



Theriogenology Question of the Month

History

A 4-year-old 17-kg (37.4-lb) Keeshond primiparous bitch was referred to our veterinary teaching hospital with a history that labor had begun approximately 7 hours previously. The bitch had delivered 8 pups (4 live and 4 stillborn). The owner was concerned because prenatal ultrasonography had been performed on the bitch, and 9 pups had been identified. Radiographs were taken by the referring veterinarian, and a retained fetus was detected. The bitch was referred to our veterinary teaching hospital with a presumptive diagnosis of dystocia attributable to a retained fetus.

Physical examination revealed that the bitch was bright, alert, and responsive. Rectal temperature was 38.9°C (102°F), and pulse rate was 110 beats/min. Femoral pulses were adequate and bilaterally synchronous. No heart murmurs or arrhythmias were evident during thoracic auscultation. Mucous membranes were pink and moist. Respiration was predominantly characterized by panting. Thoracic auscultation also revealed no abnormal sounds in any of the lung fields. Masses, organomegaly, signs of pain, or other abnormalities (such as a retained fetus) were not detected during abdominal palpation. The mammary glands were engorged and secreting milk, which was considered a normal finding during the postwhelping period. A serosanguineous discharge emanated from the vulva. Abdominal radiographs were taken (Figure 1). These radiographs were obtained for comparison with the radiographs taken by the referring veterinarian.

Question

Is there radiographic evidence of dystocia or fetal retention? *Please turn the page.*

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Figure 1—Lateral (A) and ventrodorsal (B) radiographic views of the abdomen of a 4-year-old bitch examined because of presumed dystocia attributable to a retained fetus.

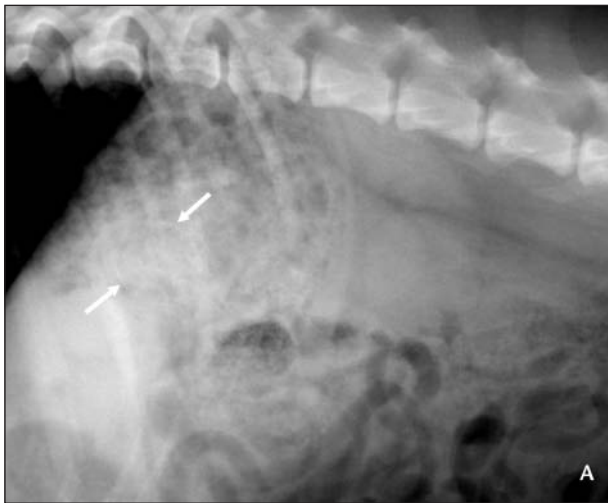


Figure 2—The same lateral (A) and ventrodorsal (B) radiographic views of the abdomen as in Figure 1. Notice the mineralized skull (arrows) surrounded by granular ingesta in the stomach and located cranial to the spleen (asterisk).

Answer

The radiographic conclusion was neonatal ingestion, rather than dystocia attributable to fetal retention.

Results

In the radiographic projections, a mineralized skull that was not attached to any other visible skeletal structures was evident in the left cranial quadrant of the abdomen, located cranial to the spleen (Figures 2 and 3). Ingesta and gas surrounded the skull, which indicated an intragastric location. The lack of any visible remaining neonatal skeletal structures could have been attrib-

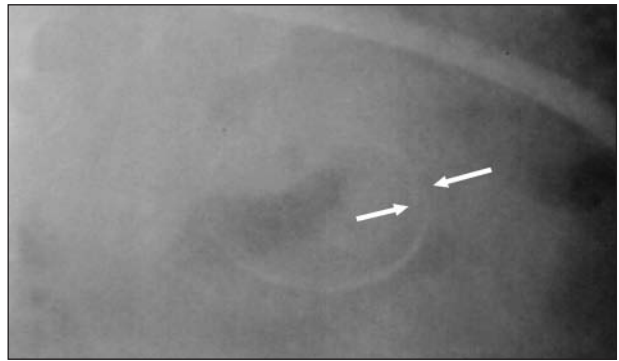


Figure 3—Magnified view of the stomach area of the lateral radiographic view of Figure 2. Notice that the mineralized skull is surrounded by ingesta. Overlapping of the calvarial bones (arrows) is evident along the suture lines of the skull.

utable to ingestion of only the skull of the neonate or possibly digestion of other ingested body parts. Large fluid-filled tubular structures occupied the caudal abdominal quadrants and were representative of a noninvolved perinatal uterus.

On the basis of the diagnosis of neonatal ingestion, it was believed that the remainder of the neonate would be digested with little risk of gastrointestinal tract perforation. Therefore, no intervention was recommended. The owner was counseled on postwhelping hysteria and maternal behavior of bitches, and the bitch was discharged to the owner.

Discussion

The diagnostic imaging modality of choice for the assessment of a late-term pregnancy depends on the goal of the procedure. When determination of fetal number is the goal, abdominal radiography has been proven to be the most reliable method. Abdominal ultrasonography is the modality of choice for the assessment of uterine health and fetal viability.

The accuracy of abdominal radiography in clinically normal late-term pregnant bitches is reportedly 100% for pregnancy detection and 93% for determination of fetal number. Abdominal ultrasonography is an accurate method for determining fetal number in only 36% of pregnancies.¹ In the bitch reported here, the ultrasonographer had accurately identified 9 fetuses. Fetal detection by use of radiography is dependent on skeletal mineralization, which typically begins at 44 to 46 days after the luteinizing hormone surge during estrus. Mineralized fetal structures are first evident on a lateral radiographic view; use of the lateral view for determination of fetal number is as effective as the use of orthogonal radiographs. Because the uterus is located caudal to the kidneys and dorsolateral to the gastrointestinal tract, its growth during gestation results in cranial or ventral displacement of the small intestines, which is representative of any mass in the caudodorsal abdomen. The use of ionizing radiation for abdominal radiography is a low-risk procedure during the last third of gestation.¹

It can be a challenge to radiographically diagnose a dystocia. In 1 report,² 75.3% of dystocias were the result of maternal causes, and evaluation of prepartum radiographs could not be used to accurately predict the outcome. Dystocia resulting from fetal causes, such as

malpresentation, malposition, malposture, or malformation, is easily detectable with abdominal radiography. Fetal malformations should also be considered during assessment of abdominal radiographs in animals examined because of dystocia.

Although ultrasonography is superior to radiography for the assessment of fetal viability, there are recognized radiographic abnormalities that correlate with fetal death. Orthogonal abdominal radiographs should be assessed to determine fetal position and posture, uterine or fetal emphysema, and integrity of the fetal skeleton. Collapse or malalignment of the skeleton, most commonly the vertebral column, results from loss of muscle tone and alters fetal posture. Radiographically, the vertebral column forms a c-shaped structure, rather than the typical straighter appearance. Fetal emphysema may be evident as gas localized to the fetal circulatory system (best detected in the fetal heart) or as free gas in the fetal thoracic or abdominal cavities. Finally, overlap of the flat bones of the skull at their sutures results from loss of brain volume; this is typically evident 2 days after fetal death and is a sign of fetal maceration.³

Postwhelping behavioral disorders in which a bitch savages or eats her pups are relatively uncommon and can be upsetting for an owner. Many terms are used to describe this behavior, including savaging, cannibalism, postwhelping hysteria, and chronism. This postpartum behavior can be initiated by an unstable social environment, which suggests that anxiety is an underlying factor. A bitch may occasionally ingest a pup for reasons that are not obvious to owners, breeders, or veterinarians. Bitches are known to ingest a dead pup or an abnormal pup that has signs of poor vigor, hypothermia, or limited movement. It is hypothesized that this promotes sanitation and prevents predation.⁴ Accidental causes can be the result of overzealous cleaning of a neonate; a bitch may be chewing and shortening the umbilical cord and therefore accidentally creating bite wounds into the neonate's abdominal cavity. Bitches that give birth to premature pups (born < 57 days of gestation) may ignore their litters.⁵

An extreme state of excitation at whelping has been detected chiefly in toy breeds but is also prevalent in some strains of Cocker Spaniels.⁶ It may be precipitated by environmental disturbances. In Bull Terriers, an acute state of hysteria has been reported in which there is aggression toward both the pups and owners.⁶ Bitches with this condition appear to be responsive to calcium administration, which indicates hypocalcemia may be the cause.

It is believed that postpartum hysteria may be a manifestation of eclampsia. Eclampsia or hypocalcemic puerperal tetany is a condition of small-breed dogs nursing large litters during the first 2 to 4 weeks after parturition. This is the period of greatest stress because of the demand for large volumes of milk. However, it also may be evident during the peripartum period (shortly before, during, or shortly after whelping). Calcium requirements usually can be met by feeding a properly balanced diet. Excessive dietary supplementation with calcium during late gestation has been incriminated in predisposing bitches to eclampsia and dystocia.⁷

As mentioned previously, a highly stressed or distressed bitch may display excitation, aggression, and inattentiveness, which increases the risks of injury to newborn pups.^{5,7} These behaviors are most common in

bitches with their first litter. Preventative measures during the prepartum and whelping periods are important in reducing the initiation of these behaviors. The dam should be provided a quiet, nonstressful environment prior to parturition and should have minimal interruptions for the first few days after whelping. Family members and strangers should be introduced gradually. When a bitch poses a serious threat to her pups, they must be separated for safety and fostered with another bitch or hand-reared by the owners.

Behaviors such as excitation, aggression, and inattentiveness are considered to be heritable traits.^{4,8} Therefore, breedings should be limited to appropriately socialized, nonfearful, obedient bitches. In general, it is believed that bitches that display aggression toward their pups should not be bred again, and their progeny should also not be used for breeding.⁴ There are few controlled studies to support this suggestion; however, it is not unreasonable to be concerned that surviving pups from such a bitch would display the same behavior toward their own pups.

Few drugs have been used to treat bitches that have poor mothering abilities. Antianxiety agents, serotonin enhancers, and antidepressants have been used in humans. However, because most of these drugs can be transferred transplacentally or via a dam's milk, their use should be considered with caution during gestation and would necessitate hand-rearing of the pups.

Dystocia in the bitch described here was ruled out because of the diagnosis of neonatal ingestion. This may have represented postpartum hysteria because this was the bitch's first litter. The owner did not report any abnormal environmental stresses, and there was no evidence of eclampsia detected during the physical examination. Furthermore, the status of the pup prior to ingestion (particularly if it had died or was weak or moribund) was not known.

Outcome

Follow-up communication with the owner revealed that the bitch did not have any abnormal mothering behavior after returning to her home environment. The 4 surviving pups were placed with new owners at 6 weeks of age.

References

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