Induction of a Deciduoma in the Dog

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ABSTRACT. Cystic endometrial hyperplasia resembling that of normal early pregnancy was induced by the insertion of a silk suture into diestrous bitches. Intraluminal trauma (wire scratching) induced a similar but moderate change. Intraluminal olive oil and saline had little or no effect. Maternal decidual response in rodentia produced by mechanical means in progesterone-stimulated uteri in the absence of fertilized ova is termed Loeb's deciduoma. A similar response was created in progesterone-stimulated canine uteri by various physical means when compared to the pregnant contralateral horn.—KEY WORDS: canine, canine deciduoma, cystic endometrial hyperplasia.
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Since the deciduoma of rodentia first was produced by Leo Loeb in 1907 [14, 15] and 1908 [16], the same trials have been performed among the mammals including man [5], monkey [10, 11] and others [6, 17]. With regard to the dog, however, there are few reports [13]. Krainz [13] reported a study of canine endometrial reactions following mechanical stimulation with glass balls. He showed no effects due to them, but cystic endometrial hyperplasia (CEH) was induced in that part of the uterus which received traumatic stimulation, where there was a line incision for ball insertion. This portion had a very similar histological structure to that of early normal placentation in the bitch [13]. After that, Hadly [9] reported on the histological evaluation of the ovary and uterus during diestrus, and canine CEH was produced by chance in his study from serial biopsies of the uterus [9]. Hardy reviewed the pathophysiology of so-called canine pyometra with CEH. In his review, he suggested the possibility that CEH was deciduoma in the dog and canine pyometra might be brought about by naturally occurring deciduoma which was followed by bacterial infection [8].

On the other hand, the bitch produces a deciduous placenta with both maternal and fetal components [2, 3]. It was uncertain if maternal deciduomas, similar to those produced in rodentia by mechanical methods [14–17], could be induced in bitches. Loeb's deciduoma is described as the maternal placenta in rodentia, especially the guinea pig, induced in the absence of fertilized ova [18].

This report deals with an attempt to induce a canine deciduoma by using almost the same methods as for the induction of the rodential deciduoma, and also includes a discussion of whether the histological findings are the same as in rodentia or not.

Twenty adult random source mongrel bitches were divided into 4 equal treatment groups. In each group, the left uterine horn was manipulated or stimulated, while the right horn was left undisturbed. While in anestrus, each animal was anesthetized and laparotomized. The left oviduct and uterine horn near its bifurcation from the uterine body were ligated with silk suture. Each bitch was observed daily for external signs of proestrus. Vaginal cytology was also performed each morning. During estrus, each bitch was allowed to copulate with a dog daily. Metestrus was determined by behavioral changes (refusal of the male) and vaginal cytology [12]. On the twelfth day of metestrus, a second laparotomy was performed, and the left uterine horn treated as described below. On day 24 of metestrus, a complete ovariohysterectomy was performed. All surgeries were performed with standard aseptic techniques.

Group 1 animals had the endometrium of the left horn scratched by inserting a 0.1 mm diameter stainless steel wire. Group 2 animals had a transmural silk suture 0.6 mm in diameter inserted through the lumen. Group 3 animals received 0.5 m*l* of olive oil placed intraluminally with a sterile syringe and 25 gauge needle. Group 4 animals received 0.5 m*l* of sterile saline injected into the lumen with the same gauge syringe and needle.

Following ovariohysterectomy, gross observations were recorded, tissues were taken from the exact site of the treatment in the horn and fixed in 10% neutral buffered formalin. Slides for microscopic examination were prepared from each ovary and uterine horn. Cystic endometrial hyperplasia (so-called "Swiss cheese endometrium" [4]) was graded as marked, moderate, or slight, based on the degree of glandular dilation and proliferation.

Macroscopically, groups 1 and 3 had slight hyperplasia of the horn. Group 2 had marked left horn hypertrophy. It appeared normal (for metestrus) in group 4. The right horn was in early pregnancy in nearly all dogs in all groups. All ovaries contained visible corpora lutea.

Histologic results are summarized in Table 1. Moderate glandular changes were seen in group 1 bitches. Those in group 2 had marked glandular dilation and proliferation. Group 3 had slight glandular proliferation without appreciable dilation. Group 4 had no glandular proliferation or dilation. All ovaries contained normal corpora lutea.

Cystic endometrial hyperplasia (CEH) was induced in all animals in groups 1 and 2. The stimuli applied to the other groups produced mild (group 3) or no (group 4) glandular changes. We assume that these latter stimuli were ineffective in providing prolonged intralumenal effects. The degree of CEH induced in groups 1 and 2 was similar to that normally seen in early pregnancy in the bitch-resembling a normal maternal decidual formation.

In rodentia, a mass of decidual tissue induced by mechanical means in the progesterone-stimulated uterus is termed Loeb's deciduoma [18]. There are no fertilized ova. A feature of this deciduoma is the presence of
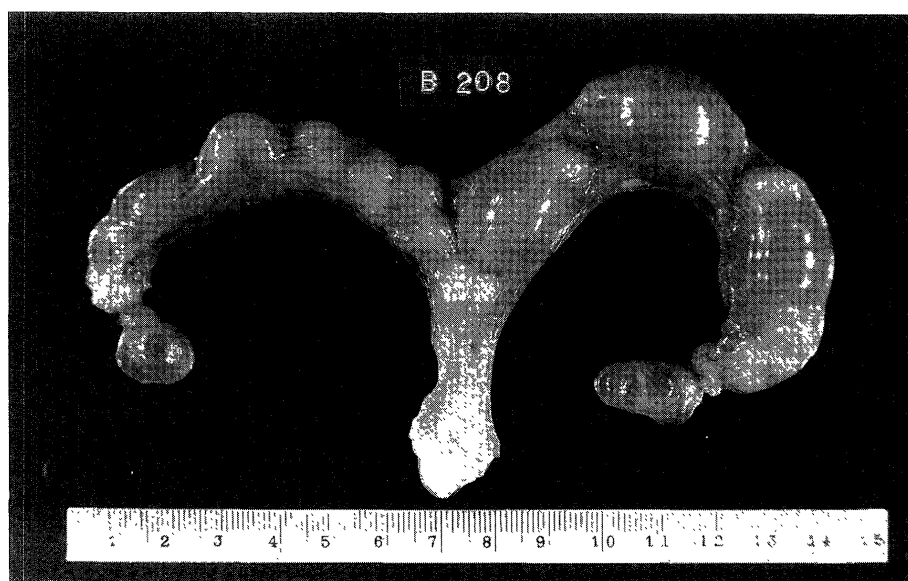
Fig. 1.   Group 1 uterus. Wire scratching produced slight hypertrophy of the left horn; normal pregnancy in the right horn.
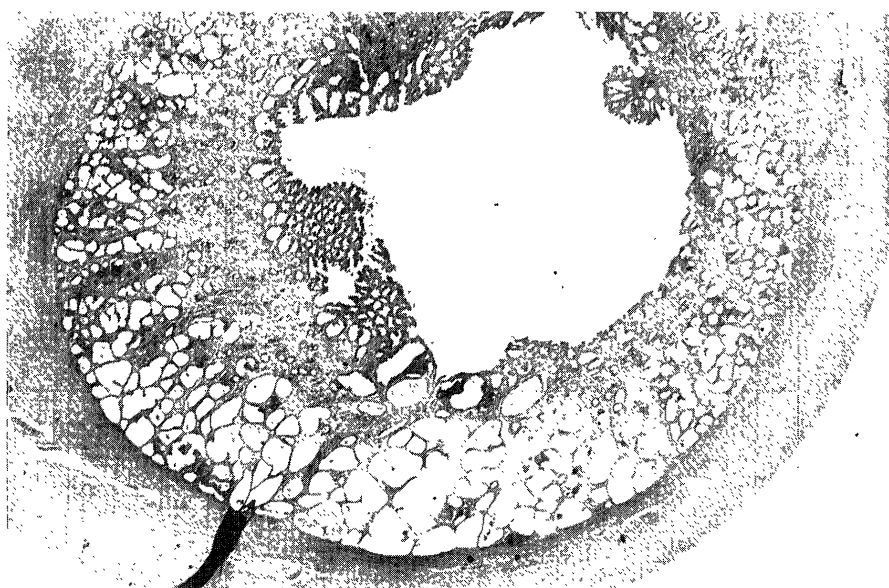

Fig. 2.   Group 1 left horn. Moderate hyperplasia and dilation of the glands. H & E stain; × 16.

Table 1.   Results of the experiments

Experimental group	Stimulus	Case	Left uterus CEH*	Right uterus pregnancy
1	Scratching with wire	5	+	+
2	Inserting silk suture	5	++	+
3	Injection olive oil	5	±	+
4	Injection saline	5	−	+

*CEH: Cystic Endometrial Hyperplasia, ++: Marked, +: Moderate, ±: Slight proliferation of glands but no CEH, −: No proliferation of glands.
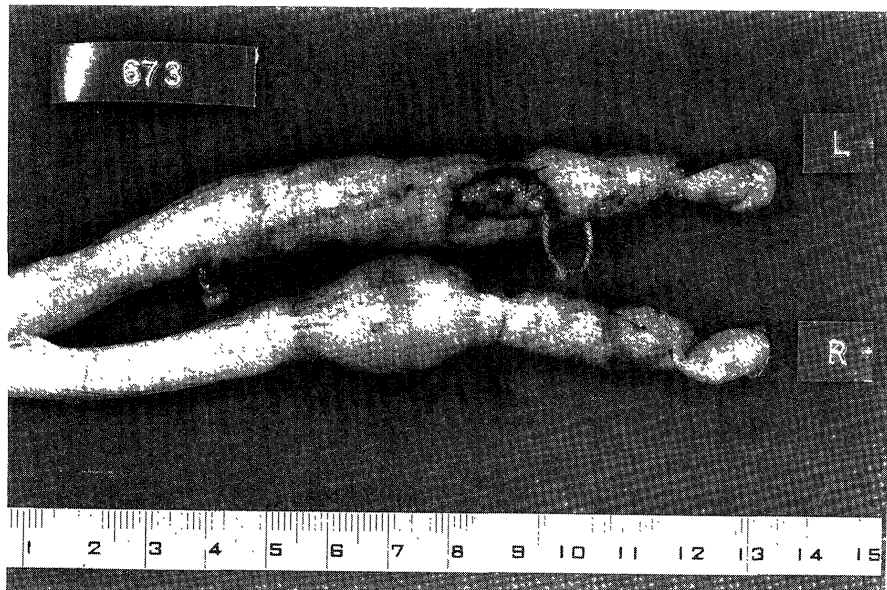
Fig. 3.   Group 2 uterus. Marked hypertrophy produced by silk suture in the left horn; normal pregnancy in the right horn.
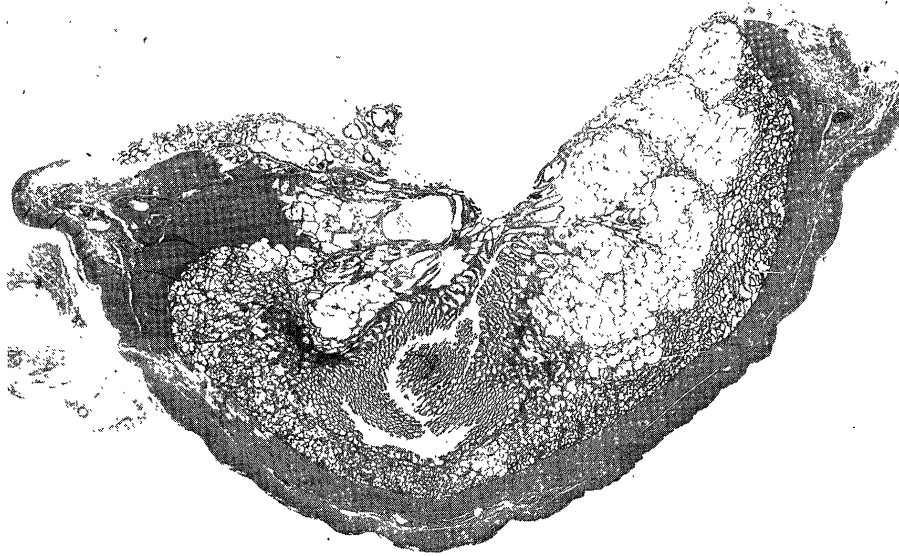

Fig. 4.   Group 2 left horn. Marked glandular hyperplasia and dilation. H & E stain; × 6.

so-called decidual cells. These are not normally found in the canine. In rodentia, they are thought to play an important role in the nutrition of the implanting fertilized ova [1, 7]. In the bitch, however, it is believed that this nutrition is supplied by hyperplastic endometrial glands [19]. Decidual cells are not always a feature of Loeb's deciduoma.

The glandular changes induced in group 2 strongly resembled those of the opposite pregnant horn. Both horns were obviously under the same hormonal influence, and thus we were able to create a deciduous reaction by the use of intraluminal silk suture. Olive oil and saline were ineffective in inducing this reaction while physical perturbation caused by scratching the endometrium with wire induced only mild to moderate glandular changes.

The author was thus able to induce an artificial maternal decidual reaction in bitches similar to Loeb's deciduoma of rodentia.
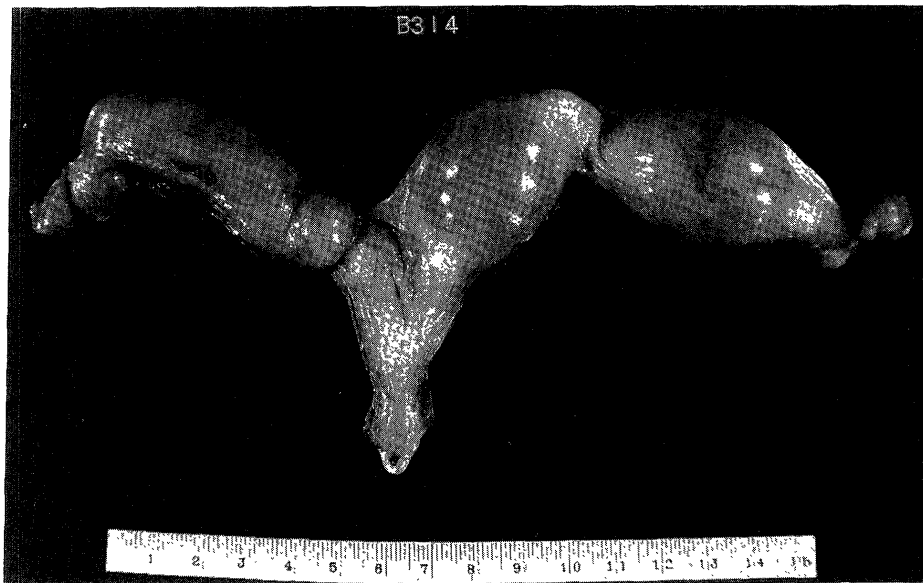
Fig. 5.   Group 3 uterus. Minimal hypertrophy of the left horn produced by intraluminal olive oil injection; normal pregnancy in the right horn.
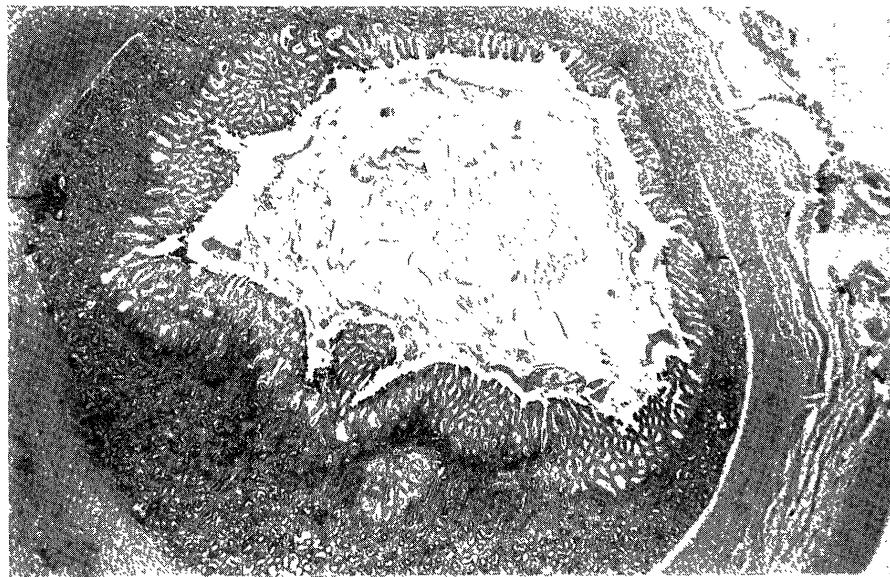

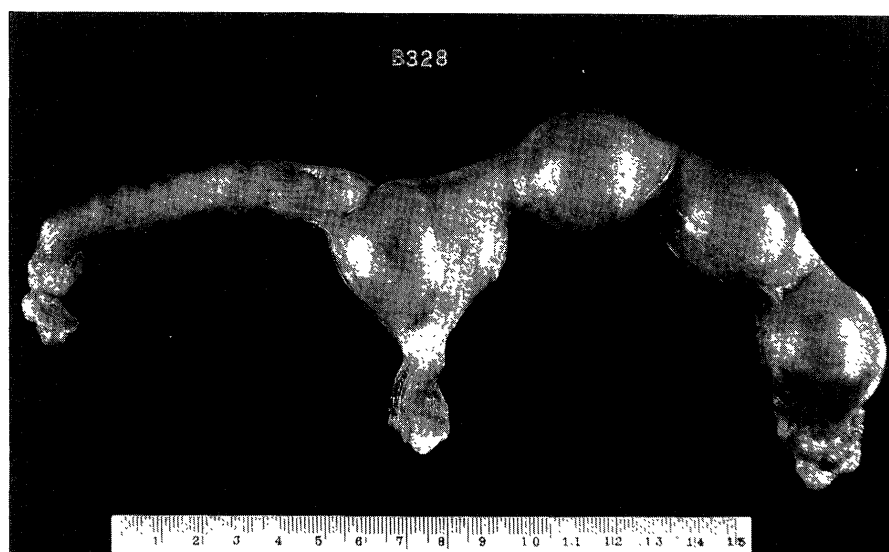Fig. 6.   Group 3 left horn. Very mild glandular growth near the lumen but no dilation. H & E stain; × 14.

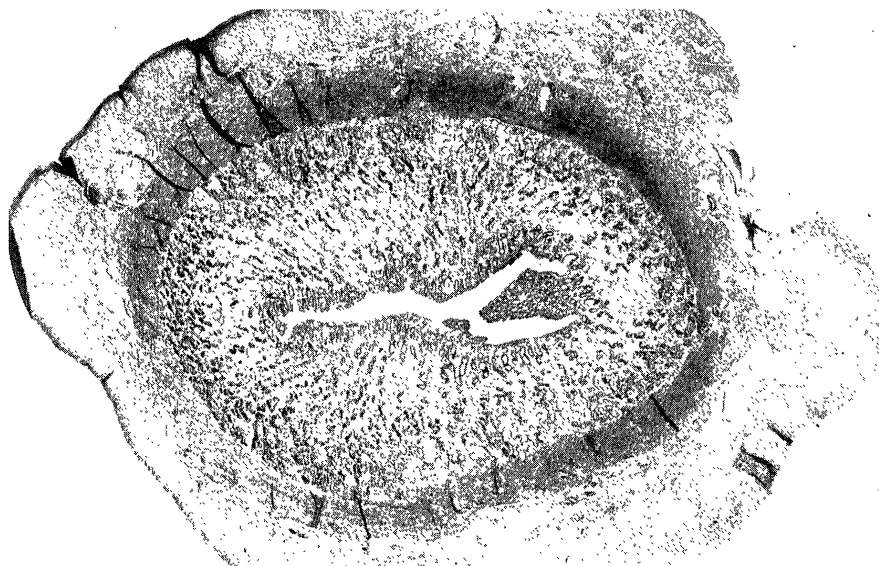Fig. 7. Group 4 uterus. Normal left horn injected with intraluminal saline; normal pregnancy in the right horn.

Fig. 8. Group 4 left horn. Normal metestrous endometrium. H & E stain; × 15.

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