

Canine Abortion

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Abortion is defined as the expulsion before full term of a conceptus that is incapable of independent life. Abortion is uncommon in the bitch, but when it does occur, owners should be aware of the treatment options and the prognosis for future fertility.

Establishing and maintaining pregnancy is dependent on many biological interactions between the embryo or fetus and the pregnant female. For approximately 12 days after fertilization, free-floating embryos are dependent on the fluid environment within the uterus for development. If this environment is inhospitable (due to inflammation, hormonal imbalances, etc.), embryos may not survive.

Death of embryos during this period often goes unnoticed because the embryos are resorbed before pregnancy has been detected. Most embryonic losses occur during this period and at implantation, when attachment to the uterus first takes place. These losses are collectively referred to as early embryonic deaths (EED).

After implantation, embryos depend almost entirely on the dam and will not survive if she is unable to adjust to the physical requirements and demands of pregnancy. Factors that lower the odds for survival include fetal or maternal abnormalities, nutritional deficiencies, environmental stresses or infectious causes. Abortions occur most commonly because placental function is compromised due to one or more of these reasons. Several possible noninfectious and infectious causes of EED and abortion are listed in Tables 1 and 2.

Table 1. Noninfectious conditions associated with loss of pregnancy in the bitch.

Embryonic/fetal defects	These and related conditions have been associated with an increased incidence of early miscarriage in women. In the bitch, these could result in early embryonic death and infertility.
Aged gametes	Breeding at inappropriate times may lead to aged eggs or sperm cells that have reduced fertility and may lead to abnormal development and death.
Chromosomal defects	Defects in the genetic makeup may be incompatible with embryo survival.

Developmental defects	Abnormal development of organ systems may not be compatible with fetal survival, leading to death and resorption or abortion.
Maternal environmental stresses	These conditions often produce an adverse uterine environment that is incompatible with fetal development. Fetal death may occur at any stage of pregnancy, resulting in abortion.
Hypothyroidism	Associated with increased danger of miscarriage in women. Lower than normal levels of circulating thyroid hormone may cause infertility in the bitch.
Hypoluteoidism	Deficient progesterone has been suggested as a cause of abortion in several animal species. Progesterone is required for the maintenance of pregnancy in the bitch.
Nutritional deficiencies	Energy and vitamin demands increase during pregnancy. If these are deficient, fetal survival may be compromised.
Structural abnormalities	Developmental (hypoplasia) or acquired (scar tissue) abnormalities result in compromised placental function that is unable to meet the demands of the growing fetus.
Exposure to drugs/compounds	The effects of many drugs/compounds on fetal development are unknown. Dexamethasone, a commonly used anti-inflammatory agent, has been reported to cause intrauterine death and resorption of fetuses when given to pregnant bitches.

Table 2. Infectious conditions associated with loss of pregnancy in the bitch.

Maternal environmental stresses	Infectious agents gain access to the pregnant uterus via the blood stream or through the cervix. These can cause placental dysfunction leading to fetal death and in some cases may infect fetuses directly.
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<i>Brucella canis</i>	The most common bacterial cause of abortion in the bitch. Abortion occurs between 45 and 55 days of pregnancy. Infertility follows infection and abortion. Vaginal discharges and aborted fetal tissues are highly infectious to other females.
<i>Escherichia coli</i> , <i>Staphylococcus aureus</i> , <i>Streptococcus spp.</i> , other bacterial isolates	These are frequently cultured from vaginal discharges or from fetal tissues after abortion. Their role in causing abortion is unknown. May be associated with infertility, persistent vaginal discharge and repeat abortions in older bitches.
b-hemolytic <i>Streptococcus</i>	Fetal infection has been reported, resulting in abortion or the birth of weak, nonviable pups.
<i>Mycoplasma</i> and <i>Ureaplasma</i>	These are opportunistic organisms normally found in the vaginal canal. In large enough numbers, they may cause infertility, EED, resorptions, abortion, stillbirths and weak, nonviable pups.
Canine herpesvirus	Infections in newborn puppies are fatal. Causes vaginitis in the bitch. This virus can cross the placenta and infect puppies, resulting in fetal death, mummification, abortion, premature birth or delivery of weak, nonviable pups.
Canine distemper virus	May cause spontaneous abortion with or without fetal infection. Often abortion results from the stress of the clinical disease.
Canine adenovirus (infectious hepatitis)	May cause spontaneous abortion with or without fetal infection. Often abortion results from the stress of the clinical disease.

<i>Toxoplasma gondii</i>	Protozoal parasite causing mild disease in adult dogs. May be more severe when present with distemper virus, which is known to suppress the immune system. Fetal infection may occur and <i>T. gondii</i> has been found in milk of lactating bitches.
<i>Neospora caninum</i>	Recently identified protozoal parasite that resembles <i>T. gondii</i> , can infect brain and spinal cord of developing fetuses or neonates. Newborns have progressive muscular weakness leading to death.

Diagnostic work-up

With any abortion, the bitch should be presented to a veterinarian as soon as possible for a complete physical examination and collection of samples for diagnostic testing. In most cases, these diagnostic procedures will not save the pregnancy, but they will help identify the appropriate supportive medical therapy and the management practices necessary to prevent future abortions.

The attending veterinarian will want to know the breeding history of the bitch, including the breeding dates for this and previous pregnancies, sire(s), previous whelping dates and the results of previous pregnancies (number of puppies, assisted or unassisted delivery, abortion, etc.). The vaccination history of the bitch and the results of previous *Brucella canis* serology tests should be given also. Any clinical illness and medications given during pregnancy should be noted at this time as well. Type of housing and diet should be recorded. This information will assist the veterinarian in determining appropriate immediate care as well as recommendations for future breedings.

The physical examination will provide information pertaining to general health, nutritional status and the possibility of an endocrine or other disease process. Abdominal palpation and radiographic or ultrasonographic examination will determine if additional fetuses are present in the uterus. Some or all fetuses may be aborted, or remaining live fetuses may be born normally at term.

Laboratory diagnostic tests should include a complete blood count, serum chemistry profile, urinalysis, serologic test for *B. canis* infection and serum thyroid hormone level determination. These tests will require that one or more blood and urine samples be collected and submitted to a diagnostic laboratory. Most test results can be obtained in less than 24 hours. A culture of the anterior vagina or vaginal discharge should be taken to identify any potential bacterial infection and the appropriate antibiotic treatment.

One of the most important but often overlooked diagnostic procedures is the examination of the aborted fetuses and their associated membranes. In some cases, the bitch may consume aborted fetuses before they can be retrieved, but when these fetuses are available, they should be collected in as clean a manner as possible and taken to the veterinarian with the bitch. *Brucella canis* infection has been reported in humans; therefore, aborted tissues suspected of being infected should be handled with extreme care.

Histopathology and culture of selected fetal tissues may be recommended. If a bacterial cause is suspected, fetal stomach contents may be cultured, because fetuses swallow amniotic fluid as a normal process of pregnancy. These tests often require that samples be sent to a diagnostic laboratory. It may take several days for results to be returned. Chromosome analysis can be performed in the dog if abnormalities are suspected; however, the analysis is not commonly available.

A bitch with a history of a difficult delivery resulting in trauma to the uterus or cervix may have scar tissue development that is incompatible with maintaining subsequent pregnancies. Exploratory surgery may be required to identify abnormal conditions of the ovaries and uterus in some bitches. Excessive scarring of the reproductive tract is often untreatable and correction of developmental uterine defects cannot be advised. Both of these conditions carry a poor prognosis for future pregnancies.

Treatment

The bitch should be hospitalized to permit close observation, diagnostic evaluation and supportive therapy if needed. Intravenous fluids may be required to help stabilize a severely ill animal. Blood, urine and culture samples should be taken immediately. Antibiotics should be administered if the blood cell analysis and/or rectal temperature are consistent with the presence of infection.

Compounds are available that increase uterine tone and aid in the evacuation of the uterus. These may be given if all of the fetuses have been aborted and if membranes are retained or if there is heavy bleeding from the uterus. The bitch should remain hospitalized while these compounds are administered and monitored with radiography or ultrasonography for complete emptying of the uterus.

Prevention

Abortion is preventable primarily by maintaining good health prior to and during pregnancy. Females to be bred should have a good vaccination history and a negative *B. canis* titer.

Supplemental vitamins should not be necessary provided a nutritionally complete commercial dog food is fed during pregnancy. The amount of food fed should be increased

gradually throughout pregnancy to accommodate fetal growth. Pregnant females should gain about 30 percent of their nonpregnant weight by the end of pregnancy.

For females with a history of abortion, a thyroid profile should be evaluated and supplemental thyroxine administered if indicated, beginning prior to breeding.

Supplemental progesterone has been shown to maintain pregnancy in cases where low serum levels are suspected. However, this has proven difficult to validate experimentally because levels are known to be highly variable during pregnancy. Under the influence of progesterone, the uterus is more prone to infection. Also, external genitalia of female fetuses may be masculinized by the administration of progesterone during pregnancy. Therefore, supplemental progesterone should be given only after all other possible causes for repeated abortions have been eliminated. The effects of many other drugs on fetal development are unknown; therefore, if medical treatment is required during pregnancy, it should be done with this in mind.

To control infectious causes of abortion, bitches should be vaccinated regularly prior to breeding and managed under strict sanitary conditions. *Brucella canis* is most prevalent in kennel situations where contact with infective discharges and fetal tissues may result in infection and possible abortion in susceptible females. Infected males may spread the disease to noninfected females at breeding. Breeding kennels should routinely test all animals for *B. canis*. To date, there is no permanent cure for *B. canis* infection in the dog. Therefore, infected animals must not be bred again and should be removed from contact with other breeding animals.

Mycoplasma and *Ureaplasma* have been cultured from the cranial vagina and prepuce of healthy, fertile animals. However, when females are housed in crowded kennels, close contact and environmental conditions can lead to increased numbers of these organisms, resulting in infertility and pregnancy losses. Providing adequate space, a clean environment and separation of individual breeding animals will greatly reduce the risk of abortion resulting from these and other bacterial infections.

Canine herpesvirus abortions have been associated with chronic infertility and cannot be effectively treated at present. Affected females should be isolated from susceptible pregnant animals. Viral abortions are most often due to the stress of clinical disease in the bitch. These can be prevented by routine vaccinations. Pregnant females should not be vaccinated with modified-live vaccines, as these could adversely affect fetal survival.

Consulting a veterinarian prior to beginning a breeding program can help establish preventive management practices that will result in the birth of healthy litters.