Pregnancy termination in the dog–an overview and case presentations
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Abstract
Several methods are available for termination of unwanted pregnancy in the bitch. Ovariohysterectomy is
recommended for bitches not intended for breeding. In valuable breeding bitches, various pharmacological products
have been used. Use of estrogens for prevention of pregnancy following accidental or undesired mating (mismating)
is not recommended. The majority of bitches presented for abortifacient therapy are not pregnant. Therapy should
only be initiated after pregnancy confirmation by ultrasonography or serum relaxin assay. Dinoprost trometamine is
the most effective abortifacient when used after 25 days of pregnancy. Progesterone antagonists (e.g., mifepristone)
and dopamine agonists (e.g., bromocriptine and cabergoline) are successfully used for pregnancy termination. Most
of these products are not approved or available for use as canine abortifacients in the U.S.

Keywords: Canine, bitch, pregnancy termination, prostaglandin F₂α, progesterone antagonists

Introduction
Several protocols are described for termination of unwanted pregnancy in the bitch. Ovariohysterectomy
(OHE) is recommended for bitches not intended for breeding. In valuable purebred breeding bitches, various
pharmacological products have been used. Comprehensive reviews on the topic are published and more recent
studies have contributed to our understanding of canine pregnancy and its termination.

The objectives of the present paper are to review the current literature on the topic and provide a detailed
description of clinical cases seen by the author.

Prevention of pregnancy following accidental or undesired breeding
Use of estrogens as immediate treatment for accidental or undesired mating is not recommended for the
following reasons:
• Many unintentionally mated bitches do not conceive
• No dose of estrogen is established to be efficacious and safe
• Potential side-effects of estrogens include pyometra and bone marrow suppression
• Other therapies such as prostaglandin F₂α (PGF) are available for pregnancy termination.

As mentioned above, many unintentionally mated bitches do not become pregnant. Out of 48 privately-owned
bitches evaluated 30 to 35 days after a single unplanned breeding, 30 (62%) bitches were determined not to
be pregnant by abdominal ultrasonography (US) and 18 bitches were confirmed to be pregnant. For management
of mismating cases, an algorithm on management may be followed. The mechanisms of action of estrogen when
used to treat mismating are suggested to involve estrogen-induced closure of utero-tubal junction and prevention of
embryo transport as well as a possible direct embryotoxic effect, based on studies in cats.

Several estrogen treatment protocols with successful outcomes have been reported. However, undesirable
side-effects of estrogen administration such as pyometra and bone marrow suppression are reported. Pyometra
developed in two out of eight dogs receiving estradiol cypionate (ECP) during diestrus.

Case presentation
A one-year old Rottweiler, Tory, presented for persistent vaginal discharge for about five days. Tory was
observed in early proestrus seven weeks prior to presentation. She was accidentally mated two weeks after the
beginning of proestrus bleeding. Tory was treated with ECP by the attending veterinarian to prevent pregnancy.
Following the treatment Tory remained in estrus for about three weeks. Proestrus bleeding stopped. Two weeks
after treatment with ECP, dark red-brown, thick vaginal discharge was noticed by the client. Vaginal swabs taken
by the attending veterinarian were submitted for culture yielded growth of \( E. coli \). Tory was treated with a
combination of amoxicillin trihydrate and clavulanate potassium (Clavamox®, Pfizer Animal Health, New York,
NY). Tory was reportedly anorexic for about a week and had two episodes of urinary incontinence.

On presentation, Tory's rectal temperature, pulse and respiration rate were 38°C, 90 beats per minute, and
20 breaths per minute, respectively. A dark brown vaginal discharge was observed upon examination of the perineal
area. On transabdominal US, the uterus was seen to be enlarged and fluid-filled; each uterine horn measured 2.5 cm
in diameter. The uterine wall was thickened and measured 6-8mm. A diagnosis of pyometra was offered; OHE was
recommended and was accepted by the client. The reproductive tract was examined after surgery and revealed multiple corpora lutea (CLs) on both ovaries and an enlarged uterus with mucopurulent contents. Tory’s recovery from OHE was uneventful.

**Termination of unwanted pregnancy**

Progestosterone (P4) is the only hormone required for pregnancy maintenance in the bitch as demonstrated by the ability to maintain pregnancy with exogenous progesterone after ovariectomy. The sole source of P4 during pregnancy in the dog is from the ovarian CLs. Most of the methods suggested for pregnancy termination are based upon interrupting or interfering with the supportive role of P4 for pregnancy maintenance.

**Case presentation**

The following two bitches were presented for termination of unwanted pregnancy. The first case was a two-year old Airedale, Sunny, referred with a history of accidental breeding 37 days prior to presentation. The second case was a 1.5-year old Irish wolfhound bitch, Graniall. Approximately 50 days prior to presentation, she escaped from her owner’s supervision for one evening. At presentation, Graniall was beginning to exhibit mammary gland enlargement. Both bitches were apparently healthy with no concurrent medical problems.

Ultrasound examination revealed six to nine fetuses with normal heartbeats in Sunny and US and radiographic evaluation of Graniall showed nine living fetuses with normal conformation and skeletal mineralization consistent with late gestation. Both bitches were treated with PGF (Lutalyse®, Pfizer Animal Health, New York, NY), 0.1 mg/kg SQ at eight hour intervals. Sunny received a total of ten doses. Graniall received 12 doses without aborting, and subsequently the dose was increased to 0.125 mg/kg SQ TID for nine additional doses.

In Sunny’s case, one fetus still enclosed within an intact amniotic sac was aborted following the ninth PGF injection. Examination with US after the tenth treatment revealed the uterus to be diffusely filled with echogenic material with no fetuses. These US findings were suggestive of a postpartum uterus. It was suspected that Sunny must have aborted and consumed the rest of the fetuses. Sunny’s serum P4 decreased dramatically from 40.4 ng/ml before therapy to 5.4 ng/ml within 24 hours. Progesterone concentrations continued to fall to 1.23 ng/ml at the completion of the abortion.

In Graniall’s case, all nine fetuses were aborted over a two day period, with the final abortion following the ninth injection at the higher dose. The average interval between aborted fetuses was about three hours (range 1 to 14.5 hrs). The maximum interval was required for the last fetus to be delivered. Serum P4 levels decreased from 64.80 ng/ml to 12.0 ng/ml within 24 hours after the first PGF treatment. Progesterone concentrations continued to decline to 3.63 ng/ml after the twelfth injection of 0.1 mg/kg PGF without triggering abortion. With the higher dose, serum P4 decreased further to 3.16 ng/ml and resulted in delivery of the first fetus. Progesterone concentrations continued to fall to 1.43 ng/ml at the completion of the PGF treatments.9

The side-effects of PGF treatment including hypersalivation, panting, diarrhea and occasional vomiting were noticed within 30 minutes after each injection in both bitches and diminished with subsequent injections. Intermittent, non-odorous, serosanguineous vaginal discharge was noticed inconsistently throughout the treatment in both bitches. Lactation also occurred in both bitches towards the end of the abortions.

**Pregnancy termination with PGF**

Natural PGF and its analogs are commonly used for pregnancy termination. Prostaglandin F₂α is luteolytic, and administration during diestrus causes a decrease in P4 production in the dog. During pregnancy, administration of PGF results in P4 decline and ultimately fetal loss. Prostaglandin F₂α is also uterotonic and facilitates expulsion of uterine contents via myometrial contraction. In order to achieve complete evacuation of uterine contents, PGF needs to be administered IM or SC two or three times a day until the pregnancy is terminated.1 The half-life of PGF is only a few seconds, therefore multiple injections are essential. Treatment is continued until all fetuses are expelled as confirmed by US examination. Even though most of the abortions occur within five to seven days after the initiation of treatment, it may take longer to terminate the pregnancy in some cases as observed in the case of Graniall.

The most commonly used PGF in the U.S. is dinoprost tromethamine. This product is marketed for use in large animals and its use in dogs is extra-label. A release form or statement to document owner consent is recommended.

Hospitalization of the patient is highly recommended in order to monitor the adverse side-effects and efficacy of the treatment. The author’s clinical observation is that the side-effects (hypersalivation, panting, etc.) are decreased after the initial few injections. To prevent vomiting, it is recommended not to feed the bitch before

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treatment; and to minimize abdominal cramps and discomfort, the bitch may be walked for five to ten minutes immediately after each PGF injection.

The synthetic PGF analog cloprostenol (Estrumate®, Intervet/Schering-Plough Animal Health, Summit, NJ) is highly potent but is not commonly used in the U.S. The reasons for its limited use include lack of dose-response and efficacy studies as well as lack of familiarity of small animal practitioners with the product which may lead to dosage errors that could be fatal.1

Pregnancy termination with progesterone antagonists

Progesterone antagonists are a group of synthetic steroids that bind to P4 receptors and prevent the action of endogenous P4. The anti-progestin mifepristone (RU486) was developed for human use and is available in some countries. Early trials conducted by Concannon, et al11 demonstrated that pregnancy can be terminated with a dose of 2.5 mg/kg, BID, PO for 4.5 days beginning on day 32 of pregnancy. This treatment was safe and no side-effects similar to those seen with PGF therapy were observed. In that study, a powdered formulation of appropriate quantity was inserted into gelatin capsules for individual animals.

Aglepristone (RU 534), an injectable analog of RU486, was made available for veterinary use in France in 1996. In a recent study,2 aglepristone administration to bitches during the mid-luteal phase markedly accelerated the luteolytic process accompanied by a parallel decline in ovarian blood flow as observed by US. Aglepristone, developed by Roussel Uclaf, is available in Europe under the name of Alizine®. Clinical studies showed no side-effects at the recommended dose, and make it a desirable method for pregnancy termination before day 35.1,12

Other methods for pregnancy termination

Dopamine agonists. In addition to luteinizing hormone, prolactin is a major luteotrophic hormone produced throughout the luteal phase in pregnant as well as in non-pregnant bitches.13 Dopamine agonists, such as the ergot alkaloids bromocriptine and cabergoline, have strong dopamine D2-receptor agonist activity. Administration of these products has been shown to reduce prolactin concentrations resulting in luteolysis and a decrease in P4 production.1

Bromocriptine, (Parlodel®, Novartis Pharmaceuticals Corp., East Hanover, NJ) at doses of 0.1 mg/kg, PO or IM daily or BID, for six days has been shown to terminate pregnancy after day 30, but failed to do so when given earlier.13 It is marketed for human use to treat hyper-prolactinemia, and is not approved for veterinary use in the U.S.

Cabergoline has been successfully used for pregnancy termination and is approved for veterinary use in Europe. Compared to bromocriptine, it is a more potent dopamine agonist, and is effective in terminating pregnancy when administered at mid-gestation or later.14 Bitches were treated after day 40, at doses of 5 μg/kg, PO, for five days, or doses of 1.75 μg/kg, SC every two days for six days. Cabergoline effectively terminated pregnancy in all bitches treated.15,16

Corticosteroids. Dexamethasone administered beginning at mid-gestation can terminate pregnancy in dogs.17 The common uses of dexamethasone in veterinary practice are for its anti-inflammatory and immuno-suppressive functions. Oral administration of dexamethasone is considered as an advantage, whereas the concerns include limited published information and lack of data on the effects on the adrenal glands.

Conclusion

Although induction of abortion may be achieved reliably with some of the treatments described above, the majority of bitches presented for abortifacient therapy are in fact not pregnant. Therefore therapy should not be initiated until pregnancy is confirmed by US or serum relaxin assay after 25 days from the last breeding. Natural PGF in an effective abortifacient after 25 days of pregnancy but its side-effects raise ethical issues. Antiprogestosterone therapies offer the advantage of safety and no side-effects and are a desirable option where available. Ovariohysterectomy should be considered in bitches not intended for breeding. Estrogen therapy to prevent pregnancy following mating is not advised.

References


