Canine pseudopregnancy and its treatment strategies

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Abstract
Pseudopregnancy is the most frequent finding syndrome of clinical signs observed in the nonpregnant domestic bitch. Pseudopregnant bitches show different clinical signs with those similar clinical signs shown by pregnant bitches. Decreased levels of progesterone concentration resulting in increased levels of prolactin predispose the bitches to pseudopregnancy. Pseudopregnancy is a normal phenomenon. Diagnosis is mainly carried out on the basis of the clinical signs revealed by the dog associated with the absence of fetuses by radiography and ultrasonographical examination. Several methods with varying results exist for the management of clinical forms of pseudopregnancy in the bitch. The only permanent solution for prevention of pseudopregnancy in the bitch is ovariohysterectomy. The objective of this present review is to describe the relevant aspects of physiology, clinical signs, diagnosis and treatment strategies of pseudopregnancy in the domestic bitch.

Keywords: Canine, dog, domestic bitch, pseudopregnancy

1. Introduction
The female dog has several unique reproductive features in comparison to other domestic and laboratory species. Ancel and Bouin (1911) first used the term pseudopregnancy to describe an abnormally long luteal phase of the estrual cycle observed in the rabbit. Pseudopregnancy is a syndrome characterized by clinical signs similar to those seen in late pregnancy or the early post-partum period [1]. Its synonyms are false pregnancy, phantom pregnancy, pseudocyesis, pseudogenetra and nervous lactation. It is now a frequent finding noticed in female dogs. The incidence of pseudopregnancy in most breeds is unknown but it is estimated to be as high as 50-75% in certain breeds [2]. The exact cause is not completely understood although it is normally suggested that certain hormonal changes might play an essential role in the development and maintenance of pseudopregnancy [3]. Thus, the present review describes the relevant aspects of physiology, clinical signs, diagnosis and treatment strategies of pseudopregnancy in domestic bitch.

2. Types of pseudopregnancy

Table 1

<table>
<thead>
<tr>
<th>Physiological or Covert</th>
<th>Clinical/Overt</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>The “physiological, pseudo pregnancy”</td>
<td>Changes similar to those seen in late pregnancy or the early post-partum period, the condition is: “clinical pseudo pregnancy”</td>
<td>[4-7]</td>
</tr>
<tr>
<td>Every non-pregnant ovarian cycle in bitches</td>
<td>Extreme behavior or atypical mammary activity</td>
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<td>Considerable mammary development associated with the luteal phase of every ovarian cycle</td>
<td>Extreme of the physiological changes that normally occur during diestrus</td>
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<td></td>
<td>Lactation or Abdominal contractions</td>
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3. Physiology
The physiology of pseudopregnancy is represented as a flowchart diagram below:

- Bitches that experience pseudopregnancy
- Non regression of corpus luteum and no conception.
- Progesterone levels maintained bringing about the signs consistent with pregnancy.
- Around 60 days of gestation
- As at the end of gestation in Pregnant Bitches
- Serum progesterone concentrations
- Stimulates Synthesis and Secretion of Prolactin
- Responsible for the typical nesting-behavior in pregnant bitches
- Exhibit same behavior as a bitch that is actually pregnant
- Resulting in exhibition of obvious pseudopregnancy [8-11]

4. Clinical signs
Pseudopregnancy mimics signs of parturition and lactation in the pregnant bitch. Clinical signs usually begin 6 to 12 weeks after estrus [12]. Different clinical signs observed in pseudopregnant bitches has been reported by several workers (Table 2). Bitches undergone examination for delayed parturition, uterine inertia, or dystocia that has subsequently been demonstrated to be pseudopregnant. Susceptible bitches have a high recurrence rate in successive oestrous cycles [1, 7].

Table 2: Reported clinical signs observed in bitches affected with pseudopregnancy

<table>
<thead>
<tr>
<th>Clinical sign</th>
<th>References</th>
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<tbody>
<tr>
<td>Psychological or behavioural changes</td>
<td>[13, 14]</td>
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<tr>
<td>Restlessness, anorexia, decreased activity, aggression, licking of the abdomen</td>
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<tr>
<td>Maternal behavioural changes</td>
<td>[14, 15]</td>
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<td>Nesting, mothering inanimate objects, adopting other bitches puppies</td>
<td></td>
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<tr>
<td>Late gestational physical changes</td>
<td>[1, 7, 12, 14, 16, 17]</td>
</tr>
<tr>
<td>Weight gain, mammary enlargement, milk secretion, and sometimes abdominal contractions</td>
<td></td>
</tr>
<tr>
<td>Less common signs</td>
<td>[2, 13]</td>
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<tr>
<td>Emesis, Diarrhea, Polyuria, Polydipsia and Polyphagia</td>
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</tbody>
</table>

5. Diagnosis
The diagnosis is based on the presence of any above clinical signs exhibit by the dog. The major differential diagnosis is pregnancy, which can be generally ruled out by abdominal palpation, ultrasonography or radiography late in diestrus when signs of pseudopregnancy commence [1].

6. Treatment strategies

6.1 No treatment
Other than discouraging maternal behaviour, no treatment needs to be recommended for pseudopregnancy as it is a normal phenomenon that resolves spontaneously and typically lasting 1-3 weeks.

6.1.2 Conservative therapy
Placing of Elizabethan collars around the neck to prevent licking of the mammary glands is recommended. Licking, milking, or warm or cold packing the glands are strong stimuli for lactation and need to be avoided. Water removal for 5-7 nights forces fluid conservation and therefore, helps in termination of lactation [1, 17]. When behavioural signs are significant, light tranquilization with non-phenothiazine drugs can be useful. On the other hand, phenothiazines are not recommended as they stimulate prolactin secretion [18].

6.1.3 Symptomatic therapy
If the conservative therapies are not responding and lactation is persistent, additional symptomatic therapy by medicinal drugs may be considered. Medicinal therapy with different sex steroids and dopamine agonist (prolactin inhibitors) has been used successfully for management of pseudopregnancy by several workers (Table 3). Sex steroids are necessary for mammary development, high doses exert a negative effect thereby inhibiting pituitary release of prolactin [15-17].

Table 3: Reported different medicinal drugs for treatment of pseudopregnant bitches

<table>
<thead>
<tr>
<th>Medicinal drugs</th>
<th>Compositions</th>
<th>Dose rate</th>
<th>Effects</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex Steroids</td>
<td>Estrogen: Diethylstilbestrol</td>
<td>1mg/day orally for 7 days</td>
<td>Signs of proestrus or estrus or uterine diseases, such as pyometra, and bone marrow hypoplasia</td>
<td>[1, 14]</td>
</tr>
<tr>
<td></td>
<td>Progesterone derivates: Megestrol acetate</td>
<td>2mg/kg/day orally for 8 days</td>
<td>Hypothyroidism, diabetes mellitus, cystic endometrial hyperplasia</td>
<td>[1, 14]</td>
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<tr>
<td></td>
<td>Androgen derivates: Mibolerone</td>
<td>36 µg/kg orally once for the first 5 days</td>
<td>Clitoral hypertrophy, other forms of virilization, and epiphora</td>
<td>[14, 19]</td>
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<td></td>
<td>Testosterone</td>
<td>1mg/kg IM once</td>
<td></td>
<td></td>
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<tr>
<td>Prolactin inhibitors (Ergot derivatives)</td>
<td>Bromocriptine</td>
<td>10 - 100 µg/kg per day orally for 10-14 days</td>
<td>Vomiting(subsided by antiemetic drugs), anorexia, depression</td>
<td>[17, 19, 20]</td>
</tr>
<tr>
<td></td>
<td>Cabergoline</td>
<td>5µg/kg per day orally for 5-10 days</td>
<td>Few side effects (more D2 dopamine receptor agonist)</td>
<td></td>
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<td></td>
<td>Metergoline</td>
<td>0.2 mg/kg per day orally for 8-10 days</td>
<td>Anxiety, aggressiveness, hyper excitation and whining</td>
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</table>
6.1.4 Surgical therapy
Ovariohysterectomy is the only permanent preventive measured when predisposed bitches is not intended for future breeding [19]. It should be done during the luteal phase, i.e. in the metestrus (dierstrus) stage of the cycle as pseudopregnancy may recur again indefinitely [4, 17].

7. Conclusion
It can be concluded that the veterinarian should made advice to the clients about the management of clinical forms of pseudopregnancy. Discouraging pseudopregnant bitches licking of the mammary gland as pseudopregnancy can be aggravated. Several authors reported different managemental practices of clinical forms of canine pseudopregnancy with varying results. However, the permanent solution for prevention of pseudopregnancy is ovariohysterectomy i.e. removal of the uterus and ovary in case of non-breeding bitches.

8. References
10. Smith MS, Mc Donald LE. Serum levels of luteinizing hormone and progesterone during the estrous cycle, pseudopregnancy and pregnancy in the dog. Endocrinology. 1974; 94:404-412.