If these cells continue to invade beyond 2 weeks post-whelp it is considered abnormal. As a result of the persistent invasion, the placental sites may remain enlarged for many weeks.

Maiden bitches under 3 years of age are predisposed. Bitches are clinically normal except for a persistent bloody vulvar discharge beyond 6 – 8 weeks postpartum. The amount of blood is highly variable, from a few drops to life-threatening amounts. The amount of discharge is due to the extent of the invasion. In the most severe cases, invasion may be so severe as to result in uterine rupture and abdominal hemorrhage. Bloody discharge can persist until the next heat cycle in some cases. Diagnosis can sometimes be made by vaginal cytology if invading placental cells are found or by ultrasonography where persistently enlarged placental sites with increased blood flow on color Doppler are present. It is possible to have some placental sites affected while others are normal.

If the amount of blood loss is severe, transfusion may be necessary, but in most cases, the amount of blood loss is minimal, so no treatment is needed. Hematocrit (percent of red blood cells compared to fluid component of blood) should be monitored in cases where blood loss is heavy to determine the need for transfusion. In more severe cases, treatment with methergine, (an ergot alkaloid), and/or the Chinese herb, Yunnan Baiyau, may be helpful. The bitch may be spayed if future reproductive use is not planned or hemorrhage cannot be controlled medically. Administration of antibiotics is not recommended unless a concurrent infection develops. Prostaglandin therapy does not appear to be an effective treatment. Progesterone should not be administered since it increases the risk of infection. Other causes of persistent hemorrhage post-whelping should include other causes of failure of blood clotting (called coagulopathy), uterine infections, trauma, uterine, cervical or vaginal tumors, vaginal infection, bladder infection and brucellosis.

When SIPS cases last more than 8 weeks after whelping, breeding on the subsequent cycle is not recommended. Relapse on subsequent pregnancies is not common.

Post-partum reproductive disorders can be challenging to diagnose. These conditions may occur rapidly and have common clinical signs. It is important for breeders to be aware of these conditions and to know when to seek veterinary guidance and treatment.

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