Changes in Plasma LH and Testosterone Levels and Semen Quality after a Single Injection of hCG in Two Dogs with Spermatogenic Dysfunction

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ABSTRACT. Plasma LH and testosterone (T) levels and semen quality after a single intramuscular injection of 1,000 IU hCG were investigated in a Beagle dog with azoospermia and a Beagle dog with poor semen quality. The plasma LH levels of both dogs did not change after the treatment. Although the plasma T levels of the dog with azoospermia increased temporarily, no sperm were detected in its semen. In the dog with poor semen quality high levels of plasma T were maintained for 2 weeks after hCG treatment and its semen quality was temporarily improved between 3 and 4 weeks after treatment. These findings indicate that the semen quality of dogs with oligozoospermia can be temporarily improved after a single injection of hCG. — KEY WORDS: canine, hCG therapy, infertility.


There have been a few reports concerning hormone therapy for spermatogenic dysfunction in the dog [5, 8]. While there have been cases in which hCG has been used to treat infertility in humans [6, 13], there are no reports of it being used to treat infertility in male dogs. Antibody to hCG is produced in canine blood as a result of repeated treatment with hCG, a glycoprotein derived from human placenta [2]. The authors, therefore, tried using a single injection of hCG to treat a dog with azoospermia (Dog No. 7) and a dog with poor semen quality (Dog No. 9).

The subjects were two 3-year-old Beagle dogs in our laboratory’s colony, both of which were diagnosed as having spermatogenic dysfunction based on their semen quality (Table 1). Semen samples were collected by digital manipulation without a teaser at one-week intervals after a single intramuscular injection of 1,000 IU hCG. Each sample was examined using methods described previously [9]. The levels of LH and testosterone (T) in peripheral plasma collected before and after hCG treatment were measured by radioimmunoassay using methods described previously [10]. As plasma T levels in the dog fluctuate diurnally [7, 11], blood samples were collected four times a day (9:00, 12:00, 15:00, 18:00 hr). Semen quality was evaluated and plasma LH and T levels were assayed in 4 normal Beagle dogs aged 3 years.

The right and left testes in Dog No.7 with azoospermia were normal size but slightly soft. The testes in Dog No.9 were normal on palpation. The testicular size and hardness in the two dogs did not change after hCG treatment. No sperm were detected in the semen of Dog No. 7 at any time during the experiment. In Dog No. 9 the total number of sperm and the percentage of motile sperm increased 3 and 4 weeks after hCG treatment (Fig. 2). The percentage of morphologically abnormal sperm (mainly bent or coiled tails) decreased from above 20% before hCG treatment to about 15% 3–5 weeks after treatment (Fig. 2). Semen quality deteriorated 8 weeks after hCG treatment. Plasma LH levels in Dog No. 7 were very high before and after hCG treatment (Table 2 and Fig. 3). The plasma T levels of both dogs before treatment were lower than in normal dogs (Table 2), and their levels peaked 90 min after the injection of hCG (Fig. 3). The T levels in Dog No. 9 remained at a relatively higher values (above 2 ng/ml) until 2 weeks after hCG treatment (Fig. 3).

There have been a few reports on azoospermic men with elevated plasma LH levels [1, 12]. There was an example of a case of a man with high plasma LH levels and azoospermia treated successfully with hCG therapy [12]. There are no reports of using hCG to treat infertility in male dogs. Antibody to hCG is produced in canine blood as a result of repeated treatment with hCG, a glycoprotein derived from human placenta [2]. The authors, therefore, tried using a single injection of hCG to treat a dog with azoospermia (Dog No. 7) and a dog with poor semen quality (Dog No. 9).

The right and left testes in Dog No.7 with azoospermia were normal size but slightly soft. The testes in Dog No.9 were normal on palpation. The testicular size and hardness in the two dogs did not change after hCG treatment. No sperm were detected in the semen of Dog No. 7 at any time during the experiment. In Dog No. 9 the total number of sperm and the percentage of motile sperm increased 3 and 4 weeks after hCG treatment (Fig. 2). The percentage of morphologically abnormal sperm (mainly bent or coiled tails) decreased from above 20% before hCG treatment to about 15% 3–5 weeks after treatment (Fig. 2). Semen quality deteriorated 8 weeks after hCG treatment. Plasma LH levels in Dog No. 7 were very high before and after hCG treatment (Table 2 and Fig. 3). The plasma T levels of both dogs before treatment were lower than in normal dogs (Table 2), and their levels peaked 90 min after the injection of hCG (Fig. 3).

Table 1. Semen quality (mean ± S.E.) before hCG treatment in 2 Beagle dogs (Dogs No. 7 and 9) with spermatogenic dysfunction and 4 normal Beagle dogs

<table>
<thead>
<tr>
<th>Dog No.</th>
<th>Total volume of semen (ml)</th>
<th>2nd fraction</th>
<th>Total number of sperm (x 10⁶)</th>
<th>Motile sperm (%)</th>
<th>Viable sperm (%)</th>
<th>Abnormal sperm (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>13.3 ± 0.8</td>
<td>6.5 ± 0.1</td>
<td>0</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>9</td>
<td>11.4 ± 1.9</td>
<td>6.3 ± 0.1*</td>
<td>217.8 ± 26.3**</td>
<td>71.5 ± 3.6*</td>
<td>81.7 ± 1.4*</td>
<td>23.5 ± 0.5**</td>
</tr>
<tr>
<td>Normal dogs</td>
<td>13.4 ± 1.4</td>
<td>6.8 ± 0.1</td>
<td>462.5 ± 37.8</td>
<td>89.4 ± 1.6</td>
<td>92.2 ± 1.7</td>
<td>9.3 ± 0.8</td>
</tr>
</tbody>
</table>

The semen samples were collected 6 times at 1 week intervals. * p<0.05, ** p<0.01, in comparison with normal dogs.

Table 2. Peripheral plasma LH and testosterone levels (mean ± S.E.) before hCG treatment in 2 Beagle dogs (Dogs No. 7 and 9) with spermatogenic dysfunction and 4 normal Beagle dogs

<table>
<thead>
<tr>
<th>Dog No.</th>
<th>LH (ng/ml)</th>
<th>Testosterone (ng/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>15.0 ± 0.6**</td>
<td>1.8 ± 0.2</td>
</tr>
<tr>
<td>9</td>
<td>5.5 ± 0.5</td>
<td>1.6 ± 0.1</td>
</tr>
<tr>
<td>Normal dogs</td>
<td>7.6 ± 0.7</td>
<td>2.6 ± 0.7</td>
</tr>
</tbody>
</table>

The plasma samples were collected 3 times at 2 weeks intervals. ** p<0.01, in comparison with normal dogs.
Leydig cells and Sertoli cells in their testes was found to be very low. Abnormal function of these cells, which are related to spermatogenesis, is also thought to have caused the azoospermia in Dog No. 7. Plasma T levels in Dog No. 9 rose temporarily and by more than those in Dog No. 7 within 2 weeks of the hCG treatment. Therefore, the T secretory function of Leydig cells for 2 weeks in response to hCG stimulation is presumed to have induced transient normalization of semen quality. Plasma LH levels in the two dogs did not change after hCG treatment. It is therefore assumed that the LH secretory function of the pituitary glands was not suppressed by the single injection of 1,000 IU hCG and the transient increase of plasma T levels after hCG treatment.

Spermatozoa with abnormal tails are known to occur as a result of abnormal values of seminal plasma pH and osmotic pressure due to dysfunction of accessory reproductive organs [3, 4]. Although seminal pH in Dog No.9 before hCG
treatment was lower than in normal dogs (Table 1), it became normal after treatment (Fig. 1). The reduction in the percentage of abnormal sperm in Dog No. 9 after hCG therapy may be related to the change in seminal pH. These findings indicate that it is possible to induce transient normalization of semen quality in dogs with poor semen quality by a single injection of 1,000 IU hCG.

REFERENCES