Two Cases of Acrosome and Folded Tail Abnormality in Dog Spermatozoa
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(Received 6 June 1988/Accepted 20 August 1988)

KEY WORDS: abnormal spermatozoa, dog.

In the bull and boar, it has been reported that epididymal dysfunction causes a remarkable increase in abnormal tail spermatozoa because of a change in the composition of epididymal fluid [2, 3, 4, 5, 10]. It has been demonstrated that sperm abnormalities are increased by estrogen injection in the bull [9]. The authors took advantage of an opportunity to investigate two dogs in which many spermatozoa with the same morphological abnormality appeared in the ejaculate. In both dogs the genital regions in which the abnormal spermatozoa occurred were examined. The genitalia were examined histopathologically and plasma androgen and estrogen levels were measured.

The dogs (Nos. 208 and 211) were both small mongrels, 2 to 5 years old. Semen was collected at 5-day interval by digital manipulation, and quality was examined by the methods described previously [7]. Sperm acrosomes were examined after staining with aniline blue and eosin B [1]. Sperm morphology was studied in smear preparations of the testis, epididymis and ductus deferens. The genitalia were fixed in Bouin’s fluid, cut into 3 μm thick sections, and stained with PAS-hematoxylin, 4-androstenedione (A), 5α-dihydrotestosterone (DHT), testosterone (T), and estradiol-17β (E2) levels were measured in peripheral and spermatogenic venous blood plasma by RIA, as described previously [8]. Four control dogs were examined in the same manner.

Semen quality is as shown in Table 1. Though both dogs, Nos. 208 and 211, were in good physical condition, the proportion of spermatozoa with abnormal acrosomes (swelling or loss of the acrosome cap) and folded tails in the testis, epididymis, and ductus deferens are as shown in Fig. 1. In both dog Nos. 208 and 211 it was noted that highly abnormal percentages of sperm acrosomes and tails were present in the testes and the epididymides, respectively. Moreover, the sperm tail abnormality was markedly higher in the ductus deferens of dog No. 208. No inflammation was seen in the genitalia of either dog histologically. Germ cells in the seminiferous tubules of both dogs were fewer in number than in the controls. Spermatids shed into the tubular lumen of the testes and a large quantity of PAS-positive secretion into the tubular lumen of the body of the epididymides were found in dog Nos. 208 and 211, respectively. Table 2 shows the plasma A, DHT, and E2 levels of peripheral and spermatogenic venous blood. These hormone levels were generally lower in both dogs than in the controls. In particular, T levels in both dogs were less than half the mean T levels of the control dogs.

In the spermatogenically dysfunctional dog and bull, abnormal formation of sperm acrosomes was seen during the transformation of spermatids [6, 11]. It has been reported in the bull and boar that abnormal concentrations of sodium and potassium, or abnormal osmotic pressure in the epididymal fluid caused the increase in abnormal tail sperm [2, 3, 4, 10]. For dogs Nos. 208 and 211 in the present experiment, high percentages of abnormal sperm acrosomes were found in the testes and high percentages of abnormal sperm tails were seen in the epididymides and the ductus deferens. It is therefore believed that not only testicular function, but the function of the epididymis and the ductus deferens was also inferior in both dogs. It is assumed that there was a relation between the occurrence of these dysfunctions and low plasma androgen levels.

REFERENCES
7. Kawakami, E., Tsutsui, T., Yamada, Y., and
Table 1. Mean values of semen quality of 5 ejaculates in dog Nos. 208, 211 and 4 control dogs

<table>
<thead>
<tr>
<th>Dog No.</th>
<th>Volume (ml)</th>
<th>Total sperm number ((\times 10^9))</th>
<th>Sperm motility (%)</th>
<th>Sperm viability (%)</th>
<th>Sperm abnormality (%)</th>
<th>pH</th>
<th>Osmotic pressure (mOsm/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Acrosome cap Head Midpiece Tail Coiled</td>
<td></td>
<td></td>
</tr>
<tr>
<td>208</td>
<td>1.6±0.3146.3±28.2 3.4±0.5 87.3±3.0</td>
<td>23.4±3.1 2.0±0.1 2.7±0.2 25.3±6.2 2.4±0.1</td>
<td>8.3±2.5 6.4±0.1</td>
<td>281.2±2.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>211</td>
<td>3.1±0.5139.5±12.3 3.2±0.4 88.6±2.7</td>
<td>28.1±1.2 2.5±0.2 2.0±0.2 23.6±4.1 2.8±0.1</td>
<td>7.2±2.2 6.5±0.1</td>
<td>283.7±3.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>12.2±1.4457.4±37.8 4.0±0</td>
<td>91.8±1.5 2.2±0.2 1.1±0.1 3.8±0.3 2.4±0.2 2.2±0.2</td>
<td>2.0±0.2 6.8±0.1</td>
<td>297.5±2.9</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Mean±S.D.

Fig. 1. Mean values of sperm acrosome and tail abnormality in the bilateral testes, epididymides, and the ampulla of ductus deferens in dog Nos. 208 (●—●), 211 (▲—▲) and 4 control dogs (M.±S.D., ○—○).

Table 2. Androgen and estrogen levels in the peripheral and the spermatic venous plasma in dog Nos. 208, 211 and 4 control dogs

<table>
<thead>
<tr>
<th>Dog No.</th>
<th>Peripheral venous plasma</th>
<th>Spermatic venous plasma(^c))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A(^a)</td>
<td>DHT(^b)</td>
</tr>
<tr>
<td>208</td>
<td>0.4</td>
<td>0.3</td>
</tr>
<tr>
<td>211</td>
<td>0.5</td>
<td>0.2</td>
</tr>
<tr>
<td>Control</td>
<td>0.4±0.1</td>
<td>0.3±0.1</td>
</tr>
</tbody>
</table>

M.±S.D.

a) 4-androstenedione (ng/ml).
b) 5α-dihydrotestosterone (ng/ml).
c) Testosterone (ng/ml).
d) Estradiol-17β (pg/ml).
e) Mean values of the bilateral spermatic veins.
要約

精子のアクロソーム異常と尾部屈折奇形が高率に認められた犬2頭について（短報）：河上栄一・筒井敏彦・小笠 晃（日本獣医畜産大学，獣医臨床繁殖学教室）—精子のアクロソーム異常と尾部屈折奇形が高率に認められた犬2頭について，これら奇形精子の発現部位の検索，生殖器の組織学的観察および血中 androgen 値の測定を行った．その結果，これら2頭の精子アクロソーム異常は主に精巣で，尾部奇形は精巣上体で発生し，これらの要因として，androgen 産生量の低下による精巣および精巣上体の機能異常が示唆された．