RESULTS FROM MONITORING HERD, WEANING PIGLETS, OESTRUS AND PARTURITION SYNCHRONISATION OF SOWS AND GILTS FROM S.C. NUTRIPIG S.R.L. FARM, SĂLĂCEA, BIHOR COUNTY

V. ARDELEAN¹, N. NECHITI², I. PAZURIC², A.G. TOMULE², C. MIRCU¹, GH. BONCA¹, SIMONA MARC ZARCUŁA¹, G. GODJA¹, A. ARDELEAN³, G. OTAVĂ¹

¹Banat’s University of Agricultural Sciences and Veterinary Medicine "King Michael I of Romania“ Faculty of Veterinary Medicine, Department of Reproduction, Obstetrics and Veterinaria Gynecology, Aradului Street No 119, 300645, Timis Country, Romania
²S.C Nutrienul S.R.L. Palota, Bihor Country, Romania
³S.C. DOPHARMA VET. SRL, Ghiroda, Timis Country, Romania
E-mail: vasile.ardelean@fmvt.ro

Summary

The authors monitored on an interval of 11 months (June 2014-April 2015) the main reproduction indicators for 2973 pigs, of which 2810 females productive, weaning piglets, oestrus and parturition synchronization of sows and gilts from farm S.C. NUTRIPIG S.R.L. Sălacea, Bihor County.

Farm S.C. NUTRIPIG S.R.L., Sălacea is part of S.C. Nutrientul S.R.L., Palota, Bihor country has 2800 pigs and raise PIC Camborough Plus hybrid as female and PIC 410 as boars.

The average number of boars/month was 21.2, with variations of 20 in October 2014 and March and April 2015 and 24 November 2014.
The average of pregnant or lactating females/month was 2816.48, with variations 2772.9 in February 2015 and 2877.1 in August 2014. The average cycle of females was 2.31/month, with variations of 2.1 in March and April 2015 and 2.6 in June 2014. Entries of gilts during period investigated was 1616, with a monthly average of 147 gilts. The number of females that died during studied period was 342 heads, with monthly average of 31.09. The average non-productive days/female/year was 56.16, varying from 44.2 in April 2015 and 65.7 in November 2014.

During the period studied were weaned 5857 sows and 61299 piglets. The number of piglets weaned/sow on average was 10.47. The average age of piglets at weaning was 29.20 days, and average weaning weight was 7.31 kg. During this period 5895 piglets died, with a monthly average of 535.91 piglets. Number of live piglets farrowed/sow/year averaged 26.18, with variations of 22.9 in December 2014 to 29.6 in April, 2015.

For oestrus induction in gilts was used product Altresyn at a dose of 5 ml/gilts, one per day for 18 consecutive days.
In approximately three days from the last administration of Altresyn, 95% of the animals treated came into estrus compared to 94% of the control group. For the induction of parturition in this unit, inseminations are done on Monday, Tuesday and Wednesday, and parturition takes place Thursday and Friday.

Key words: sow, reproduction indices, weaning, estrus and parturition induction
Time of piglet’s weaning is a very important factor which influence the number of births/year/sow and to optimize reproduction, optimal age for weaning should be established. Reducing the duration of lactation too much will cause a decrease in female fertility. Through extending the interval weaning-insemination the conception rate reduces and therefore the litter size decreases. In most farms, the greatest impact on reproduction it done by a short lactation period, less than 17 days. Lactation very short impact can be minimized through careful monitoring and increasing sow feed intake during lactation (8).

Improving the detection of estrus and establish the optimal timing of mating/insemination are critical for efficient reproduction (3).

The interaction between farrowing, feeding and season appears to be responsible for the big difference between weaning - artificial insemination both in sows and in gilts (1).

Ovulation period or time required for the release of all oocytes is highly variable and lasts only three (13).

After the first and second parturition, sows often consume less food during lactation (4), loss of body weight are higher and weaning-estrustr interval is greater (11, 12).

Ambient temperature higher than 30°C reduce boar’s fertility, causing a decrease in sows fertility (5).

The male presence reduce lactating period in sows, accelerating the manifestation of postpartum estrus (9).

Insufficient feeding during lactation can reduce embryonic survival in future gestation (8, 9).

Sows and gilts mounted or Al in July-September have a low rate of births compared to females mounted or Al in the rest of the year (6).

Lack of hygiene of the vulva and perivulvare region is a factor that has negative repercussions on the reproductive performance of sows inseminated (7, 10).

Materials and methods

Industrial breeding of swine is based on the organization, growth and fattening in the same unit, which gives high yields and benefits, with obvious social and economic benefits.

The most important feature of pigs reproduction in the industrial type is that mount or artificial insemination, gestation, parturition and weaning take place in groups of a certain size and in specific periods.

In this swine farm, management is computerized, and includes animals evidence, climate from house keeping area; recent improvements that guaranteeing a better performance in the near future.

Equipment: house box, feeding, ventilation and cooling systems are brand Facom Big Dutchman and Agrico.
The data needed to achieve this scientific paper were provided by S.C. Nutrient SRL Palota, Bihor County. Besides all analyzed parameters for improving productive parameters was tried hormonal methods. Regarding induction of estrus in gilts was used Altresyn product, which was tested on 900 gilts, for a period of 6 months. After a quarantine period of 30 days, it was administered Altresyn 5 ml/gilt/day for 18 consecutive days. There were two groups, experimental and control group with the same number of gilts. To improve the rate of estrus induction there are other methods, which involve lower costs, such as grouping sows (mixing) between crates and the administration of vitamin E. Regarding induction of parturition in this unit insemination program using a well-established, so that insemination is performed on Mondays, Tuesday and Wednesday.

**Results and discussions**

Data regarding livestock, reproductive indices as weaning, inducing estrus and parturition in sows and gilts performed in farm Nutripig SRL Sălacea, Bihor county are shown in Table 1-2. During studied period were weaned 61 299 piglets, with variations between 4810 in August 2014 and 6500 in December 2015. During this time were weaned and removed from the nest 5857 sows, with variations between 393 in January 2015 and 612 in December 2014. They were weaned on average 10.45 piglets/sow, with variations between 9.7 in August 2014 and 10.9 in January and April 2015. The average age of piglets at weaning was 29.2 days. The average weight of piglets at weaning was 7.2 kg. Piglets mortality was 5895 piglets. Average born alive piglets/sow/year was 26.1, with variations from 29.6 in April 2015 and 22.9 in December 2014. The average number of boars was 20/month/year. The average pregnant or lactating females was 5640. Number of entries gilts was 1616, with a monthly average of 146 gilts. Number of culed female throughout the monitored period was 453, with a monthly average of 41.1 sows. In the monitored period 244 female died, with a monthly average of 22 sows. The average replacement rate/year was 56 sows. The mortality rate of female/year averaged 11.5 sow/year. Average number of female taken out from population/year was 47.7. Unproductive days/female/year was 56.4.
Regarding induction of estrus in gilts was used Altresyn product, which was tested on 900 gilts, for a period of 6 months. After a quarantine period of 30 days, it was administered Altresyn 5 ml/gilt/day for 18 consecutive days.

There were two groups, experimental and control group with the same number of gilts.

After three days from Altresyn administration, 95% of the herd came into heat and 94% in control group. These results indicate that applying this treatment is not justified due to higher product costs, higher volume of work and results obtained.

In this situation, in this farm are used other medical methods with a lower cost and less work, such as grouping sows (mixing) between crates and the administration of vitamin E.

Regarding induction of parturition in this unit insemination program is well-established, so that insemination is performed on Mondays, Tuesday and Wednesday and parturition on Thursday and Friday.

Conclusions

After monitoring results regarding swine population, weaning, oestrous induction and parturition in the swine farm S.C. NutriPig Sălacea, Bihor County we can concluded.

By performing artificial insemination costs with maintenance and feeding a greater number of boars are significantly reduced.

Due to fact that in swine intensive system, medications costs is the third economic criteria correlated with fluctuations, with prices in live pig and reported to results obtained, gilts synchronisation with Altresyn, is not justified.

For heat induction are used other medical methods with a lower cost, such as grouping sows (mixing) between crates and the administration of vitamin E.

To avoid births in weekends, in this unit insemination program is well-established, so that insemination is performed on Mondays, Tuesday and Wednesday and parturition on Thursday and Friday.
### Table 1

Reproduction index regarding weaning of sows and gilts in farm S.C. NutriPig SRL Salacea, Bihor country

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reproduction Index</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weaning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weaning piglets</td>
<td>5570</td>
<td>6010</td>
<td>4810</td>
<td>5365</td>
<td>6300</td>
<td>5020</td>
<td>6500</td>
<td>4260</td>
<td>5638</td>
<td>5426</td>
<td>6400</td>
<td>51289</td>
<td></td>
</tr>
<tr>
<td>Weaning females/out</td>
<td>529</td>
<td>591</td>
<td>486</td>
<td>529</td>
<td>699</td>
<td>474</td>
<td>612</td>
<td>393</td>
<td>534</td>
<td>511</td>
<td>589</td>
<td>5857</td>
<td></td>
</tr>
<tr>
<td>from nest</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Females out from nest</td>
<td>161</td>
<td>157</td>
<td>159</td>
<td>155</td>
<td>131</td>
<td>110</td>
<td>96</td>
<td>105</td>
<td>90</td>
<td>95</td>
<td>133</td>
<td>1388</td>
<td></td>
</tr>
<tr>
<td>Weaning piglets/sow</td>
<td>10.3</td>
<td>10.3</td>
<td>9.7</td>
<td>10.3</td>
<td>10.7</td>
<td>10.6</td>
<td>10.6</td>
<td>10.7</td>
<td>10.7</td>
<td>10.6</td>
<td>10.5</td>
<td>10.47</td>
<td></td>
</tr>
<tr>
<td>Total adopted piglets</td>
<td>-428</td>
<td>139</td>
<td>-310</td>
<td>-55</td>
<td>297</td>
<td>11</td>
<td>155</td>
<td>73</td>
<td>100</td>
<td>-27</td>
<td>-305</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Average age on</td>
<td>29.1</td>
<td>30.1</td>
<td>28.5</td>
<td>28.0</td>
<td>29.2</td>
<td>29.3</td>
<td>29.0</td>
<td>30.2</td>
<td>28.3</td>
<td>28.1</td>
<td>29.4</td>
<td>29.20</td>
<td></td>
</tr>
<tr>
<td>weaning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average weight at</td>
<td>7.2</td>
<td>7.2</td>
<td>7.2</td>
<td>7.2</td>
<td>8.4</td>
<td>7.1</td>
<td>7.6</td>
<td>7.1</td>
<td>7.2</td>
<td>7.1</td>
<td>7.1</td>
<td>7.31</td>
<td></td>
</tr>
<tr>
<td>weaning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dead suckling piglets</td>
<td>595</td>
<td>633</td>
<td>622</td>
<td>638</td>
<td>644</td>
<td>467</td>
<td>426</td>
<td>492</td>
<td>432</td>
<td>412</td>
<td>534</td>
<td>5695</td>
<td>535.91</td>
</tr>
<tr>
<td>Mortality in suckling</td>
<td>5.2</td>
<td>10.0</td>
<td>7.0</td>
<td>10.6</td>
<td>10.3</td>
<td>8.6</td>
<td>7.2</td>
<td>8.2</td>
<td>7.6</td>
<td>7.3</td>
<td>7.1</td>
<td>8.10</td>
<td></td>
</tr>
<tr>
<td>piglets</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Born alive piglets/sow/year</td>
<td>27.6</td>
<td>23.1</td>
<td>24.5</td>
<td>28.3</td>
<td>23.8</td>
<td>27.1</td>
<td>22.9</td>
<td>26.4</td>
<td>24.9</td>
<td>28.7</td>
<td>28.6</td>
<td>29.6</td>
<td>26.18</td>
</tr>
</tbody>
</table>
Table 2

Reproduction index regarding swine population in farm S.C. NutriPig SRL Sâlăcea, Bihor County

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>01 – 04</td>
<td>01 – 05</td>
<td>01 – 06</td>
<td>01 – 07</td>
<td>01 – 08</td>
<td>01 – 09</td>
<td>01 – 10</td>
<td>01 – 11</td>
<td>01 – 12</td>
<td>01 – 13</td>
<td>01 – 14</td>
<td>01 – 15</td>
<td>01 – 16</td>
<td>01 – 17</td>
<td>01 – 18</td>
<td>01 – 19</td>
<td>01 – 20</td>
<td>01 – 21</td>
<td>01 – 22</td>
<td>01 – 23</td>
<td>01 – 24</td>
<td>01 – 25</td>
<td>01 – 26</td>
<td>01 – 27</td>
</tr>
<tr>
<td>Population</td>
<td>3032</td>
<td>3015</td>
<td>3002</td>
<td>3035</td>
<td>2973</td>
<td>2928</td>
<td>2964</td>
<td>2932</td>
<td>2937</td>
<td>2940</td>
<td>2936</td>
<td>5999</td>
<td>2973</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total swine</td>
<td>2846</td>
<td>2865</td>
<td>2882</td>
<td>2866</td>
<td>2797</td>
<td>2755</td>
<td>2771</td>
<td>2757</td>
<td>2757</td>
<td>2805</td>
<td>2800</td>
<td>5997</td>
<td>2810</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>productive</td>
<td>21</td>
<td>21</td>
<td>21</td>
<td>21</td>
<td>20</td>
<td>24</td>
<td>23</td>
<td>22</td>
<td>21</td>
<td>20</td>
<td>20</td>
<td>981</td>
<td>21.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>females 1</td>
<td>2832.8</td>
<td>2870.9</td>
<td>2877.1</td>
<td>2875.3</td>
<td>2834.0</td>
<td>2787.4</td>
<td>2764.5</td>
<td>2778.6</td>
<td>2772.9</td>
<td>2798.4</td>
<td>2793.3</td>
<td>2816.48</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average cycle</td>
<td>2.6</td>
<td>2.5</td>
<td>2.4</td>
<td>2.4</td>
<td>2.4</td>
<td>2.3</td>
<td>2.2</td>
<td>2.2</td>
<td>2.2</td>
<td>2.1</td>
<td>2.1</td>
<td>2.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>of females 1</td>
<td>37</td>
<td>1</td>
<td>90</td>
<td>86</td>
<td>80</td>
<td>140</td>
<td>112</td>
<td>114</td>
<td>1029</td>
<td>277</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Culled females</td>
<td>39</td>
<td>133</td>
<td>35</td>
<td>0</td>
<td>0</td>
<td>70</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>277</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dead females</td>
<td>30</td>
<td>38</td>
<td>30</td>
<td>39</td>
<td>37</td>
<td>22</td>
<td>28</td>
<td>29</td>
<td>24</td>
<td>25</td>
<td>30</td>
<td>342</td>
<td>31.09</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Replacement</td>
<td>65.8</td>
<td>59.4</td>
<td>59.9</td>
<td>62.2</td>
<td>53.0</td>
<td>60.0</td>
<td>55.7</td>
<td>68.7</td>
<td>55.8</td>
<td>67.6</td>
<td>59.19</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>rate/year</td>
<td>12.1</td>
<td>14.6</td>
<td>11.6</td>
<td>15.7</td>
<td>14.5</td>
<td>9.0</td>
<td>11.2</td>
<td>11.5</td>
<td>10.6</td>
<td>10.0</td>
<td>12.4</td>
<td>12.11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>30.7</td>
<td>51.4</td>
<td>53.3</td>
<td>33.1</td>
<td>62.8</td>
<td>64.0</td>
<td>32.0</td>
<td>66.9</td>
<td>49.2</td>
<td>44.6</td>
<td>46.9</td>
<td>47.72</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mortality/year</td>
<td>4.6</td>
<td>5.6</td>
<td>5.3</td>
<td>0</td>
<td>0</td>
<td>6.8</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2.63</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average cycle</td>
<td>55.4</td>
<td>61.4</td>
<td>61.9</td>
<td>58.5</td>
<td>57.7</td>
<td>65.7</td>
<td>58.7</td>
<td>55.9</td>
<td>51.0</td>
<td>47.3</td>
<td>44.2</td>
<td>56.16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
References


RESULTS OBTAINED IN TREATMENT OF COWS WITH CHRONIC PUERPERAL ENDOMETRITIS

V. ARDELEAN¹, C. MIRCU¹, G. OTAVĂ¹, SIMONA MARC ZARCUŁA¹, G. GODJA¹, A. ARDELEAN², GH. BONCA¹

¹Banat’s University of Agricultural Sciences and Veterinary Medicine „King Michael I of Romania” from Timisoara, Faculty of Veterinary Medicine, Department of Reproduction, Obstetrics and Veterinary Gynecology, 300645, Aradului Street No. 119, Timişoara
²S.C. DOPHARMA VET. SRL, Ghiroda, Timis Country, Romania
E-mail: vasile.ardelean@fmvt.ro

Summary

The authors studied 59 cows from Romanian Spotted, Flechwieh, Bruna de Maramureș, Brown Red Holstein breeds and their crossbreed, diagnosed with chronic puerperal endometritis, which were divided into three experimental groups and one control group.

The females from experimental groups were treated according to three therapeutic protocols as follows: Group 1, consisting of 17 females was subjected to the following therapeutic protocol: Betadine, sol. 3%, 50 ml for each uterine horn, two administration every 48 hours and 25 ml, from the same solution/uterine horn for third administration. At 48 hours after the last administration of Betadine, 6 pessaries with oxytetracycline hydrochloride and Neomycin were administered. Group 2, consisting of 18 females has been treated with Metrosept 50 ml/female, intrauterine, 4 consecutive administration, at 24 hours interval. Group 3, consisting of 14 females has been treated with Germisan, 30 ml/uterus, 3-4 administration, at 48 hours interval and group 4, consisting of 10 cows, control group, was subject of no treatment.

From 17 cows treated in accordance with first protocol, 70.59% were considered clinically healed, 47.06% were inseminated and 41.18% became pregnant. In group 2, from 18 cows treated, 88.89% were considered clinically healed, 77.78% were inseminated and 47.06% became pregnant. In group 3, from 14 cows, a percent of 92.86 were considered clinically healed, 85.72% were inseminated and 78.58% became pregnant. In cows from control group, formed by 10 cows, 10% were considered clinically cured, 10% have been inseminated, but none became pregnant (0.00% clinically unhealed).

Key words: cow, puerperium, chronic endometritis, treatment

In cows the uterus normally is a sterile environment, unlike the vagina, which hosts many microorganisms (9). Pathogens from normal vaginal flora or from the environment may invade the uterus from time to time. A healthy uterus is able to get rid of these transient infections very quickly, but in postpartum period, the uterus is usually contaminated with a variety of pathogens. In a few days or weeks postpartum, sterile environment of the uterus is restored in most cases. In cases where the infection persists, subacute, acute or chronic endometritis develops and
have a negative effect on fertility. In cows with puerperal endometritis, the most often pathogens are *Arcanobacterium pyogenes*, alone or in combination with *Fusobacterium necrophorum* or other Gram-negative anaerobes.

Signs of infection varies from obviously and persistent exudate from the uterus or vagina, to exudate floaters in estrus mucus, which is usually clear. Changes may occur in the consistency of uterine tonus, but only transrectal palpation is not a method of diagnosis.

For decades, cows endometritis were treated by uterine lavage with antiinfectious solution. Although antimicrobial solutions can get rid of the bacteria, there is little evidence that inflammation of the endometrium is gone and the fertility is restored. Many products usually administered intrauterine are deleterious for the uterine tissue.

It has also raised concern about residues of antibiotics in milk and meat, along with weak or uncertain results, which should discourage intrauterine therapy as a routine approach to the management of cattle endometritis.

**Materials and methods**

The females from experimental groups (59 cows) were treated according to three therapeutic protocols as follows:

**Group 1**, consisting of 17 females was subjected to the following therapeutic protocol: Betadine, sol. 3%, 50 ml for each uterine horn, two administration every 48 hours and 25 ml, from the same solution/uterine horn for third administration. Betadine solution was administrated at 37ºC. At 48 hours from the last administration of Betadine, 6 pessaries were administered, each contained 250 mg oxytetracycline hydrochloride and 250 mg Neomycin. Pessaries were dissolved in 25 ml physiological saline solution, which was introduced intrauterine with the same pipette used for Betadine administration, a single administration.

**Group 2**, consisting of 18 females has been treated with the following therapeutic protocol: Metrosept 50 ml/female, intrauterine, 4 consecutive administration, at 24 hours interval. Metrosept contain 5g/100ml iodoform, 5g/100 ml oxytetracycline, 2.5g/100 ml enrofloxacin and excipients (parafilm oil, neutral vaseline) ad 100 ml. The producer recommend 30-40 ml/intrauterin administration, 2-3 times at 24 hours interval.

**Group 3**, consisting of 14 females has been treated with Germisan (intrauterine suspension for veterinary use), prepared in laboratory of Reproduction, Obstetrics and Gynecology Discipline from Faculty of Veterinary Medicine Timisoara. Germisan contains: iodoform 40 g; boric acid (borax) 15 g, subnitric bismut 15 g. All ingredients are mixed very well and are emulsified in 1000 ml vegetal oil. Germisan is administrated intrauterine, for 2-3 times, at 48 hours interval.

**Group 4**, consisting of 10 cows with chronic endometritis, as the control group, was subject of no treatment.
These therapeutic protocols where chosen taking into consideration the following aspects:

- to exclude incompatible states between ingredients;
- to possess universal germicide action;
- to exclude microbial-resistant phenomena;
- cost price to be reduced;
- to require a lower number of interventions.

### Results and discussions

The results obtained after using the three consecutive therapeutic protocols are presented in table 1.

#### Table 1

<table>
<thead>
<tr>
<th>Specification</th>
<th>Female no. identified and treated</th>
<th>Clinically cured at first A.I.</th>
<th>Not-healed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Group 1</td>
<td>17</td>
<td>12</td>
<td>70.59</td>
</tr>
<tr>
<td>Group 2</td>
<td>18</td>
<td>16</td>
<td>88.89</td>
</tr>
<tr>
<td>Group 3</td>
<td>14</td>
<td>13</td>
<td>92.86</td>
</tr>
<tr>
<td>Group 4 (control)</td>
<td>10</td>
<td>2</td>
<td>20.00</td>
</tr>
<tr>
<td>Total</td>
<td>59</td>
<td>43</td>
<td>72.89</td>
</tr>
</tbody>
</table>

A.I. – artificial inseminated
P – pregnant

From 59 cows taken under observation, 43 (72.89%) were considered clinically cured as a result of the three therapeutic protocols, 2 females were from control group. From those cows, 31 (52.55%) were diagnosed pregnant and 27 (45.77%) females were considered not healed. Assessment was made on the basis of clinical and gynecological examination and also on non return rate.

Solutions with local hiperemiant effect, especially those based on iodine, as those with coagulant effect are recommended to be administered in the first phase of chronic endometritis therapy as their specific effects determines accutization of the inflammatory process. In these circumstances the local response to the medication used will be better, and the mobilisation of local defense factors will be improved quantitative and qualitative (1,4).

Boitor et al. (2) recommend in endometritis of I and II grade instilations with iodine solution formed by Lugol solution, potassium iodine, distilled water in the ratio of 1:2:300 or 1:2:200 or even 1:2:96, the last only in exceptional cases
because it produces serious inflammation with destruction of tissues, resulting a true iatropathy. The amount of solution recommended to be instilated in the uterus, depends on its size, ranging from 20-500 ml.

In terms of changes induced by iodine solutions, Bonca (3) observed in the first 24 hours after Lugol solution was administrated, relatively serious injuries: swelling, fibrinous exudate, epithelium losses etc. From day 3 proliferative changes occured in stroma, accompanied with vascular changes. In vascular endothelium, especially perivascular endothelium forms amitotic new cells with tendency to differentiate into macrophages. Mitotic multiplication of stroma cell are also evident.

After Schultz and Grunert (6) the main effect of iodine solutions is to stimulate macrophage activity in endometrium.

Putro (5) and Stolla et al. (8) using colloidal iodine solutions (Mercoiod) obtained better results in treatment of endometritis in cows compared to iodine solution (Lugol). Best results obtained with colloidal iodine solutions are generated by a general action by stimulating the thyroid and suprarenal glands.

Sirba et al. (7) recommend the exclusion of anti-infectious medication (antibiotics and chemotherapy) and manual interventions on the infected uterus, recommendations based on the good results (97.2% clinically healed) consecutive treatments with prostaglandins and estrogens.

After Bonca (3) choosing the ingredients of Germisan suspension is made based on pharmacodynamic action of each component, avoiding incompatibilities with opposite effects, because the ingredients of the product have recommendations for use on mucosa. According to the same author, as a result of in vitro testing of antimicrobial effect of Germisan suspension has proved that it has a strong inhibitory effect on cultures of E. coli, B. cereus and C. piogenes, even after 5 minutes contact, while the cultures of P. aeruginosa, S. aureus and S. pyogenes the same effect was found after one-hour contact.

Regarding interval administration of Germisan, Bonca (3) observed that intrauterine administration at 24 hours period required 10.45 doses for healing 77.02% of cows with endometritis, administration at 48 hours period required 4.33 doses for healing 100% of cows, and administration at every 72 hours period required 4.40 doses for healing 88.33% of cows.

Conclusions

Pharmacotherapy of chronic puerperal endometritis in cows had the best results in case of group 2 and 3 where we obtained a gestation rate of 66.67%, respectively 78.58%. With a minimum volume of work (2–3 administration) and a lower cost has obtained clinical healing and gestation in 11 cows (78.58%) from group 3.

Considering the fact that antibiotic treatment of endometritis has large economic consequences through the non-use of milk for processing due to antibiotic residues in milk and meat, we do support the opinion of those authors
who recommend exclusion of anti-infectious medication (therapy with antibiotics and chemotherapy) for treatment of these disorders in cows.

References

LABORATORY RESEARCH IN METABOLIC ACIDOSIS AT RAMS

V. CIULAN, T. MOȚ, CRISTINA PETRUSE, D. MORAR, F. SIMIZ, ANDREEA MARIN, A. OLARIU-JURCA, FLORICA MORARIU

Banat’s University of Agricultural Sciences and Veterinary Medicine „King Michael I of Romania” from Timisoara, 300645, Calea Aradului, No. 119, Timișoara, Romania
E-mail adress: ciulan.valentin@yahoo.com

Summary

Reticular rumen acid indigestion occur frequently at ruminants that consume large quantities of feed rich in carbohydrates. The disease is more common in females compared to males due to productive partition, low individual resistance and other causes.

In males the disease occurs rarely, being present, in particular, in use in the breeding males during the mount when they are fed concentrated feed in larger quantities.

The study that follows presents the results of laboratory tests of hematology and biochemistry blood from the rams clinically diagnosed with metabolic acidosis compared to clinically healthy males (rams).

The aim of the study was to assess the differences regarding the analyzed parameters in male patients compared with those clinically healthy.

Compared with healthy animals, the suffering rams showed significant differences in hemoglobin (p<0.001), distinctly significant for HEM and VEM (p<0.01) and unsignificant for erythrocytes and CHEM (p<0.05) values.

Key words: rams, acidosis, blood, biochemical

Acute and supraacute rumen acidosis is mainly acido-lactic with histaminotoxicosis. The chronic and latent rumen acidosis is a metabolic acidosis correlated with the disruption of the synthesis of fatty acid volatile plus the acids derived from tainted tissue metabolism. (1, 2, 5)

Ruminal metabolic acidosis is a major pathogenic entity for large or small ruminant, both extensively and intensively exploited for both reproductive and fattening.

In practice a special importance is given to the acute form called "acute indigestion", "ruddy intoxication", "toxic poisoning". Clinical manifestations are dramatic and brutal. The losses are 40-50% (3, 6).

Ruminal acidosis is diagnosed based on clinical manifestation correlated with nutritional survey data. Special attention is given to sudden ration changes and imbalances in the ration.

Functional disorder occurs as a result of hemoconcentration, dehydration, hypoglycemia, oliguria, metabolic acidosis, circulatory and metabolic disorders general influence on the central nervous system (3).
It adds intravascular coagulation, degenerative lesions in the organ parenchymal, hepatitis, ruminal bloating etc. Paraclinical parameters are important as reduction of pH and alkaline reserve and blood ketones in milk or urine. In the absence of clinical manifestation of ketosis decrease urinary pH appears to apparently healthy animals maintained under identical conditions and provided to exclude acid-base reactions regulated physiological or caused by other diseases.

Materials and methods

Research were conducted on 24 adult rams ready to mount, Turcana breed, in August and September 2015 in a private farm located in western Timis county. Included in the study were clinically healthy sheep, who received the forage ration concentrated in small quantity, good quality hay and grazing green fodder. There were taken in the study also two rams suspected with ruminal acidosis receiving the same ration fodder, but the amount of concentrated dose was doubled.

In order to perform hematological and biochemical blood examination, in both categories of rams were taken blood samples in vacotainer of 9 ml with and without anticoagulant through jugular vein puncture. Blood samples were collected in the morning avoiding as much as possible their influence on hematological and biochemical parameters.

Regarding the parameters of blood, erythrocytes were determined hemocitometric, hemoglobin’s method Sohli, erythrocyte indices percentage hematocrit by centrifugation. Biochemical values of urea were analyzed by the method Kowansci, cholesterol by method Zak, alkaline reserve colorimetric method and glycemic orthotoluidina. Individual results of hematological and biochemical blood test were statistically processed by nonparametric Man-Whitney test.

Results and discussions

Table 1 presents the mean and standard deviation in clinically healthy rams and for those with clinical signs of ruminal acidosis.
Table 1
The mean values and standard deviation of hematological results for healthy rams and rams with ruminal acidosis n=24

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Rams with acidosis n=10</th>
<th>Rams clinically healthy n=14</th>
<th>Reference values (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemoglobin (g/dl)</td>
<td>10.5±1.4</td>
<td>11.5±1.5</td>
<td>11±2</td>
</tr>
<tr>
<td>Erythrocytes (10^6/mm^3)</td>
<td>9.6±0.12</td>
<td>8.9±1.4</td>
<td>12±4</td>
</tr>
<tr>
<td>Haematocrit (%)</td>
<td>34.8±0.75</td>
<td>39.16±1.2</td>
<td>36±4</td>
</tr>
<tr>
<td>MCV (fL)</td>
<td>28.6±2.3</td>
<td>27.9±1.1</td>
<td>34±6</td>
</tr>
<tr>
<td>MCH (pg)</td>
<td>17.9±0.8</td>
<td>15.3±0.7</td>
<td>16±2.5</td>
</tr>
<tr>
<td>MCHC (g/dL)</td>
<td>29.03±1.04</td>
<td>27.6±1.19</td>
<td>32±3</td>
</tr>
</tbody>
</table>

Calculation of erythrocyte constants derived highlighted higher values of MCH and MCHC's rams with ruminal acidosis compared to clinically healthy. In the study review finds that ruminal acidosis rams with clinically healthy versus those differences were highly significant (p <0.001) for hemoglobin distinct about significant (p <0.01) for MCHC and significant (p <0.05) for erythrocytes and MCH. Morphological changes of blood obtained from rams with ruminal acidosis compared to clinically healthy are consistent with data from literature, the result states of dehydration, diarrhea, haemoconcentration and liver disfuntions. Overall the values are near the reference values within the limits of variation, either to be superior to the lower value. At all rams included in the study all levels of hemoglobin and erythrocytes are lower compared to reference data suggesting study, anemic existence of a state of low intensity.

Variation in male blood biochemical parameter values included in the study is reported in the Table 2.

Table 2
The mean and standard deviation of biochemical results of rams included in the study n=24

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Rams with acidosis</th>
<th>Clinically healthy rams</th>
<th>Reference values (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glycemia (mg/dl)</td>
<td>58.2±1.6</td>
<td>52.4±1.8</td>
<td>55±5</td>
</tr>
<tr>
<td>Cholesterol (mg/dl)</td>
<td>130±1.9</td>
<td>100±2.0</td>
<td>100±50</td>
</tr>
<tr>
<td>Alkaline reserve (mEq/L)</td>
<td>10.2±0.6</td>
<td>12.6±0.3</td>
<td>15.2±0.5</td>
</tr>
</tbody>
</table>

Ruminal acidosis in male compared to those with healthy clinical parameter values analyzed: glucose, cholesterol and alkaline reserve are considerably lower compared with the reference data values.
In terms of average values of alkaline reserve ruminal acidosis in male with
a finding of significantly less value thereof 10,2±0,6 (mEq/L) compared to the rams
clinically healthy and benchmarks 15,2±0,5 (mEq/L) is consistent with data from the
literature.

Conclusions

Rams with acidosis compared with those clinically healthy were recorded
for elevated hemoglobin, hematocrit, MCH and MCHC.

The healthy rams compared with those with ruminal acidosis, those with
blood sugar levels, cholesterol and alkaline reserve are superior.

At all rams included in the study both sick and clinically healthy is aware of
a low intensity anemia deficiency

References

1. Aschenbach, J.R., Gabel, G., Effect and absorption of histamine in sheep
rumen: significance of acidic epithelial damage. J. Anim. Sci, 2000, 78:464-
470.
2. Braun, U., Rihs, T., Schefer, U. Ruminal lactic acidosis in sheep and goats,
Timisoara, 2011.
4. Parvu, Gh., Supravegherea nutritionala metabolismica a animalelor, Ed. Ceres,
5. Oliveira, D.M., Medeiros, J.M.A., Assis, A.C.O., Neves, A.B., Galiza,
G.J.N., Simões, S.V.D., Dantas, A.F.M., Riet-Correa F., Acidose láctica
47(4), 253-261.
CEREBROVASCULAR EVENTS IN DOGS

CRISTINA FERNOAGA

The Faculty of Veterinary Medicine, 105th Independentei Street, District 5, 050097, Bucharest – Romania
E-mail: cfernoaga@yahoo.com

Summary

Cerebrovascular diseases are very frequent in humans, representing a third cause that determines death inside industrialized countries.

In Veterinary Medicine, cerebrovascular diseases are described more rarely, although their incidence is not well known at this moment. Until recently, cerebrovascular diseases in animals could be diagnosed only post-mortem, and due to development of imaging techniques, the ability of tracing these diseases is now possible for live animals as well.

Cerebrovascular diseases are ischemia, heart attacks, hemorrhages and aneurisms (3). Vascular disruptions to the Central Nervous System (CNS) can be due to a loss in blood supplies (ischemia/heart attacks) or hemorrhages in the nerve tissue. In most cases, the initial process is focal, although it is possible that disrupting a systemic perfusion might cause multifocal processes or diffusion in the brain.

Vascular injuries in the CNS can have different causes, such as infections, aneurisms, neoplasia, atherosclerosis, arterial and venous malformations, embolism, vasospasms, hyper-viscosity syndrome, hypertension, coagulopathy, immune deficiencies, disseminated intravascular coagulation (DIC), septicemia.

Vascular events have to be diagnosed as soon as possible after they occur, which depends on the moment the patient arrives at the doctor’s office.

I have investigated in this study a number of 18 patients, dogs, belonging to different breeds and genders, with ages over 10 years old.

All patients have been investigated after a protocol:
- Anamnesis;
- Clinical exam;
- Neurological exam;
- Cardiologic exam;
- Ophthalmologic exam;
- Additional exams (MRI).

Vascular events occur more frequently in animals over middle age and even more frequent in seniors (over 10 years old).

From all vascular events taken into study, the results from the anamnesis showed sudden occurrence and super-acute evolution.

The neurological signs were characteristic to the affected cerebral area (cerebral hemispheres, vestibular apparatus, cerebellum, brainstems).

The treatment was rapidly established and consisted in anti-inflammatory, Actovegin and osmotic anti-diuretics.

Key words: cerebral, diuretic, Nuclear Magnetic Resonance, vascular events
Cerebrovascular diseases are very frequent in humans, representing the third cause of death for industrialized countries. In veterinary medicine, cerebrovascular diseases are rarely described, but their incidence is unknown for the moment. Until recently, the diagnostic for cerebrovascular diseases in animals could only be made post-mortem. Due to the development of imaging techniques, the ability to prove these diseases is possible for live animals (8).

Vascular disruptions of CNS can be blamed on a loss in terms of blood supply (ischemia/infarction) or hemorrhage in nerve tissues. In most cases, the initial process is focal, however, it is possible that a disruption of the systemic perfusion can determine multifocal or diffuse processes in the brain (8).

Cerebrovascular events can be: ischemia, infarction and hemorrhage.

Ischemia means reduction of blood flow to a level that is not compatible with normal operation. An important amount of blood flow reduction leads to necrosis of the tissues, called infarction/heart attack (3).

Spontaneous intracranial hemorrhages are caused by bleeding in the brain or its near vicinity, without being accompanied by trauma. Bleeding in the brain may be epidural, subarachnoid, intraparenchymal or intraventricular. Epidural and subdural hemorrhages are always accompanied by cranial trauma (3).

Although not well documented, hypertension seems to play a primary role in developing intraparenchymal bleeding in dogs and cats. Typically, the ischemic hemorrhages have a good evolution, recovery taking place in short duration. The bleeding depends on the location and how big the area flooded is, the infarction having a different evolution (size wise and location) (8).

The etiology of ischemic cerebrovascular accidents is represented by: embolus/thrombus, hyperactive syndrome, hypertension, atherosclerosis.

Regarding hemorrhagic strokes, they can be determined by: neoplasia, parasites, coagulopathy and vascular malformations (9).

Vascular change can occur in any breed of dogs, most commonly at the age of over 10 years (seniors), but can also occur in adult animals (over 7 years olds) and extremely rare in young animals.

A predisposition to gender has not been proven. There is no direct link between the castrated and not castrated ones and the appearance of cerebrovascular change.

Vascular lesions can be localized in any component of the brain: the cerebral hemispheres, cerebellum, brainstem and vestibular apparatus (1).

For this reason, a complete neurological examination should be performed to discover all neurological signs, in order to determine the exact affected area of the brain (neuroanatomical diagnosis) (3).

Materials and methods

We have taken into study a number of 18 patients, dogs of different breeds (Table 1) that came in the Medical Clinic of the Faculty of Veterinary Medicine of
Bucharest, during October 2014 – December 2015, due to a neurological event that occurred unexpectedly, evolution being different from one case to another.

Table 1
The casuistry from the Faculty of Veterinary Medicine in Bucharest 2014-2015

<table>
<thead>
<tr>
<th>No.</th>
<th>Breed</th>
<th>Gender</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>German Shepherd</td>
<td>3 females / 2 males</td>
<td>Over 10 years</td>
</tr>
<tr>
<td>2</td>
<td>Pitt-Bull</td>
<td>1 male</td>
<td>10 years</td>
</tr>
<tr>
<td>3</td>
<td>Cocker</td>
<td>1 female</td>
<td>14 years</td>
</tr>
<tr>
<td>4</td>
<td>Common breed</td>
<td>1 female</td>
<td>12 years</td>
</tr>
<tr>
<td>5</td>
<td>Boxer</td>
<td>1 male</td>
<td>10 years</td>
</tr>
<tr>
<td>6</td>
<td>Caniche</td>
<td>2 females / 1 male</td>
<td>Over 10 years</td>
</tr>
<tr>
<td>7</td>
<td>Schauzer</td>
<td>1 male</td>
<td>14 years</td>
</tr>
<tr>
<td>8</td>
<td>Teckel Metis</td>
<td>1 male</td>
<td>12 years</td>
</tr>
<tr>
<td>9</td>
<td>Small breed Metis</td>
<td>1 female / 2 males</td>
<td>Over 10 years</td>
</tr>
<tr>
<td>10</td>
<td>Rottweiller</td>
<td>1 male</td>
<td>11 years</td>
</tr>
</tbody>
</table>

The majority of the dogs taken into study had ages close to 10 years old (16 dogs, 88.88%), only two being 14 years old (11.12%).

All patients were presented in the Medical Clinic of the Faculty of Veterinary Medicine of Bucharest, due to sudden occurrence of different neurological signals. Some changes were more severe than others.

All cases were investigated following the same protocol:
- anamnesis;
- clinical examination;
- neurological examination;
- blood tests;
- urine test;
- cardiology examination;
- ophthalmological examination;
- abdominal ultrasound;
- thorax x-ray;
- cerebral MRI.

Cases that reached consultation in severe condition, uncompensated, were, initially, rebalanced (therapy using oxygen, electrolytic rebalancing), subsequently being investigated thoroughly.

Most bleeding events have received blood transfusions according to their blood type (2 dogs, 11.12%).
Some patients were investigated with more advanced methods: MRI (8 of them being positive, 2 had an unfavorable evolution, 8 have not have financial means).

Results and discussions

All 18 patients studied were submitted Medical Clinic of the Faculty of Veterinary Medicine of Bucharest, due to sudden neurologic events. Development and prognosis for vascular events is important when presenting to the doctor, from the moment the event was triggered.

Two of the dogs (11.12%) reached consultation in severe condition, uncompensated, were, initially, rebalanced (therapy using oxygen, electrolytic rebalancing), subsequently being investigated.

All cases were investigated following the same protocol: detailed anamnesis, complete clinical examination, neurological exam, blood tests (hematological, biochemical) and urine tests. Only two of the dogs (11.12%) had marking anemia and received integral blood transfusions according to the blood type. In the biochemical tests, there have not been detected any patients with diabetes, but 9 of them (50%) had their cholesterol level above the permissible limit.

All patients received a full cardiological examination, and 6 (33.33%) of them had hypertension at the time of examination. The ophthalmological examination was mandatory in all cases. The ophthalmological examination is important to complete de patient's examination. An examination of the back of the eye is seek, with possible changes that take place at this level. (Thomson C., 2012).

In some cases, we used the ultrasound examination (10 cases, 55.55%) and radiological examination (6 cases, 33.33%). Only 1 of the cases investigated by ultrasound showed significant changes, detecting a tumorized spleen. Following the completion of the radiological examination, lung metastases were found in a patient from breast tumors surgically removed 2 years ago.

The neurological examination was completed for all cases taken into study, according to the stages of the clinical neurology sheet:

- status;
- temperament;
- posture while walking and stationary;
- walk;
- proprioception;
- spinal reflexes;
- cranial nerves;
- panniculus;
- perianal reflex.

The results of each patient were recorded in the neurological sheet and lead us to the neuroanatomical diagnosis (table 2).

Neuroanatomical localization was different at the brain level (cerebral
hemispheres, cerebellum, brainstem and vestibular system).

<table>
<thead>
<tr>
<th>Neuroanatomical localization</th>
<th>Patients</th>
<th>Clinical signals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cerebellum</td>
<td>1</td>
<td>Hypermetria, head tremor, successive falling</td>
</tr>
<tr>
<td>Central Vestibular</td>
<td>4</td>
<td>Vertical nystagmus, front limb propioception changes, changes in cranial nerves, head leaning on the affected side</td>
</tr>
<tr>
<td>Peripheral Vestibular</td>
<td>8</td>
<td>Horizontal nystagmus, head leaning on the affected side, instability in walking, circling on the affected side</td>
</tr>
<tr>
<td>Cerebral hemispheres</td>
<td>4</td>
<td>Pressing the head against objects, dromomania</td>
</tr>
<tr>
<td>Brainstem</td>
<td>1</td>
<td>Drastically changed status, permanent lateral decubitus</td>
</tr>
</tbody>
</table>

The most frequent causes that lead to neurological disruptions are classified under the acronym “VITAMIN D”, having the following meaning:

- Vascular (e.g. infarctions, hemorrhage, ischemia);
- Inflammatory, Infectious;
- Traumatic, Toxic;
- Anomalies (congenital);
- Metabolic;
- Idiopathic;
- Neoplasia, Nutritional;
- Degenerative (6).

In this stage, we used the “VITAMIN D” acronym and in all cases the vascular side was predominant. Unfortunately, we cannot clinically or neurologically differentiate an ischemic vascular accident from the hemorrhagic accident (Table 3). We recommended special imagistic investigations in order to confirm the suspected diagnosis. The most useful imagistic methods are the MRI and the CT.
As in specialized literature, we found out that in dogs suspected of ischemic stroke, the evolution was good, recovery being short (48-72 hours). For the hemorrhagic cases, evolution and prognosis depend on localization and size, the infarction having a very different evolution (size and localization).

Table 3

<table>
<thead>
<tr>
<th>Diagnostic suspicion</th>
<th>Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infarctions</td>
<td></td>
</tr>
<tr>
<td>Central Vestibular</td>
<td>1</td>
</tr>
<tr>
<td>Cerebellum</td>
<td>1</td>
</tr>
<tr>
<td>Hemorrhages</td>
<td></td>
</tr>
<tr>
<td>Cerebral Hemispheres</td>
<td>1</td>
</tr>
<tr>
<td>Brainstem</td>
<td>1</td>
</tr>
<tr>
<td>Ischemic</td>
<td>14</td>
</tr>
</tbody>
</table>

Only 8 (44.44%) of the patients could have an MRI taken due to the necessity of general anesthesia and financial costs. This way, we confirmed the 2 infarctions and 6 ischemic cerebrovascular accidents.

It is mandatory to quickly establish a treatment as accurate and effective as possible. First, the patient must be stabilized, in terms of oxygenating the tissues and hydroelectrolytic.

The principles of the treatment are:
1. Monitoring and correction of basic physiological variables (e.g. oxygen level, fluid balance, BP, body temperature);

2. Inhibition of the biochemical and metabolic cascades subsequent to ischemia to prevent neuronal death (the concept of neuroprotection);

3. Restoration or improvement of CBF by thrombolysis in the presence of a thrombus.

Something must be done within 6 hours after the stroke and before irreversible neurological damage occurs (7).

We always controlled the blood pressure, and if the cardiological examination showed hypertension, we administrated the treatment prescribed by the cardiologist.

In such cases, hypertension can often be controlled with an ACE inhibitor such as Enalapril (0.25-0.5 mg/kg q12h) or benazepril (0.25-0.5 mg/kg q12h) and/or calcium channel blockers such as amlodipine (0.1-0.25 mg/kg q24h), which tend to be more effective.

Neuroprotection is assured by administering glucocorticoids, although their use is controversial in case of a stroke. On another hand, their use can cause gastro-intestinal disorders.

We used cerebral trophic, such as:

- Actovegin 1 vial/day IV, 3-5 days in saline or 5% glucose (deproteinised hemoderivate from calf blood 200mg/5ml);

- Cerebrolysin 1 vial/day IV, 10 days in saline or Ringer solution (peptidic hydrolyzate from pig brain 215.2 mg/ml).

Thrombolytic therapy with heparin was not used in this study, because it is administered in the first 3-4 hours from the occurrence of the ischemic stroke. For this, the MRI or the CT have to confirm the existence of such event. In order to avoid similar events in further evolution of the patients with ischemic vascular events, confirmed by the MRI, we recommended the usage of cardioaspirin 0.5mg/kg/24h.

For the cerebrovascular accident treatment, we also used administration of Manitol, an osmotic diuretic, to reduce cerebral edema or cerebral hypertension, the dosage being 0.25-2.0g/kg IV over 10-20 minutes up to 4-8 hours.

Manitol is not indicated towards patients with cerebrovascular strokes because it can worsen the hemorrhage, and towards hypovolemic patients (2, 7).

When necessary, we use antibiotics that cross the blood-brain barrier. In this study, for animals with hyperthermia we administered cephalosporin (Cefort) 25mg/kg, two times a day, between 7 and 10 days. Physical therapy was useful in cases with neurological sequel (paresis, paralysis, hemiparesis, hemiplegia).

The treatment has to be a long-term to prevent any recurrence. In these cases, recovery from relapses is difficult, but depends on the type of vascular event, and also its location (5).
Conclusions

The moment presenting at the doctor is very important, because vascular accidents represent an emergency, each hour being important for the future evolution of the patient.

The evolution depends, also, on quickly establishing a correct and effective treatment. Stabilization (therapy with oxygen and fluid) as soon as possible of the patient with a stroke is mandatory.

Performing the neurological examination is important in order to localize the neuroanatomical brain damage.

The MRI is the imagistic investigation that is most useful in case of vascular events, but was performed solely in patients who could have the general anesthesia administered (type, lesion size).

Triggering elements and relapses must be avoided. For this reason, the treatment is lengthy and more complex.

References

IDIOPATHIC EPILEPSY IN DOGS

CRISTINA FERNOAGA

The Faculty of Veterinary Medicine, 105th Independentei Street, District 5, 050097, Bucharest, Romania
E-mail: cfernoaga@yahoo.com

Summary

Epilepsy is a functional neurological disorder, characterized by generalized or localized tonic-clonic seizures, with sudden and recurrent character. Also, it can be primary and secondary.

Primary epilepsy (or idiopathic epilepsy) has unknown causes, and secondary epilepsy can be determined from intracranial and extracranial causes (toxic or metabolic). Idiopathic epilepsy can be diagnosed apart from the secondary epilepsy only by exclusion.

For suspicions of this condition, we will take into consideration:
- Breed (genetic determinism in Labradors, Golden Retriever, Beagle etc.)
- The age when the first seizure occurred (usually, between the age of 6 months and 5 years old)
- Higher frequency in males (2:1 ratio)
- Characterized by generalized seizures
- Frequency between seizures may vary

The study has been done on a number of twenty-two, which were present at the FMVB Medical Clinic, for an eighteen months period. The dogs belonged to multiple breeds, both males and females, with ages varying between one and five years old.

For the final diagnostic, we turned to specific investigations, such as: electroencephalograms (EEG) and nuclear magnetic resonance (cerebral MRI).

The prescription has been administrated after the patient has had its second epileptic seizure, and it has been adjusted according to its evolution, from case to case.

Key words: idiopathic epilepsy, seizures, electroencephalogram, nuclear magnetic resonance.

Epilepsy is a functional neurological disorder, characterized by generalized or localized tonic-clonic seizures, with sudden and recurrent character. Also, it can be primary and secondary (5).

Primary epilepsy (or idiopathic epilepsy) has unknown causes, and secondary epilepsy can be determined from intracranial and extracranial causes (toxic or metabolic). Idiopathic epilepsy can be diagnosed apart from the secondary epilepsy only by exclusion. All possible causes should be removed for the secondary epilepsy (3).

It is defined by the striking of generalized tonic-clonic seizures or partial seizures, which can be generalized. Normally, the duration does not exceed 30-90 seconds, the patient recovering quickly, its behavior being normal once the seizure
has passed. Seizures can occur at different times, however, for the patients in our study, the gap between seizures was from 28 days up to 3 months (1).

Epileptic seizures have four stages:
- Prodromal (or incipient);
- Pre-ictus (or aura);
- Ictus (or the stroke itself);
- Post-ictus (recovering from the stroke) (3).

Because the owner is impressed in the moments when the dog is having a seizure, he/she will not be able to differentiate each stage and describe each of the four. Sometimes, the prodromal stage is absent. It is wise to observe at least one seizure per patient (directly or through a video recording) (3, 4).

Idiopathic epilepsy has a higher frequency in male dogs as opposed to female dogs, with a 2:1 ratio, and more frequent in uncastrated males. It has genetic determinism in some breeds, such as Labrador, Golden Retriever, Beagle (recessive factor) (6).

In order to having more correct information regarding the seizure, we should ask the owner to record the seizure. Chances are very slim for the patient to have a seizure during a doctor’s appointment. Regarding idiopathic epilepsy, the neurological exam between seizures must be normal (2).

Materials and methods

The study was made on a number of 22 dogs, present at the FMVB Medical Clinic, for a period of eighteen months (September 1st 2014 – February 1st 2016). All patients have presented generalized and tonic-clonic seizures at home, with different intensities. A number of patients have suffered from partial seizures which have gotten generalized immediately or with time. Frequency between seizures varied greatly for the patients in study, as some of them have had multiple seizures during the same day, whereas others have had one seizure every few days or, even months.

A number of the dogs have been brought to our clinic immediately after the seizure, others after a couple of seizures, some of them being already on prescribed Phenobarbital.

The patients belonged to different breeds, both male and female, neutered or not. The age in which the first seizure had occurred was vastly different (between the ages of one and five years old).

All animals that have been taken into study have followed the same investigation and examination plan, which is:
- Obtaining an anamnesis, as accurate as possible, regarding the moment of the first seizure strike, how it evolved, when it happened, what is the frequency, what other clinical signs occur during the seizure, how and how much it lasts before recovery, other disorders from the past, other ongoing prescriptions or regimens etc
- Complete clinical examination
Complete neurological examination (if executed during the seizure, it has been followed by another one after the seizure has ended) and making a neurological sheet
- Blood test (biochemistry, haematological)
- Urine sample analysis (summary and sediment)
- Cardiologic examination
- Ophthalmologic examination
- Ultrasound or radiographic examination, by case
- Analysis for secondary epilepsy exclusion (electrolytes, toxic, ammonia and bile acids, toxoplasmosis test etc)

All tests should turn out negative for idiopathic epilepsy, but must be applied because the diagnostic between primary and secondary epilepsy is established by exclusion.

For this study, we turned to more advanced investigation: electroencephalograms (EEG) and magnetic nuclear resonance (cerebral MRI with and without contrast substance).

For all patients we have established treatment with Phenobarbital in order to avoid future seizures.

The treatment was completed and adjusted depending on the evolution of each patient.

Results and discussions

For this study, we took a number of twenty-two dogs which have shown epileptic seizures. Among these, 17/22 (77.27%) are males and 5/22 (22.73%) are females. They belong to multiple breeds, some of them with genetic determinism (recessive factor) and some without.

In the first category, we can mention: 6 Labradors, 5 Golden Retrievers and 3 Bassets, meaning 14/22 (63.63%).

In the second category, without genetic determinism of breed, can be mentioned: 3 Bichons, 1 Amstaff, 1 Pitbull, 1 Terra-Nová and 2 half breeds, meaning 8/22 (36.36%).

The patients have shown limited seizures (a repeated stroke between different time gaps), cluster seizures (more than 3 seizures in a row) or status epilepticus (multiples seizures, without recovering in-between strokes). From the total of the dogs taken into study, 19/22 (86.36%) have shown seizures between medium time gaps (28 days up to 3 months, the rest of 3/22 (13.64%) have shown either cluster seizures or status epilepticus. We should mention that these have been uncastrated males, not showing similar events after neutering.

All patients have been examined following the same protocol (described in the Materials and Methods section). The anamnesis has emphasized the presence of generalized tonic-clonic seizures for all dogs taken in study, only two of them also showing partial seizures, which got generalized immediately after initiation. All
seizures lasted between 30 and 90 seconds, recovery being fast, without neurological manifestations.

From the anamnesis we were able to find out that the animals have been suffering from seizures during the night time, occurring mid sleep, developing in lateral decubitus, the patients being unconscious. Of course, we do not exclude the presence of seizures during the day, although the owners have not witnessed such events. The tonic-clonic contractions and pedaling have been seen in all dogs taken in study, showing autonomous signs, such as: salivation 22/22 (100%), urinating 18/22 (81.81%) and defecating 2/22 (9.09%).

Recovering from the seizure has been extremely fast, as animals recognize their home and owner, so they drink, eat and play as if nothing has ever happened. The seizures have been recorded at home by the owners and any event has been presented to us under this form.

The clinical and neurological examinations have been made with thorough attention for each patient. The clinical examination was normal, the strokes being unleashed at the cortex level, but we have not detected any unusual signs from this part of the brain during the neurological examination, being normal for all examined dogs. The results have been checked into the neurological sheet in order to have comparison, in case of need (other neurological examination or another crisis).

The neurological examination has been effectuated during the time gaps in-between seizures. For those with cluster seizures or status epilepticus, the examination took place during and after the seizure. Other conducted investigations have turned normal, meaning this way we have excluded secondary epilepsy. We continued the investigations by conducting the EEG’s and the magnetic nuclear resonance (cerebral MRI with and without contrast substance). All results from the EEG’s have confirmed idiopathic epilepsy (primary), and those from the MRI have excluded secondary intracranial epilepsy.

Therefore, the general diagnostic for all dogs taken in study was idiopathic epilepsy (primary).

The treatment was instituted immediately after the manifestation of the second seizure, present in 20/22 (90.91%) of the patients. For the 2/22 (9.09%) of the dogs that had the treatment initiated when coming to our Medical Clinic, we adjusted the Phenobarbital dosage, because the initial one was too high. In both cases, we used 4-5mg/kg/day of Phenobarbital, administrated in two divided doses.

The three patients with cluster epilepsy or status epilepticus have been treated with 0.5-1mg of Diazepam in continuous perfusion (CRI) and 3-6mg/kg of Phenobarbital, intravenous. Because they kept showing seizures, we have instituted the emergency treatment with 6mg/kg/hr of Propofol, CRI.

These dogs have been neutered immediately after the clinical and neurological statuses allowed to. We utilized inhalational anesthesia and after neutering, some showed partial seizures (limited), but between big time gaps and greatly reduced intensity (1-3 months).
We followed the same protocol in both uncastrated males and females. They have been neutered with inhalational anesthesia during seizures. These patients have also shown following seizures, but as well as those already mentioned above, the seizures have significantly decreased in intensity and frequency (1-3 months). Some of them, 4/22 (18.18%) have only shown partial seizures, without showing any modified mental status. The others, 18/22 (81.82%) continued having generalized seizures and from these, 5 needed treatment completion with 10mg/kg of Levetiracetam, twice a day. This treatment with Phenobarbital and Levetiracetam reduced the frequency between seizures even more, but also their intensity (3-6-12 months gap).

The treatment is continued on a long period of time and the blood levels of the Phenobarbital are kept for check-up every 4-6 weeks. The dosage will be adjusted according to the results. In case of generalized seizures occurrence, 0.25 mg/kg of Diazepam will be administrated rectally, in a single dose.

We have completed the treatments for the animals in study with: Omega 3, Antioxidants and food for brain issues (B/D).

**Conclusions**

The diagnostic for idiopathic (primary) epilepsy is made by secondary epilepsy exclusion.

Idiopathic epilepsy is characterized by the presence of generalized tonic-clonic seizures, of 30-90 seconds duration.

Neurological examination for the patients with this neurological dysfunction is normal.

Uncastrated males are affected in a higher percentage than the neutered males and females (spayed or not).

The patients that have experienced cluster epilepsy or status epilepticus have been neutered. Onward, these have only shown unique strokes, lighter in intensity and with greater gap in-between manifestations.

The dogs taken into study have shown good response to the treatment including Phenobarbital (4-5 mg/kg/day). The owners have to understand that the treatment will not permanently remove or stop the appearance of seizures, but reduces their intensity and frequency.

The animals that continued showing generalized or partial seizures, that generalized afterwards, even on Phenobarbital, have benefited from the additional Levetiracetam treatment (10mg/kg, twice a day), and the result was expected.
References

MORPHOLOGICAL ASPECTS AND NUCLEAR MATURATION IN BOVINE OOCYTES CULTURED IN MEDIUM WITH/WITHOUT SHEEP FSH

G. GODJA, C. MIRCU, V. ARDELEAN, G. OTAVA, GH. BONCA, SIMONA MARC ZARCULA

Department of Reproduction, Obstetrics and Veterinary Gynecology, Banat's University of Agricultural Sciences and Veterinary Medicine "King Michael I of Romania" from Timisoara, Faculty of Veterinary Medicine, 300645, Aradului Street No. 119, Timisoara, Romania
E-mail: gabigodja@yahoo.com

Summary

In vitro maturation of oocyte is one of the critical steps for in vitro production of bovine embryos. Our study was designed to compare morphological aspects of bovine COCs and nuclear maturation status based on Hoechst staining between two oocytes culture groups, with or without FSH. COC's quality had a positive effect on cumulus expansion rate based on morphological aspects observed after maturation as follows: 83.01% from COCs I class (CI) had cumulus expansion (p<0.56), in class II (CII), 67.85% (p<0.31) and in class III (CIII), 22.85% (p<0.04) similar results were observed in oocyte cultured without FSH: in class CI, 78.43% (p<0.24), in class CII, 52.45% (p<0.15) and in class CIII, 16.52% (p<0.12). FSH supplementation did not influenced bovine COC maturation as it was revealed only through evaluation of morphological aspects and nuclear maturation marker identified subsequent to Hoechst staining.

Key words: bovine oocyte maturation, FSH, Hoechst

In bovine assisted reproduction technology (ART), IVF technique is done with good results. Statistical data of International Embryo Transfer Society (IETS) confirm the progress; in 2012, globally there were 443.533 IVF embryos available for transfer to other cattle, increasing data compare with year 2007, for example, when 245.000 embryos were produced in vitro (10,13).

Although in vitro production of bovine embryos is high compared with other species, successful development to blastocyst stage is only 30-40%. Many factors are responsible for the success of this technique, such as: oocytes quality retrieved from follicles, follicular environment ensured to oocytes, oocytes culture systems, number of oocytes in medium, embryos culture systems etc (1,9).

Serum (FCS, ECS) and hormones (FSH, LH, 17β estradiol) are added to maturation media to improve bovine fertilization and cleavage rate in different concentration, for example 1 µg/ml (12) or 20 µg/ml (5), although bovine pre-ovulatory surge FSH concentrations was reported in average 125 ng/ml; the same works for LH, which can be added such as 5µg/ml, although in vivo LH surge average is 200 ng/ml (2).
The aim of this paper it is to observe the influence of the composition of maturated media on oocyte maturation and to highlight the nuclear maturation of bovine oocytes using Hoechst staining, identifying the specific elements that emphasizes this process.

Materials and methods

Bovine ovaries (n=50) were collected from slaughterhouse and transported within two hours to the laboratory in containers consisting of 0.9% NaCl solution, at 35°C. The handling medium for COC was Dulbecco-PBS (100 ml) [7] supplemented with 100 µl Pen/Strep; 3.6 mg sodium piruvate, 30 mg BSA, 100 mg glucose. COC’s were aspirated by puncturing the follicles with 3-8 mm diameter with a 18G needle attached to a 5 ml syringe.

The classification of COC’s based on morphological aspects was made with stereomicroscope1 (Stemi 2000-C, ZEISS) with hot plate (33.4°C) after the criteria of Hawk and Wall, 1994 (8).

The oocyte maturation media prepared in our laboratory consists of tissue culture medium 199 (TCM 199 HEPES modification medium, M2520, Sigma-Aldrich) with 10% ECS and with or without sheep FSH (F8174, Sigma-Aldrich)(9). We have maturated 8-10 COC’s tanks in 50µl TCM-199, with 0.5 µl FSH (0.88 µg/µl) or without FSH, in 35 mm Petri dishes (Greiner Bio-One, Germany) covered with mineral oil at 38.5°C in 5% CO2 humidified atmosphere air for 24h. After 24h of cultivation, all oocytes were examined for maturation and signs like expansion and presence of mucus in cumulus cells were observed. In order to see if there is a correlation between signs of maturation observed at stereomicroscope like expansion of mucus in cumulus cells and extrusion of the first polar body - characteristic for nuclear maturation we stained 18 oocytes from class I and II (FSH+) and 24 COC from class I and II (FSH-) with Hoechst 33342. Before staining the oocytes were denuded using a fine capillary glass. Oocytes denudated were incubated 15 minutes in 400 µl PBS with 5 µl Hoechst and examinated with inverted fluorescence microscope Leica DMI4000 B in the laboratory of cytogenetics and molecular genetics from Complex of Research Laboratories “Horia Cernescu”.

Results and discussions

Out of a total of 50 cow ovaries were collected 406 COC, in average 8.12 COC/ovary. Based on morphological aspects 189 COC were maturated in vitro during the experiment. FSH supplementation influenced the rate of maturation as follows 8.80±1.88 vs 8.00±1.05 for C I class, 7.60±2.48 vs 6.40±0.93 for C II class

---

1 The research was carried in the IVF (In Vitro Fertilization) laboratory from the Horia Cernescu Research Unit equipped through POSCCE 2669 program
and 3.20±1.80 vs 3.80±1.32 for C III class, without semnificative differences (table1).

Table 1

| COC classification (X ±SX) before/after maturation in culture medium with/without FSH |
|-------------------------------------|-----------------|-----------------|
| C I                                 | Before maturation | 10.60±2.32      | 10.20±1.39      |
|                                     | After maturation  | 8.80±1.88       | 8.00±1.05       |
| C II                                | Before maturation | 11.20±2.24      | 12.20±3.61      |
|                                     | After maturation  | 7.60±2.48       | 6.40±0.93       |
| C III                               | Before maturation | 14.00±4.56      | 23.00±11.22     |
|                                     | After maturation  | 3.20±1.80       | 3.80±1.32       |

COC’s quality had a positive effect on cumulus expansion rate based on morphological aspects observed after maturation. As it can be observed, in class C III there were significantly less COC maturated (p<0.05) than in class I and class II (table 1).

Fig. 1. Oocytes stained with Hoechst. Oocyte in normal light (A)63X, oocyte in fluorescence light (B) 63X, (C) 40X, oocyte partial denuded (D) 63X, polar body (→)
DNA binding fluorochrome Hoechst 33342 is a nuclear dye that can be used in ART technology without affecting the viability of the cells if exposure to UV irradiation is short. It is used during enucleation step of oocytes in nuclear transfer technology (3) and also to emphasize the effects of different substances used in IVF technique on nuclear development of the oocytes (4).

Oocytes DNAs staining with Hoechst is a satisfactory alternative to assess nuclear maturation and abnormal changes (6).

We have noticed a low percentage of oocytes in stage MII (figure 1), based on gamete maturation marker, with no difference between groups with/without FSH. In FSH+ groups, I\textsuperscript{st} class and II\textsuperscript{nd} class from 9 oocytes, respectively 7 that morphologically had signs of maturation, after staining none presented polar body; and in FSH- groups we observed 2, respectively 1 oocyte with polar body from 6 oocytes I\textsuperscript{st} class, respectively 4 II\textsuperscript{nd} class that morphologically had signs of maturation. Extrusion of the first polar body is not a sufficient criteria to evaluate nuclear maturation of oocytes. It must be ensured that after a certain period of time in the maturation medium, in oocyte will be formed metaphasic plaque (MII) (6).

Staining the oocytes with Hoechst proved that morphologically signs of maturation are not sufficient for evaluation of oocytes’s capacity to undergo development.

Conclusions

Adding FSH in the maturation medium did not influenced nuclear maturation of bovine COC’s, but has to play a role in preparing the next stages of IVF by increasing the capacity of fertilization and development of bovine oocytes.

Hoechst 33342, nuclear dye, can be used for assessing the nuclear maturation of bovine oocytes.

References

CONTRIBUTION OF TRAUMATIC FACTORS TO ETIOLOGY OF INFLAMMATION AND HYPERTROPHY WITH THE NICTITANT GLAND’S PROLAPSE

C. IGNA, B. SICOE, CEZARINA REBEDEA

Banat's University of Agricultural Sciences and Veterinary Medicine "King Michael I of Romania" from Timisoara, Faculty of Veterinary Medicine, 300645, Aradului Street No. 119, Timisoara, Romania
E-mail: corneligna@usab-tm.ro

Summary

In this study, we aimed to investigate the contribution of traumatic factors to etiology of inflammation and hypertrophy with the gland’s prolapse, also monitoring how it affects tear production.

The biological materials used consisted of five neutered mongrel dogs, clinical healthy, with a medium weight of 20 kgs, and age between four and six years, without any history of nictitans gland affections. The study consisted of 10 experiments in which we acted with different traumatic factors upon the nictitans gland, in order to induce inflammation. We kept a minimum 10 days rest period between each experiment, in order to allow subjected glands to recover its normal functions.

We observed the tear production, by using the Schirmer test, and the morphological changes of the subjected glands and third eyelids (aspect, volume, shape, consistence, colour) discernible by clinical examination. Tear secretion of each subjected nictitans was compared with its counterpart.

Key words: prolapsed gland of the third eyelid, dog, Schirmer test

Situated at the base of the third eyelid’s cartilaginous skeleton, the annex gland of the third eyelid is responsible of the production of a sero-mucosis secretion, similar to that of the lacrimal gland. (19) The annex gland produces nearly 30-50% of the precorneal tear film (2, 3, 9, 14, 16, 20).

Pathology of the annex gland (cartilage exoversion, hypertrophy, hyperplasia and prolapse) is especially involved in triggering keratoconjunctivitis sicca in carnivores (19).

Hypertrophy and hyperplasia of the annex gland appear on an irritating background (13) and can be the cause of prolapse (2, 8, 19).

Even though the pathogenic mechanism behind the nictiitan’s prolapse has not been determined so far, it is thought to be a genetic abnormality, due to the high frequency of appearance in some dog breeds – Beagle, American Cocker Spaniel, Boston Terrier, Poodle, and brachycephalic breeds (4, 6, 12), with a high incidence in dogs under one year of age (7). It is thought to be an unusual laxity of the connective tissues, between the lacrimal gland and preorbital tissues (16, 17, 18). The ligament supporting the gland fails in supporting it, allowing it to prolapse.
(2, 15, 19) Stades et al. (20) believe this pathology might occur secondary to an inversion of the gland at the base of „T“-shaped cartilage.

In the speciality literature are mentioned the causal links between hypertrophy, hyperplasia and annex gland’s prolapse (2, 8, 15, 19, 20) without any details regarding involved traumatic factors.

In this study we aimed to investigate the contribution of traumatic factors to etiology of inflammation and hypertrophy, followed by prolapse, of the nictitans gland, also monitoring, how tear production is affected.

**Materials and methods**

The study was conducted in the Surgery Clinic of the Faculty of Veterinary Medicine, from Timișoara.

The biological material consisted of 5 dogs (mongrels, neutered, clinical healthy, with an average weight of 20 kgs and an age between four and six years old), without any history of annex gland pathology.

The study consisted of 10 experiments conducted on five dogs, in which we attempted to experimentally induce hypertrophy and / or prolapse of the annex gland of the third eyelid, by subjecting the gland and / or the third eyelid to mechanical trauma or by direct application (injecting) certain chemical agents (Table 1).

Between each experiment we maintained a minimum 10 days rest, in order to allow functional recovery of subjected glands.

The experiments were performed in dogs under injectable general anesthesia, using association of Xylazine 2% (1mg / kg c. i.v.) and Ketamine 10% (5 mg / kg c. i.v.), with patients being placed in ventral recumbency.

Postoperatively, we observed, through clinical examination, local changes of the subjected gland and third eyelid (aspect, volume, shape, consistency), and comparing it to it’s correspondent – reference - gland and eyelid.

Quantitative determination of tear production was performed daily, for seven days, by using Schirmer Tear Test 1.

<table>
<thead>
<tr>
<th>Experiment number</th>
<th>Type of traumatic factor</th>
<th>Conducted procedure</th>
<th>Number of animals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mechanical</td>
<td>Folding the base of the cartilage with a haemostat forceps.</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Sectioning of the base of the cartilage.</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Insertion of a scarified nylon wire in the conjunctival sac. In case of wire removal, due to epiphora or pruritus, the procedure is repeated. The wire was kept for seven days.</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 1

**Used traumatic factors within the experiments**

41
Curettage of the bulbar aspect of the third eyelid’s annex gland. The procedure was repeated three times in the seven days period of monitoring.

Chemical
Injecting the annex gland with 1 ml NaCl 0.9%. The procedure was repeated three times in the seven days period of monitoring.

Injecting the annex gland with 1 ml 5% Glucose solution - single administration.

Injecting the annex gland with 0.1 ml alcohol 70° - single administration.

Injecting the annex gland with 0.1 ml concentrated betadine - single administration.

Injecting the annex gland with 0.1 ml iod tincture - single administration.

Injecting the annex gland with 1 ml of liquid paraffin - single administration.

Results and discussions

The macroscopic change, consistently observed in all 10 groups, was congestion of the conjunctival and bulbar mucosa.

Evident changes occurred after insertion of a scarified nylon wire in the conjunctival sac (experiment no. 3) and after injecting the annex gland with 0.1 ml iodine tincture (experiment no. 9), meaning hyperemia of the third eyelid’s conjunctival mucosa, conjunctival edema, and epiphora, respectively. Changes have completely resolved after four days from the ending of experiment no. 3, and in four to six days in experiment no. 9.

With the other experiments, the only observed change was the congestion of the conjunctival and bulbar mucosa, which completely regressed during the seven day monitoring period.

In none of the 10 experiments conducted, there was no prolapse of the third eyelid’s annex gland observed.

Data recorded on tear production, using the Schirmer Tear Test, is presented in Table 2 and figure 1. The results presented are the arithmetic average of the seven daily determinations, conducted on the experiment eye, as well as the reference eye.

Significant increase of tear production compared to the reference eye was obtained after applying the following mechanical traumatic factors: sectioning the base of the cartilage (5.43 mm), insertion of a scarified nylon wire in the conjunctival sac (7.47 mm) and curettage of the bulbar aspect of the bulbar aspect of the third eyelid’s annex gland (5.17 mm), respectively reproduction of chemical irritation by injecting the gland with 5% glucose solution (4.2 mm), betadine (6.88 mm) and iod tincture (8.54 mm).
Table 2

Average of Schirmer Tear Test 1 for the experiment eye, and the reference eye, respectively

<table>
<thead>
<tr>
<th>Experiment</th>
<th>Eye</th>
<th>Dog 1</th>
<th>Dog 2</th>
<th>Dog 3</th>
<th>Dog 4</th>
<th>Dog 5</th>
<th>Average (mm.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R</td>
<td>20.28</td>
<td>18.42</td>
<td>22.14</td>
<td>22.71</td>
<td>19.85</td>
<td>20.68</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.72</td>
<td>5.72</td>
<td>3.57</td>
<td>2</td>
<td>4.57</td>
<td>3.71</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.71</td>
<td>7.43</td>
<td>5</td>
<td>3.14</td>
<td>6.86</td>
<td>5.43</td>
</tr>
<tr>
<td>3</td>
<td>E</td>
<td>28.42</td>
<td>25.28</td>
<td>29</td>
<td>29.28</td>
<td>29.14</td>
<td>28.22</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>20.85</td>
<td>20.57</td>
<td>21.28</td>
<td>22.14</td>
<td>19</td>
<td>20.76</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.57</td>
<td>4.71</td>
<td>7.72</td>
<td>7.14</td>
<td>10.14</td>
<td>7.47</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.86</td>
<td>5.42</td>
<td>4.71</td>
<td>5</td>
<td>6.86</td>
<td>5.17</td>
</tr>
<tr>
<td>5</td>
<td>E</td>
<td>23.57</td>
<td>24.57</td>
<td>25</td>
<td>24.85</td>
<td>23.71</td>
<td>24.34</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>20.57</td>
<td>20.42</td>
<td>21.42</td>
<td>22.71</td>
<td>20.28</td>
<td>21.08</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>4.15</td>
<td>3.58</td>
<td>2.14</td>
<td>3.43</td>
<td>3.26</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.86</td>
<td>5.43</td>
<td>3.14</td>
<td>2.86</td>
<td>5.29</td>
<td>4.12</td>
</tr>
<tr>
<td>7</td>
<td>E</td>
<td>24</td>
<td>25.28</td>
<td>26.42</td>
<td>26.42</td>
<td>25.85</td>
<td>25.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.28</td>
<td>6.71</td>
<td>3.85</td>
<td>3.85</td>
<td>6.57</td>
<td>4.95</td>
</tr>
<tr>
<td>8</td>
<td>E</td>
<td>28.28</td>
<td>27.14</td>
<td>27.14</td>
<td>27.14</td>
<td>27.42</td>
<td>27.42</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>20</td>
<td>20.14</td>
<td>22.28</td>
<td>21.71</td>
<td>18.57</td>
<td>20.54</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8.28</td>
<td>7</td>
<td>4.86</td>
<td>5.43</td>
<td>8.85</td>
<td>6.88</td>
</tr>
<tr>
<td>9</td>
<td>E</td>
<td>29.71</td>
<td>29.14</td>
<td>29.85</td>
<td>29</td>
<td>29.42</td>
<td>29.42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8.43</td>
<td>9.43</td>
<td>8.43</td>
<td>7.86</td>
<td>8.57</td>
<td>8.54</td>
</tr>
<tr>
<td>10</td>
<td>E</td>
<td>22.57</td>
<td>24.42</td>
<td>22.85</td>
<td>24.57</td>
<td>24</td>
<td>23.68</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>20</td>
<td>18.85</td>
<td>21.28</td>
<td>22.57</td>
<td>19.57</td>
<td>20.45</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.57</td>
<td>5.57</td>
<td>1.57</td>
<td>2</td>
<td>4.43</td>
<td>3.23</td>
</tr>
</tbody>
</table>

Histologically speaking, increase of third eyelid’s annex gland tear production may appear due to the action of an irritating factor, by an increase in conjunctival vessels’ permeability, with the formation of cellular exudate (10).

Similar increase of tear production, secondary to chemical irritation were reported after topical administration of Cyclosporine (21).
Fig. 1. Graphical interpretation of the Schirmer Tear Test 1 averages for the experiment and reference eye, respectively

Minimal value of Schirmer Tear Test 1, when compared to the reference eye, was obtained in Experiment no. 10. Similar values were reported in healthy dogs after topical administration of tropicamide – 1% (11).

Tear production can also decrease in case of generally administration of Acepromazine (1), remanence of non-excised prolapsed gland, and in case of excised prolapsed gland (5).

Conclusions

Following direct action on the third eyelid’s annex gland, of certain mechanical and chemical traumatic agents, the constant macroscopic change observed was congestion of bulbar and conjunctival mucosa. The prolapse of the third eyelid’s annex gland could not be reproduced. Direct action upon the third eyelid’s annex gland of some mechanical and chemical traumatic agents, did not determine a decrease under the minimum physiological value of tear production.

Acknowledgements

Imaging works was supported by the project Dezvoltarea infrastructurii de cercetare, educație și servicii în domeniile medicinei veterinare și tehnologiilor inovative pentru RO 05, cod SMIS-CSNR 2669.
References

PERIPHERAL NERVE SHEATH TUMOURS OF THE BRACHIAL PLEXUS IN A DOG: A CASE REPORT

C. IGNA, LARISA SCHUSSLER, ROXANA DASCALU, DIANA BREZOVAN

Banat’s University of Agricultural Sciences and Veterinary Medicine “King Michael I of Romania” from Timisoara, Faculty of Veterinary Medicine, 300645, Aradului Street No. 119, Timisoara, Romania
E-mail: corneligna@usab-tm.ro

Summary
Primary tumours of peripheral nerves are rarely reported in animals. This study describes a case of a five-year-old female German Sheppard dog that had a five months history of progressive left thoracic limb lameness. Palpation revealed muscle atrophy of the scapular and humeral area, painfullness in this region, and an axillary mass. We reported pre-operative diagnosing procedures based of X-ray exam and computer tomography imaging (CT) combined with fine-needle aspiration biopsy and rapid smear test Diff Quick, surgical procedures by remove and re-remove of axillary mass, post-operative confirmation by repeated histopathological analysis, and the results of chemoteraphy with cisplatin.

Key words: dog, peripheral nerve sheath tumour, brachial plexus

Primary tumours of peripheral nerves are rarely reported in animals (3, 17, 19, 22, 23). Brachial and lumbar plexus tumours account for 26% of nervous system neoplasms in dogs (7).

Canine peripheral nerve sheath tumors (PNST) based on morfologic and biological behaviors are divided to benign – BPNST (schwannoma or neurofibroma) and malignant – MPNST (epithelioid, melanotic, chondrogenic or osteoid, or glandular epithelial differentiations types) (1, 14, 15, 16, 18, 20).

The brachial plexus comprises somatic nerves that originate from spinal nerve roots between the sixth cervical vertebra and the second thoracic vertebra (5). Brachial and lumbar plexus tumours account for 26% of nervous system neoplasms in dogs (7). Many of them metastasise to distant tissues or infect surrounding tissues (23).

Prognosis is guarded or poor even after limb amputation because tumours that affected brachial plexus have a tendency to recur from the remaining nerve cells (2, 3).

This report describes a canine malignant tumours of peripheral nerves originating from the brachial plexus, the surgical procedures by remove and re-remove of MPNST of brachial plexus in a bitch, pre-operative diagnosing procedures based of X-ray exam and computer tomography imaging (CT) combined with fine-needle aspiration biopsy and rapid smear test Diff Quick and post-operative confirmation by repeated histopathological analysis, and the results of chemoteraphy with cisplatin.
Case description

A five-year-old, female neutered, German Sheppard dog was referred to the Surgery clinic of the Faculty of Veterinary medicine Timisoara for a left fore-limb lameness of five months duration.

Prior to admission pain and discomfort were initially identified in the left shoulder. The dog was treated for arthritis, of the currant's medic, with carprofen (Rycarfa – Krka dd Novo Mesto), oral glucosamine and chondroitin sulphate supplements (Artro-protect HA – Pasteur SA), and an intra-articular injection (once a week for three weeks) of prednisolone (Prednisolon - Veyx-Pharma GmbH). Despite these treatments, the lameness deteriorated and three months later there was frequent knuckling of the right front foot with persistent lameness episodes.

After admission the dog was clinically examined. The following was noted: easy muscle atrophy of the left fore-limb, in walking difficulties, intermittent lameness in rapid walking, painfulness in this region, and an axillary mass (23/18 cm) was palpable. The neurological examinations were in normal.

X-ray exam detected an axillary left mass (fig. 1) and no abnormalities in the thoracic radiography image – fig. 2.

![Fig. 1. The tumour was visualised as a homogeneous hypertensive mass in the region of the humerus](image1)

![Fig. 2. Radiographic image of the thorax](image2)

The biopsy specimen (obtained with fine-needle biopsy) was subjected to a smear and interpretation revealed numerous leukocytes, eosinophils, macrophages and blood clots and numerous round cells. The image was indicative of no tumour, probably an inflammatory mass.

A surgery excision of the axillary mass was performed with removed the formation on the brachial plexus nerves, and the axillary lymph node was left in place.
After surgery a histopathological samples from axillary mass were stained with three different techniques: Haematoxylin–Eosin, Giemsa and PAS. Histological analysis revealed: two tumor fragments with fasciculated pattern consisting of cells with elongated nucleus and small round nucleolus, with weak eosinophilic cytoplasm with imprecise boundaries; numerous mast cells; tumor cells that infiltrate lobules of adipocytes; area looking like a cyst occupied by weak eosinophilic fibrillar material and inflammatory cellular elements; presence of vascular structures with branched aspect and thin wall. Ensemble of histological aspects advocates for tumor of soft parts goes under debate mesenchymal conjunctival tumor proliferation or proliferation of peripheral nerve categorised as BPNST.

At one week after surgery was beginning chemotherapy with cisplatin (Platinol - Bristol-Myers Squibb Company). The dosage of cisplatin was 60 mg/m² and was given with 2-hour in saline solution, one administration/week, for six weeks. A remittent anorexia was observed in a first week after chemotherapy debut.

After an interval of nine months of favorable evolution, the bitch was readmitted in surgery clinic at fifty-teem months after surgery excision of the axillary tumor mass. Clinically examination revealed same symptoms features on the first admission. Radiographically examination revealed an ovoid amorphous mass with a distinguishable margin and hyperdense focal deposition of mineral in the central area (fig. 3). Both examinations showed local recurrence of tumour of the brachial plexus nerve and indicated possibility of MPNST. The treatment of brachial plexus nerve tumours involves limb amputation. In this case, the dog’s owners refused to authorize amputation, and insisted for surgical excision only of the axillary mass.

Fig. 3. The tumour - an ovoid mass with hyperdense focal deposition of mineral in the central area in the axillary region
Due to the availability of advanced imaging and the current understanding on margins security by tumors removal (9) we performed a CT investigation. A mass in the brachial plexus with no spinal cord compression was detected – fig. 4.

Fig. 4. The computed tomography scan, showing the large amorphous mass with mineral deposition in the left axillary region

After surgical removal of the tumor was collected several samples for histological examination as follows: from profound, deep area, from the center of the tumor, from the surface zone and from small and solitary formations.

The soft tissue samples from the profound area of the tumor were fixed ethanol 80%, for 7 days. The rest of the tissue samples were fixed in trichloracetic acid, for 14 days, decalcification being necessary due to their solid consistency.

After fixation, the tissues samples were been dehydrated, cleared, and infiltrated with the paraffin as embedding material. The thickness of the histological samples sections was 5 µm. For microscopic examination the used staining techniques were Haematoxylin – Eosin and trichrome Mallory.

The microscopic examination of the histological slides obtained from profound area of the tumor revealed the presence of numerous spindle (fusiform) neoplastic cells (fig. 5), which are arranged in interlacing fascicles, and/or forming...
clusters, that emphasizing an "onion bulb" like aspect (fig. 6), which accordingly with the scientific data is commonly observed in canine peripheral nerve sheath tumors (4). Between these spindles cells can be observed few mono- or binucleated spherical cells. Also, the thick collagen fibers form a dense connective tissue pattern.

Canine peripheral nerve sheath tumors, which can comprise various types including schwannoma and neurofibroma, present as starting point the glial cells of peripheral nervous system (Schwann cells), perineurial fibroblasts or both types of cells (4, 8, 10).

Fig. 5. Histological section trough the profound area of the tumor: spindle neoplastic cells (→), H&E stain, 200X

Fig. 6. Histological section trough the profound area of the tumor: fascicles (→) and clusters of spindle cells (→), H&E stain, 100X

Microscopical examination of the tumor fragments collected from the central zone pointed out chondrogenic metaplasia, in which the neoplastic spindle cells suffer a differentiation process by transforming into cartilaginous cells. The cartilage from this area, which explains the solid consistency, enclosed small zones of loose connective tissue and lobules of adipocytes (fig. 7).

Histological specimens obtained from the external zone of the tumor, near the surface, showed the similar changes recorded in the central area (fig. 8). In addition, was also observed the osteogenic metaplasia, where the neoplastic cells and the collagen fibers start to designate a compact osseous tissue (fig. 9.)
Fig. 7. Histological section through the central area of the tumor: cartilage (→), loose connective tissue (→) and lobule with adipocytes (→), Mallory stain, 100X

Fig. 8. Histological section through the external zone of the tumor: cartilage (→), H&E stain, 100X

Fig. 9. Histological section through the profound area of the tumor: osseous tissue (→), H&E stain, 100X

The small, solitary formations present as microscopic aspects: cartilage at the periphery covered by a layer formed by fibroblasts and collagen fibers, like a capsule (fig. 10), and in the center, lobules with adipocytes and abnormal blood vessels, with very thick walls, sign of hemangioma (fig. 11).
According with the scientific data, the divergent differentiation of the spindle neoplastic cells from schwannoma or nerofibroma into cartilaginous, osseous, angiomatous or other complex tumoral formations are included in malignant canine peripheral nerve sheath tumors, which are uncommon (4, 20).

The chemotherapy with cisplatin (Platinol - Bristol-Myers Squibb Company) was reloaded. The dosage of cisplatin was 60 mg/m² and was given with 2-hour in saline solution, one administration/week, for six weeks. The patient had a favourable evolution after surgical re-intervention at the time (three months) when this paper was submitted for publication.

Discussions

Malignant schwannomas are a malignant peripheral nerve sheath tumours (MPNST) in which the cell of origin is thought to be a Schwann cell (18). In general, MPNSTs are mesenchymal neoplasms that are included under the general group of soft-tissue sarcomas due to similarities in biologic behaviour (11, 12).

This may be due to the fact that it is difficult to diagnose brachial plexus tumours on the basis of clinical signs alone. Survey radiography, myelograph, electromyography (EMG), computed tomography (CT), and magnetic resonance imaging (MRI), are commonly used to detect brachial plexus tumours (11, 13, 23). The use of immunohistochemistry must be necessary for precise diagnosis (4, 6, 20).

The treatment of choice is wide surgical excision (amputation, and resection of the involved plexus) (11). Surgical excisions only of axillary tumours mass are a high grade of recurrence. Although chemotherapy (cisplatin) are mentioned in literature (21) as adjuvant treatments, in this study their role is questionable.
Potential prognostic factors for malignant schwannomas include size, location, grade, previous treatment, and surgical margins (9). In general, the prognosis for dogs with malignant schwannoma is poor however, because the tumour cells readily spread along the nerves making complete resection difficult resulting in recurrence following incomplete resection (2, 10).

Conclusions

The tumour in this study was re-diagnosed as malignant canine peripheral nerve sheath tumors, based on its histopathological and clinical features. Benign PNST must be differentiated from malignant PNST by another diagnosis procedure. Immunohistochemistry may be a precise diagnosis method. Cisplatin therapy had no beneficial outcome in this patient.

Acknowledgements

This research work was carried out with the support of the project Dezvoltarea infrastructurii de cercetare, educație și servicii în domeniile medicinei veterinare și tehnologiilor inovative pentru RO 05, cod SMIS-CSNR 2669.

References


20. Tavasoly, A., Javanbakht, J., Khaki, F., Hosseini, E., Bahrami, A., Hassan, M.A., Mirabad, M., Ulnar malignant peripheral nerve sheath tumour diagnosis in a mixed-breed dog as a model to study human: histologic,
AN ASSESSMENT OF RAT SPERM MOTILITY, CONCENTRATION AND MORPHOLOGY

VIOLETA IGNA, IOANA ANDREI, V. ARDELEAN, G. OTAVĂ, F. MUSELIN, ALEXANDRA TRIF

Banat's University of Agricultural Sciences and Veterinary Medicine "King Michael I of Romania" from Timisoara, Faculty of Veterinary Medicine, 300645, Aradului Street No. 119, Timisoara, Romania
E-mail: ignaviota@gmail.com

Summary

Considering the importance of Wistar strain in the field of reproductive toxicology, the purpose of this study is to contribute to the database on several reproductive parameters of Wistar male rats, aged 7-8 weeks, by investigating body weight and main reproductive organs weight, sperm concentration, sperm motility and sperm morphology.

Key words: Wistar rat, sperm count, motility, morphology

The laboratory rat is recognized as the experimental model of today's biomedical research in numerous fields, including neurobehavioral studies, cancer and toxicology (9). The rat is normally the preferred species for the reproductive toxicity test (2). A variety of rat strains are available to the researcher and the choice of a particular strain for a particular experiment can have a significant effect on experimental outcome (2). Currently, Wistar rats and Sprague-Dawley rats are gradually becoming the most used laboratory animals worldwide (9). Both these strains are outbred with high fertility and consistent breeding characteristics (2). The absence of standard procedures for analysis of rat reproductive parameters, could cause errors in experimental design or in evaluation of results. The experimental studies that include analysis of the reproductive rat male parameters, shows few of the variables that make difficult to compare results, and to extrapolate the results. Such variables include the age at the time of experimentation - that range from unspecified age (5) or immature male -30 days (6) to 10-11 weeks (4) and six months of age or more (10); the acclimatization time; rat strain; body weight; general health; methods of analysis.

Materials and methods

Animals: nineteen Wistar male rats, aged 7-8 weeks, used as a control group in different research in toxicology laboratory from the Faculty of Veterinary Medicine Timişoara, were considered in this study. The rats were housed in plastic cages, at constant room temperature of 23 ± 2°C, and controlled illumination cycle - 12 h light: 12 h dark. The animals received food (the usual laboratory diet) and tap
water ad libitum. All rats were purchased from the Faculty of Medicine and Pharmacy Biobase of Cluj-Napoca, Romania and maintained under the same standard laboratory conditions.

Sample collection
Rats were anaesthetized by intraperitoneal injection of ketamine (50 mg/kg b.w.), weighed and exsanguinated. Body weight was recorded and is shown in the results. Testes, epididymides and vas deferens were taken from the body immediately after euthanasia, through an abdominal incision. The vas deferens were excised and used for sperm samples collection. The luminal fluid content was collected from right and left excised vas deferens, by a slight slip and gentle pressure exerted by a clamp, along length of the vas deferens and used for sperm evaluation. Testes and epididymides were weighed together, but individually the right and the left.

Sperm motility and concentration
Sperm motility and concentration were determined using a computer-assisted analyzer (IVOS HTB, version 12.3 Hamilton Thorne Biosciences, USA) using Animal Motility Software and HTB IVOS parameter settings recommended for rat semen. An aliquot from vas deferent fluid was diluted in pre-warmed Tyrode saline solution (Sigma-Aldrich Chemie GmbH, Steinheim, Germany) using the 1:20 dilution rate, gently mixed and incubated for 3 minutes at 37°C. A volume of 3 µl of the diluted sample was placed on the chamber of Leja slide (Leja Products B. V. Netherlands), and computer-assisted assay (CASA) was performed. Sperm motility parameters investigated were total motility (MT), progressive motility (MP) and velocity (VAP).

Sperm morphology
Three staining methods were applied, in order to determine the most appropriate for morphological studies of rat spermatozoa: Diff-Quik kit (Medion Diagnostic AG Düdingen Switzerland), Spermac kit (Stain Enterprises, P.O. Box 152, Wellington, South Africa) and Eosin (S.C. Prod Impex SRL, Bucuresti, Romania). The Diff-Quik and Spermac kits were used according to producers’ recommendation. Eosin staining procedure involved the following steps: placing an aliquot of 5 µl of the diluted sample on the microscope slide; adding an equal volume of eosin 1% stain solution; mixing the stain and sperm sample; making a smear; air-drying for 5-10 min; washing in distilled water and then air drying again. Morphological examination of the stained spermatozoa was performed by microscopy, with brightfield optics at x200, x400 and x1000 magnification (a combination of a x20, x40 and x100 objective lens with a x10 ocular lens) using an Olympus BX51 microscope. About 200-215 sperm per sample were examined and classified in normal sperm and abnormal sperm. The percentage of normal and abnormal sperm was calculated. Abnormal sperm were classified into four groups: sperm with abnormalities of the head, of the neck and midpiece, of the tail and sperm with mixed abnormalities. The percentage of each kind of abnormal shape was calculated. Results are expressed as mean ±SD.
Results and discussions

Body weight and reproductive organs weight (testes and epididymis)

An average body weight of 207.79 g was registered and important individual differences were noted between the males (from 60 g to 310 g). Important differences in body weight between male rats of the same age are reported in other studies also (9). These individual variations cause problems, first in the experimental group–forming stage, when the weight variation of animals used should be minimal and not exceed ± 20% of the mean weight of each sex (2) and in the final stage of results analysis. Regarding reproductive organ, average weight testis+epididymis/male value was 2.41g with no significant differences between right and left organs – Table 1.

Table 1

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body weight</td>
<td>207.79±78.97</td>
</tr>
<tr>
<td>Right testis+epididymis weight</td>
<td>2.46±0.70</td>
</tr>
<tr>
<td>Left testis+epididymis weight</td>
<td>2.35±0.68</td>
</tr>
<tr>
<td>Average weight testis+epididymis/male</td>
<td>2.41±0.68</td>
</tr>
</tbody>
</table>

Results are expressed as mean±SD. N=19

Sperm count and motility

Mean values of sperm concentration in deferent vas were 917.05±485.29 x10^6 sperm/ml, registering significant individual variations (from 195.80 x10^6 to 1986.70 x10^6 sperm/ml). Such a wide individual variation in sperm count has been revealed in other studies for Wistar rat and also for other rat strains (10). The values of sperm concentration is close to that reported by Wilkinson (10) who detected 1024±109x10^6 sperm/ml and by Kempinas (3): 187.7±5.6 SEMx10^7 sperm /ml, both studies in the cauda epididymis of adult Wistar rats. In opposition to these results are the data reported by Lucinda (6) that recorded 108.4 ±64x10^6 sperm/ml in control group of adult Wistar rats and 1095±334.8x10^6 sperm/ml ml in control group of immature Wistar rats.

Relatively low values were recorded in total and progressive sperm mobility (29.32 %MT and 10.95% MP) while sperm velocity was significantly higher than that recorded by others (7) – Table 2.
### Sperm count and motility sperm parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Values (mean ± SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentration (No sperm/ml)</td>
<td>917.05±485.29 x10⁶</td>
</tr>
<tr>
<td>Total Motility (MT %)</td>
<td>29.32± 11.84</td>
</tr>
<tr>
<td>Progressive Motility (MT %)</td>
<td>10.95±3.09</td>
</tr>
<tr>
<td>Velocity (VAP μm/sec)</td>
<td>132.45±17.15</td>
</tr>
</tbody>
</table>

Results are expressed as mean±SD, N=19

### Sperm morphology

Microscopic analysis of the stained sperm smear using the three methods described above, revealed that all three staining methods are suitable for rat sperm staining in order to achieve the morphology and morphometry studies – Fig.1. All of them offer a good visualization of the spermatozoa and its main structural components. Diff-Quik staining technique is the fastest of the three made.

![Fig. 1. Rat sperm stained with Diff-Quik (A), Spermac (B) and Eosin (C, D) - microscope images, 400x magnification (A,B and C) and 200x magnification (D) ](image)
Sperm morphological examination results are shown in Table 3, Fig. 2 and 3.

Table 3

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Values (mean ± SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal sperm (%)</td>
<td>66.97±13.79</td>
</tr>
<tr>
<td>Total abnormal sperm (%)</td>
<td>33.03±13.79</td>
</tr>
<tr>
<td>Head abnormalities (%)</td>
<td>14.07±9.53</td>
</tr>
<tr>
<td>Neck and midpiece abnormalities (%)</td>
<td>0.68±0.61</td>
</tr>
<tr>
<td>Tail abnormalities (%)</td>
<td>10.66±5.44</td>
</tr>
<tr>
<td>Mixed abnormalities (%)</td>
<td>7.62±8.52</td>
</tr>
</tbody>
</table>

Results are expressed as mean±SD, N=19

Fig. 2. The distribution of normal and abnormal spermatozoa
Fig. 3. Spermatozoa with different abnormal morphology

Data for total normal spermatozoa in rat sample are very heterogeneous, ranging from 69 (8) to 89-90% (1).

Conclusions

Body weight and sperm concentration in deferent vas recorded significant individual variations at this age grup.

The low values of total and progressive sperm motility correlate with a high percentage of morphological abnormalities.

References


CT-ANGIOGRAPHY OF THE THORAX AND ABDOMEN IN CAT

R. LĂCĂTUȘ1, R.C. PURDOIU1, ILEANA MATEI2, F. ARDELEAN2, D. DOHOTARIU1, I. PAPUC1

1University of Agricultural Sciences and Veterinary Medicine Cluj Napoca, Mănăștur No. 3-5, 400372, Cluj-Napoca, Romania
2University of Medicine and Pharmacy “Iuliu Hatieganu”, Plastic and reconstructive surgery, Recovery Clinical Hospital Cluj-Napoca, Romania
E-mail: robert.purduiu@usamvcluj.ro

Summary

The aim of the study was to highlight the role and importance of computed tomography using contrast substances to identify the main blood vessels in the thoracic and abdominal cavity of cat.

Evaluation of the blood vessel in animal prove to be rather difficult using other imaging methods (B mode US, Rx) because those methods offer information only about some vascular branches. Contrast radiography offer a static view of the blood flow and at a certain time instance. Using CT evaluation combined with contrast agent not only we are able to identify the blood vessels but also the vascularization of the organs.

For identifying the blood vessels of the thoracic and abdominal cavity Visipaque 320 was used as a contrast media. The study was done on a European breed cat, weighting 4 kg, the cat was subjected to CT examination due to a posttraumatic event. Contrast CT was required to investigate the organ perfusion. Before contrast CT the cat underwent neuroleptanalgesia, and the physiological constant were monitored.

Contrast CT (Angio-CT) is a useful method that help evaluate the organ perfusion and help identify the presence, size, and spatial location of different formation or modifications of vessels.

Key words: cat, Angio-CT, blood vessel, contrast agent, Visipaque 320

Computed Tomography (CT) or Computerized Axial Tomography (CAT) has demonstrated values in determining the aspect of internal organs, being a widely spread method for diagnostic (1). Contrast enhanced CT, using I.V. contrast agents is more sensitive in identifying a possible trauma or abnormal vessel functionality (1, 2). Advances in the spiral CT acquisition offer comprehensive information that can be used in blood vessels diagnostics, CT being also the first choice in case of stroke (2, 3, 4 and 5).

High attenuation capability of contrast agents aids in evaluation of organ parenchyma and identify the site of a possible hemorrhage (6, 7, 8 and 9).

Materials and methods

The biological material was represented by a cat, European breed, 3 years old and 4 kg weight. The cat was presented for consultation after was hit by a car,
showing multiple concussion and paralysis of the hind limbs. Radiography of spine show a fracture of the lumbar vertebrae’s.

Computed Tomography was performed with the cat undergoing sedation using Diazepam (Barr) 0.5 mg/kg i.m., Butorfanol (Bristol-Myers) i.v.0.2 mg/kg, Propofol (Pfizer) 5 mg / animal by intravenous injection.

Contrast agent was represented by Visipaque 320 (iodixanol, 320 mgI/ml, producer Nycomed Amersham), injected i.V. using an automatic injector CT “9000 ADV Contrast Delivery System” (producer Mallinckrodt) with a flow of 1.7 ml/sec for a period of 19 seconds at a pressure of 120 psi. The contrast agent was administered on saphenous vein.

Results and discussions

CT examination was performed with the patient in lateral right decubitus. The CT exposure was done after 5 seconds post contrast, the monitoring phase, being examined the felling degree of aorta with contrast agent. For the arterial time examination was done when the Hounsfield Units (HU) on the aorta reached values greater than 100 HU (12 s post injection). At this stage the kidney were filled with contrast agents (fig. 1, fig. 2). In the late arterial time the contrast is still evident in the aorta but the kidneys ar almost free of contrast (fig. 3)

Fig. 1. Arterial time, after 12 minutes of contrast agent injection
Fig. 2. Coronary view of the thorax, after 12 minutes post contrast injection

Fig. 3. Abdominal vascularization at 20 s post contrast administration, late arterial time
The venous time was obtained at 30 s post contrast agent injection. At this stage the liver vessel’s and vena cava are full with contrast agent, also the structure of the heart and the main venous branches could be evidentiate (fig. 4-6).

Fig. 4. Venous time, 30 s post contrast

Fig. 5. Venous time, virtual coloration of the image to highlight the hepatic venous vascularization
The parameters used for the acquisition of images were 110 kV, 14-35 mAs, with a pitch factor of 1.5.

**Conclusions**

Helical Computed Tomography (CT) is a very useful solution in evaluation of posttraumatic patients. CT is a quick method, which do not require special preparation, and can put in evidence a possible internal haemorrhages. The late arterial time show the organs vascularization, being capable to highlight a parenchimatouse haemorrhage, or even a possible new formation in the organs parenchyma.

**References**


THE DEVELOPMENT OF THE ELECTROCARDIOGRAPHIC AND ECHOCARDIOGRAPHIC PARAMETERS IN CANINE CARDIOMYOPATHY BEFORE AND AFTER PIMOBENDAN ADMINISTRATION

T. MOŢ1, V. CIULAN1, D. MORAR1, CRISTINA PETRUSE1, DANIELA ELENA BRÂSLAŞU2, M. C. BRÂSLAŞU2, F. SIMIZ1

1Banat’s University of Agricultural Sciences and Veterinary Medicine “King Michael I of Romania” from Timisoara, Faculty of Veterinary Medicine, 300645, Aradului Street No. 119, Timisoara, Romania
2University of Agronomic Science and Veterinary Medicine of Bucharest, Faculty of Veterinary Medicine
E-mail: teodor_mot@yahoo.com

Summary

The research was conducted on two dogs belonging to different races, aged 9/16 years old and weighing 13/10 kg.

The electrocardiographic and echocardiographic recordings were performed using a digital Delta 1 CARDIOLINE electrocardiograph with 12 derivations and a digital MINDRAY DP-2200 VET electrocardiograph.

Pimobendan administered in therapeutic doses causes an increase in the cardiac contractile force without negative effects on the electrocardiographic parameters and on the myocardial efficiency.

Pimobendan administered in therapeutic doses has positive effects on the myocardiocytes, thereby reducing the need of energy and oxygen. We have noticed an improved overall condition of the dogs that is why we recommend Pimobendan administration, especially during stressful and hot days.

By echocardiography we have found that Pimobendan, as a positive inotropic agent, determined the decreased shortening fraction (FS) in a short period of time (about 2 weeks) without causing the deterioration of the cardiac performance.

Key words: dog, Pimobendan, electrocardiographic, echocardiographic

ECG and echocardiography, as complementary methods, lead not only to significant progress in the accurate diagnosis of various heart diseases, but also allow early determination of disease, leading to the establishment of specific therapies in the early stages of the disease (1,4).

Recently, due to the increased frequency of heart disease, positive developments have been registered in the field of therapeutic management by introducing the inotropic agents, in this case Pimobendan, on the veterinary pharmaceutical market. It determines both an increased survival rate and a better quality of life (2).
ECG recording enables printing the electrical impulses generated by the dog’s heart and facilitates the identification of its conduction disorders, as well as the potential changes in the cardiac chambers.

By echocardiography, we can obtain data about the heart size, its components (walls of cardiac chambers, interventricular and interatrial septum, heart valves) and the great vessels, providing images/visual information about the kinesis of the heart and valve apparatus in real time.

Taking into account the aspects mentioned above, we have planned regular monitoring of the studied cases. By performing electrocardiography and echocardiography in M mode before and after treatment with Pimobendan we intend to treat different degrees of congestive heart failure in dogs (3).

Materials and methods

The investigations were carried out on two dogs of different breeds, aged between 9-16 years and weighing 10-13 kg at the Clinic of Medical Pathology within the FVM of Timișoara.

The electrocardiographic and echocardiographic recordings were performed using a digital Delta 1 CARDIOLINE electrocardiograph with 12 derivations at a speed of 25mm/sec. The electrocardiograph is equipped with a high resolution thermal printer using 60 mm paper roll. For the cables provided at the ends with crocodile clips, we wet the electrodes with alcohol.

A digital MINDRAY DP-2200 VET electrocardiograph has been used in order to obtain the ultrasound images. It is provided with an ultrasound micro convex probe using frequencies of 5.5, 6.5 and 8 Mhz. The echocardiography was performed on the animals placed in the right lateral decubitus on the special examination table, easily restrained so as to be immovable during the examination.

Results and discussions

The electrocardiographic and echocardiographic recordings were performed on a small metis castrated male dog of 9 years old and weighing 13 kg.

Clinically, the animal shows fatigue, medium intensity dyspnea during the exercise, nocturnal cough and the heart projection area is slightly enlarged reaching the 7th intercostal space.

The ECG and the ultrasound aspects before and after the administration of two doses of 0.25 mg Pimobendan / kg / day, are shown in Fig. 1-6.
By analysing the electrocardiographic recordings we found that all the parameters were within the range of physiological limits (FC = 100bpm, intermediate shaft, vertical heart, sinus rhythm, PR_int = 0.1s, QT_int = 0.16s, isoelectric ST_segm.) the only exception being an atrioventricular block.

An M mode echocardiography is shown in Fig. 2 with the following parameters:
- The diastolic diameter of the left ventricle (DDLV) - 23.4 mm;
- The systolic diameter of the left ventricle (SDLV) - 11.3 mm;
- Shortening fraction (SF) - 51.7%.

Fig. 2. M mode echocardiography in the dog before Pimobendan administration
The electrocardiographic aspects 2 weeks after Pimobendan administration are shown in fig. 3.

The electrocardiogram revealed: the intermediate shaft, an increased heart rate to 125 beats / minute and the wave duration P (0.08 s) specific for left atrial cardiomegaly as well as the reduced QT interval.

The echocardiographic investigation revealed a decreased shortening fraction from 51.7% to 42.61%, calculation based on the value parameter DDLV-29.1 mm and –SDLV - 16.7 mm (fig. 4).

The electrocardiographic recordings taken 30 days after the onset of treatment revealed a maintained constant heart rate, the decreased duration of the P wave and a prolonged QT interval to 0.2 s, specific for inotropic drug administration (fig. 5).
Fig. 4. M mode echocardiography in dogs 2 weeks after Pimobendan administration – decreased SDLV and DDLV

Fig. 5. Electrocardiographic aspects in dogs 30 days after Pimobendan administration - QT prolongation

From the echocardiographical point of view, a pronounced decreased shortening fraction to 15.94% was noticed, the DDLV being of 23.2 mm, and the SDLV of 19.5 mm (fig. 6)
The second case, represented by an uncastrated metis male dog, aged 16, weighing 10 kg, showed clinically fatigue and dyspnoea on exertion, nocturnal cough. The ECG and echocardiography aspects before and after the Pimobendan administration are shown in fig. 7-10.

The electrocardiographic examination revealed framing parameter values within the physiological limits (FC = 100 beats / min, sinus rhythm, vertical heart, intermediate shaft, P wave - 0.04 s / 0.2mV, PQ interval - 0.12 s, QRS complex - 0.04 s / 1 mV ; QT - 0.16 s; isoelectric ST segment) (fig. 7)
The M mode echocardiography highlights the following values (fig. 8):
- The diastolic diameter of the left ventricle (DDLV) - 16.4 mm;
- The systolic diameter of the left ventricle (SDLV) - 5.36 mm;
- Shortening fraction (SF) - 67.07%, tends to physiological upper limit of the species.

Fig. 8. The M mode echocardiography in dogs before Pimobendan administration

By corroborating all the data, we established that the animal was suffering from cardio hypokinesia because it presented a reduced amplitude of the ventricular complex which allows the Pimobendan administration twice a day (morning and evening) in a dose of 0.25 mg / kg / day.

For objective reasons, repeated investigations were not possible after 14 days.

After 1 month of treatment, the electrocardiography revealed an increased heart rate to 125 beats / minute, a decreased amplitude of the P wave from 0.2 mV to 0.1 mV, the constant maintenance of the of PQ interval at 0.12 seconds an increased the amplitude of the QRS complex from 1 mV to 1.1 mV (fig. 9).
Fig. 9. Electrocardiographic images in dogs after 1 month of Pimobendan treatment

Taking into account the DDLV of 14 mm and the SDLV of 5.95 mm of systolic, the shortening fraction was of 57.7% lower than the baseline (fig. 10).

Fig. 10. The M mode echocardiography in dogs after 1 month of Pimobendan treatment
Conclusions

The minimum therapeutic dose of Pimobendan causes an increase in the cardiac contractile force without negative effects on the electrocardiographic parameters and on the myocardial efficiency in dogs.

Pimobendan, as a positive inotropic agent, determines the decreased shortening fraction (FS) in a short period of time (about 2 weeks) registered by electrocardiography, increasing the possibility of adaptation to effort.

Pimobendan administered in therapeutic doses has positive effects on the myocardiocytes, thereby reducing the need of energy and oxygen in dogs.

References

REPORT A DELAYED HAEMOLYTIC REACTIONS IN A DOG WITH CHRONIC RENAL INSUFFICIENCY AFTER A TRANSFUSION OF INTEGRAL BLOOD

S. MUNTEAN1, ILDIKÓ BARABÁSI1, ALINA NĂSALEAN1, Ş. NICULESCU2, R. DRĂGAN1, L. OGNEAN1*

1Department of Physiology, University of Agricultural Science and Veterinary Medicine, Manastur street, 3-5, 400037, Cluj-Napoca, România
2Privat Veterinary Medical Clinic “Şerban Niculescu” Sibiu, România
E-mail: lognean@yahoo.com

Summary

During a large study focused on evaluating the effectiveness of transfusional therapy with integral blood (IB) on canines patients, we reported delayed manifestation of hemolytic reaction to a dog with chronic renal insufficiency. The patient was a six years old half breed female with obvious symptomatology of renal insufficiency (pollakiuria, haematuria, discomfort at miction, apathy, loss of appetite). During the observation period the patient was regularly evaluated and monitored clinically, hematologically (with an automatic analyzer) and biochemically (with a semi-automatic analyzer). The diagnostic of chronic renal insufficiency was outlined based on analyzes’ results, among which relevant were BUN (71 mg/dL), creatinine (2.5 mg/dL) and ratio BUN/creatinine (28.4). The severity of unregenerate chronic anemia was established by the low values of RBC (1.46 T/L), HCT (6.3%), Hb (2.1 mg/dL) and VEM (42 mg/dL), correlated with the critical clinical state and also with unfavorable/reserved prognostic lead to the decision of performing blood transfusion (450mL IB bag). The blood was taken from a random dog (male, vaccinated, dewormed) through a close system, in a 450mL standard bag with CPDA1. Blood transfusion was emergency made without compatibility tests patient-donor because it was the first transfusion for this patient. According to the analysis after transfusion, in the second day RBC values rose only to 2.33 T/L and HCT to 13.5%, and the third day recorded a regression for RBC to 1.81 T/L and HCT to 10.2%. The evolution during the fourth-30th day interval has a slight increase (RBC 4.7 T/L and HCT 27.2%). After two months it was a significant decrease, when the state of health worsened considerably, having the values of RBC 1.55 T/L and of HCT 11.2%. Finally it was concluded that the investigated patients have developed a delayed hemolytic reaction because transfusion of IB was not rated in terms of compatibility, also they did not record a significant increase in parameters of packed red cells, indicating an eventual rejection of transfused red blood cells.

Key words: dog, anemia, transfusion, delayed hemolysis

The symptoms of delayed hemolytic reactions usually manifest after 9 days from the first transfusion, which correlates with the continued growth of antibody title. Such transfusion incompatibilities can generate red blood cells carrying antigens DEA 3, 5 and 7. According to conducted studies by King L.G. and Boag Amanda (2007), it was found a frequency of delayed hemolytic reactions in dogs
with 10% DEA 3 and 20%. DEA 5 negative. There were also noted delayed hemolytic reactions in case of the dogs DEA 7 negative after transfusion with DEA 7 positive blood. As well it was found an incidence of 50% of dogs DEA 7 positive from the population tested (4, 8).

Noteworthy is also the general trend that any adverse reactions causes by blood transfusion be classified as immunological or non-immunological reaction with acute or delayed manifestation. In this context, great importance should be attributed to the main preventive measures aimed at reducing the risk of transfusion reactions through a closer monitorization of the blood donor, collecting conditions, and also of the preparation, storage and administration of blood products. As is well known, the most alarming form of transfusion reaction is acute, usually found in DEA1.1 negative canine patients treated with blood DEA 1.1 positive, which was sensitized after a transfusion with red blood cells carrying the antigen DEA 1.1 (9). It is manifested through fever, tachycardia, dyspnea, muscle tremors, vomiting, apathy, hemoglobinemia and hemoglobinuria (1).

Unlike the acute form, in the delayed hemolytic reaction the haemolysis occurs extravascular, the symptomatology is similar but the severity is much lower. Such a reaction may be initiated from the second day until 21st day after the transfusion (7, 10).

Regarding chronic renal insufficiency (CRI), it is noted that this disease has a slow and gradual evolution, running over several years. During its evolution, it does not manifest changes in the patient's general status, except for when the compromised renal tissue reaches 75% (3). Usually, the first symptoms consist in increased water consumption and urination, being a compensatory response of the body to eliminate the accrue catabolites. In dogs with CRI, the prognosis is unfavorable, and the treatment is only supportive, aiming to ensure a more comfortable life for patients (5). The survival of patients can take between a few months and a few years and the symptoms most common are: polydipsia, polyuria, lethargy, anorexia, weight loss, vomiting, diarrhea, gastrointestinal ulceration, exercise intolerance (2). Among the complications occurring in patients with CRI, particular attention is given to the ulcers extended to the entire digestive tube, anemia, increased vascular pressure, which can even lead to blindness.

The aim of this paper was to highlight the need of knowing the blood type and performing the crossmatch tests between donor and recipient, even if it is the first transfusion with blood products for the recipient patient.
Materials and methods

The study was conducted on a canine patient, represented by a 6 years old sterilized half-breed female. It was consulted and treated in a private veterinary practice from Sibiu, showing obvious symptoms of RCI, evidenced by pollakiuria, hematuria, discomfort during urination, apathy, loss of appetite. From anamnnesis it revealed that these symptoms were triggered gradually within two-three weeks.

After recording medical history and performing a thorough clinical examination, they resorted to collect few samples of blood in vacutainers with EDTA for hemoleucogram and in tubes with serum stabilizer to obtain necessary biochemical analysis. Samples of blood were investigated in the first hour after collection with an automatic hematology analyzer Abacus Junior Vet and a semi-automatic biochemistry analyzer Mindray BA-88A. It followed a period of 90 days, the patient was kept under medical supervision and was regularly clinical, haematological and biochemical assessed and monitored. The diagnosis of CRI was based mainly on results from biochemical analyzes and matching them with those supplied by hematological tests and clinical examinations. Of these, we paid particular relevance to BUN values (71 mg/dL), creatinine (2.5 mg/dL) and the ratio BUN/creatinine (28.4). An essential landmark was represented by the severity of regenerative chronic anemia established based on low levels of red blood cell (RBC) count (1.46 T/L), hematocrit (6.3%), hemoglobin (2.1 mg/dL) and VEM (42 mg/dL).

A main impact also proved to be the correlation of these values with critical clinical status and poor/reserved prognosis of the patient. All this led eventually to the decision to perform a blood transfusion; this intensive therapy procedure consisted in administration of whole blood units (WB) (450 mL) using the method in a closed system. In the absence of a stock of WB, it was resorted to the cabinet’s database of owners with potential donor dogs. Thus it was found an owner who responded positively to the made appeal, providing a canine donor, male, 30 kg, vaccinated and dewormed. From this donor it has been collected, under neuroleptanalgesia, by jugular vein puncture, a bag of 450 mL blood on CPDA-1.

The transfusion was done without evaluating the blood compatibility between the donor and the patient through crossmatch tests or by blood type. The use of this procedure is warranted by the clinicians team, they corroborate the emergency situation with finding that this patient is at his first blood transfusion. After performing transfusion with WB, the patient had been hospitalized in the clinic and kept 30 minutes under strict medical observation, carefully monitoring the symptoms (vomiting, diarrhea, hypersalivation, urticaria, face edema, tachycardia, dyspnea or hemoglobinuria) of a possible acute transfusion reaction. Then followed a period of medical observation, where blood samples were taken periodically for hematological tests (Tab. 1) and metabolic profile (Tab. 2). Additionally, in the fourth day the blood sampling was completed with few rapid tests for erlichiosis, anaplasmosis, borreliosis, dirofilariosis and blood smear examination for
baebesiosis. The result was found to be negative for all these tests. During this period, the patient was infused with solutions for hydration, nutrition and to achieve an electrolyte balance physiologically closer.

Results and discussions

As shown in Table 1, blood counts were not restored to an acceptable level after the transfusion of one unit (450 mL) of WB, which pleaded for suspicion of delayed hemolytic reaction triggered posttransfusion. In this regard, we assigned particular relevance to the evolution of parameters of mean red blood cells. The dynamics of HCT levels proved decisive; its values increased from 6.3% to 13.5% in the first day after the transfusion, so that in the next 3 days to fall slightly (10.2, 11.02 respectively 11.9%) and barely after the 8th day to increase over 17%, but on the 90th day was recorded a further decrease to 11.2%. A similar trend and dynamics presented RBC and Hb, dropping in days 3, 4 and 5 after transfusion from 2.33 to 1.81, 2.08 and 2.2 T/L respectively from 4.7 to 3.7, 3.9 and 4.0 g/dL. We also note that the patient’s general status has slightly improved, but below what the clinicians anticipated during the first 30 days of clinical observation period, which does not exclude the possibility that the transfused red cells are removed, possibly lysates. This evolution shows that transfusion with WB has not reached the original purpose of correcting the severe form of anemia of this patient. Moreover, the overall evolution of red blood cell parameters, dominated by alternating increases and decreases of HCT, RBC and Hb throughout the monitoring period, supported a diagnosis of a slight adverse delayed hemolytic reaction for the investigated patient.

Table 1

The dynamics of haematological parameters during the period patient monitoring

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Unit.</th>
<th>References</th>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 5</th>
<th>Day 8</th>
<th>Day 12</th>
<th>Day 30</th>
<th>Day 90</th>
</tr>
</thead>
<tbody>
<tr>
<td>RBC</td>
<td>X10^9/mm^3</td>
<td>5-7.9</td>
<td>1.49</td>
<td>2.33</td>
<td>1.81</td>
<td>2.2</td>
<td>3.18</td>
<td>4.8</td>
<td>4.7</td>
<td>1.55</td>
</tr>
<tr>
<td>HCT</td>
<td>%</td>
<td>35-57</td>
<td>6.3</td>
<td>13.5</td>
<td>10.2</td>
<td>11.9</td>
<td>17.8</td>
<td>21.7</td>
<td>27.2</td>
<td>11.2</td>
</tr>
<tr>
<td>Hb</td>
<td>g/dL</td>
<td>12-19</td>
<td>2.1</td>
<td>4.7</td>
<td>3.7</td>
<td>4</td>
<td>6.2</td>
<td>6.7</td>
<td>9.6</td>
<td>4.4</td>
</tr>
<tr>
<td>MCV</td>
<td>µm³</td>
<td>66-77</td>
<td>42</td>
<td>56</td>
<td>56</td>
<td>54</td>
<td>56</td>
<td>53</td>
<td>56</td>
<td>72</td>
</tr>
<tr>
<td>MCH</td>
<td>g/dL</td>
<td>21-26</td>
<td>13.9</td>
<td>20.1</td>
<td>20.5</td>
<td>18.4</td>
<td>19.5</td>
<td>16.4</td>
<td>20.5</td>
<td>29.2</td>
</tr>
<tr>
<td>MCHC</td>
<td>g/dL</td>
<td>32-36.3</td>
<td>32.9</td>
<td>34.6</td>
<td>36.5</td>
<td>34</td>
<td>34.9</td>
<td>30.9</td>
<td>35.5</td>
<td>39.9</td>
</tr>
<tr>
<td>RDW</td>
<td>%</td>
<td>14-17</td>
<td>17.9</td>
<td>22.4</td>
<td>22.2</td>
<td>25.6</td>
<td>22.5</td>
<td>23.4</td>
<td>21.9</td>
<td>13</td>
</tr>
<tr>
<td>WBC</td>
<td>X10^3/mL</td>
<td>5-14.1</td>
<td>33.8</td>
<td>33.9</td>
<td>30.1</td>
<td>28.9</td>
<td>-</td>
<td>42</td>
<td>29.5</td>
<td>9</td>
</tr>
<tr>
<td>Gran.</td>
<td>X10^3/mL</td>
<td>3.3-12</td>
<td>24.3</td>
<td>28.7</td>
<td>25.5</td>
<td>24.1</td>
<td>-</td>
<td>33.2</td>
<td>24.9</td>
<td>8</td>
</tr>
<tr>
<td>Gran.</td>
<td>%</td>
<td>58-88</td>
<td>71.7</td>
<td>84.2</td>
<td>84.4</td>
<td>83</td>
<td>-</td>
<td>78.8</td>
<td>84.2</td>
<td>87.4</td>
</tr>
<tr>
<td>Lymp.</td>
<td>X10^3/mm³</td>
<td>0.4-2.9</td>
<td>7.1</td>
<td>3.5</td>
<td>3.1</td>
<td>3.8</td>
<td>-</td>
<td>5.6</td>
<td>3.3</td>
<td>0.7</td>
</tr>
<tr>
<td>Lymp.</td>
<td>%</td>
<td>8-21</td>
<td>21</td>
<td>10.5</td>
<td>10.5</td>
<td>13.2</td>
<td>-</td>
<td>13.4</td>
<td>11.3</td>
<td>8.2</td>
</tr>
<tr>
<td>Mono.</td>
<td>X10^3/mm³</td>
<td>0.1-1.4</td>
<td>24</td>
<td>1.7</td>
<td>1.5</td>
<td>1</td>
<td>-</td>
<td>3.2</td>
<td>1.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Mono.</td>
<td>%</td>
<td>2-10</td>
<td>7.3</td>
<td>5.3</td>
<td>5.1</td>
<td>3.8</td>
<td>-</td>
<td>7.8</td>
<td>4.5</td>
<td>4.4</td>
</tr>
<tr>
<td>PLT</td>
<td>X10^9/mL</td>
<td>211-621</td>
<td>280</td>
<td>355</td>
<td>250</td>
<td>697</td>
<td>642</td>
<td>571</td>
<td>616</td>
<td>425</td>
</tr>
</tbody>
</table>
It is also necessary to mention the severe form of development of IRC, which also determined notable changes in the main leukocyte and blood biochemical indexes, of which we name just the very high levels of leukocytosis (21-42 G/L), respectively granulocytosis (78.8-84.2%), maintained during the first 30 days of the period of survival. In this context must also be analyzed the just as important changes of some indices of metabolic profile, such as glucose oscillations (101 to 228 mg/dL) associated with increases in BUN (40-155 mg/dL) and creatinine (2.5-11.2 mg/dL) (Tab. 2).

Table 2

<table>
<thead>
<tr>
<th>Unit</th>
<th>Ref.</th>
<th>Day 1</th>
<th>Day 3</th>
<th>Day 5</th>
<th>Day 6</th>
<th>Day 8</th>
<th>Day 9</th>
<th>Day 12</th>
<th>Day 16</th>
<th>Day 90</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glu</td>
<td>76-119</td>
<td>228</td>
<td>114</td>
<td>152</td>
<td>101</td>
<td>118</td>
<td>141</td>
<td>115</td>
<td>115</td>
<td>144</td>
</tr>
<tr>
<td>BUN</td>
<td>8-28</td>
<td>71</td>
<td>55</td>
<td>57</td>
<td>45</td>
<td>40</td>
<td>49</td>
<td>53</td>
<td>43</td>
<td>155</td>
</tr>
<tr>
<td>T-Bil</td>
<td>0-0.3</td>
<td>0.3</td>
<td>0.5</td>
<td>-</td>
<td>-</td>
<td>1.1</td>
<td>1.2</td>
<td>1.0</td>
<td>0.9</td>
<td>-</td>
</tr>
<tr>
<td>Ca</td>
<td>9.1-11.7</td>
<td>10.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>12.7</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T-Pro</td>
<td>5.4-7.5</td>
<td>7.9</td>
<td>8.1</td>
<td>8.6</td>
<td>8.6</td>
<td>9</td>
<td>8.5</td>
<td>8.9</td>
<td>7.3</td>
<td>6.3</td>
</tr>
<tr>
<td>Alb</td>
<td>2.3-3.1</td>
<td>2.1</td>
<td>2.2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2.6</td>
<td>-</td>
<td>1.9</td>
</tr>
<tr>
<td>GPT/ALT</td>
<td>10-109</td>
<td>26</td>
<td>-</td>
<td>11</td>
<td>11</td>
<td>15</td>
<td>8</td>
<td>6</td>
<td>6</td>
<td>118</td>
</tr>
<tr>
<td>ALP</td>
<td>1-114</td>
<td>108</td>
<td>146</td>
<td>204</td>
<td>190</td>
<td>224</td>
<td>218</td>
<td>216</td>
<td>190</td>
<td>77</td>
</tr>
<tr>
<td>Cre</td>
<td>0.5-1.7</td>
<td>2.5</td>
<td>2.9</td>
<td>4.7</td>
<td>4.7</td>
<td>4.4</td>
<td>3.9</td>
<td>3.1</td>
<td>2.5</td>
<td>11.2</td>
</tr>
</tbody>
</table>

After the first month of therapy and monitoring, the owner unduly deemed that the patient's health bettered, therefore he neglected the recommendation of clinicians to return regularly for check and reassessment. The owner returned with the patient for a checkup after a pause of two months, because the patient was showing signs of increased dyspnea, dehydration and chronic fatigue. On the one hand, repeating the blood tests revealed very important decreases of HCT (11.2%), RBC (1.55 T/L), hemoglobin (4.4 g/dL) from the prior testing. On the other hand, the leukocytosis diminished (9 T/L), but the granulocytosis increased (87.4%), biochemically it was surprising the increase of creatinine to 11.2 mg/dL.

Upon completion of the consultations was interfered with infusion rehydrants and glucocorticoids in order to decrease the creatinine level, but nevertheless the patient started collapsing and succumbed. Delayed hemolytic transfusion reaction is the result of extravascular hemolysis which occurs in 3 to 21
posttransfuzional days. This reaction can be observed in dogs treated with incompatible blood for the first transfusion. The body needs about 7-10 days to generate an immunological response through the production of antibodies against foreign cells. Thus the specific immunological response accelerates the removal of RBC received from a donor through transfusion, shortening its effectiveness.

This process can also occur following administration of a blood type against which the patient has natural isoantibodies (DEA 3, DEA 5 and DEA 7 in the case of the dog) or after the prior sensitization of the patient (through a prior blood transfusion once it has already triggered an anamnestic response). It is therefore produced a delayed haemolytic reaction instead of an acute hemolytic reaction, given by the involvement of antibodies anti- DEA 1.1 and DEA 1.2.

According to the bibliographical consulted data, the delayed hemolytic reactions usually show a more tenuous manifestation and can easily pass unnoticed (B). This type of reaction should be suspected in the case of patients to which the posttransfusion HCT suddenly decreases or does not remain high, at the expected values, for as long as it should have and also in patients who develop hyperbilirubinemia and/or bilirubinurie. The most common clinical signs after these haemolytic reactions are fever, anorexia and jaundice, with a positive result to direct Coombs test.

Delayed hemolytic reactions usually do not require any specific treatment. They can be prevented by using standard blood products or verified by the crossmatch tests. This explains why crossmatch test is mandatory for dogs receiving a second transfusion and for cats since the first transfusion. However, it should be borne in mind that the crossmatching tests can not detect a low titer antibodies, so that the delayed hemolytic reactions can not be prevented completely. Moreover, in some species (equine) the clinician must take into account the fact that sensitization of a foreign erythrocyte antigen may take more than a year.

Conclusions

Transfusion of a significant amount of WB (450 mL) to a 25 kg dog, as is patient investigated in this study, causes a significant increase in those 3 parameters of packed red blood cells (Ht, RBC and Hb) in a very short time. In contrast, after such a transfusion, the values of the erythrocyte parameters of the presented patient neared the inferior physiological limits only after 30 days, having significant decreases in the first three days. All this led to the detection of a delayed haemolytic reaction triggered in the conditions of having given up the transfusion compatibility testing between patient and donor.
References


5. **Ildiko, Barabasi, Arion, Alexandra, Ognean, L..** Triple Immunosuppressive Therapy of Immune-mediated Hemolytic Anemia in a Dog: Case report. Bulletin UASVM Veterinary Medicine, 2015, 1, 72.


8. **Moldovan, Meda Maria, Ognean, L., Morar, I., Iancu S..** The Therapeutic Efficacy Of Some Blood Products For Transfusion In Dogs And Cats, Bulletin UASVM, Veterinary Medicine, 2011, 1, 68.


CORRELATION BETWEEN CLINICAL AND CYTOLOGICAL ASPECTS OF ANAL SAC INFLAMATION IN DOGS

C. POPOVICI, DANIELA NEAGU, MARIA-ANDREEA MĂRINCUS, R. CODEA, N. FIT

University of Agricultural Sciences and Veterinary Medicine Cluj Napoca, Mănăștur Street, No. 3-5, 400372, Cluj-Napoca, Romania
E-mail: popovici_vet@yahoo.com

Summary

The aim of this study was to establish a correlation between the cytological aspects of aseptic samples tucked from the anal sacs and clinical manifestations of the patients. After collecting the sample, a Diff-Quick smear was done and Olympus microscope (100X magnification) was used for examination, the image was obtain with Olympus Soft Imaging Solutions, UC30. We evaluate the presence of epithelial cell with or without bacterial colonization, the presence of inflammatory cell (neutrophils, eosinophils, and macrophage) and the presence of free bacteria.

The main differences between the sample collected from healthy dogs and the dogs with clinical signs of perianal inflammation was the number of keratinized squamous epithelial cell, that was directly proportional with severity of the anal sac affection. The presence of inflammatory cell with normal or degenerated aspects was correlated with abscessed anal sac (different aspect previous recorded in literature). Degenerated neutrophils is one good indicators of chronic inflammation. Intracellular bacteria were found only in abscess of anal sac and Malassezia spp. was identify in only one case without any clinical manifestations.

Degenerate neutrophils found in anal sac abscess indicate inflammation correlates with the presence of old and gritty secretion of pus.

The present of neutrophils and intracellular bacteria in correlation with clinical signs of anal sac inflammation represent one important criteria of infection (abscess of anal sac), and justified the decision of antibiotic administration in those patients.

Keyword: anal sac, dog, abscess, cytology

In this study we examine ten dogs presented for consultation in Internal Medicine department of USAMV Cluj-Napoca, from this the majority was mixed breed (7) and the other breed represented was: Cane Corso (1), Amstaff (1), Fox-terrier (1); 3 male and 7 female, with age from 7 months to 8 years. From this 3 represent healthy dogs (negative witness patients - that has not presented clinical signs of tonsillitis and affection of anal sacs). The other 7 cases was represented by 4 dogs with anal sacs abscess, 2 dogs with anal sacs impaction and 1 dogs with saculitis – tonsillitis. After the clinic consultations we sterile take the sample from anal sacs after sedation of the dogs (medetomidine). The sample was collected in two ways in conformity with volume of anal sacs (turgidity): with 22 G
intravenous catheter (big turgidity), or with manual evacuation after we cleaned the area with one sterile saline soaked gauze swab directly to one sterile tampon.

Cytology: from samples aseptically collected from anal sacs region we make slides stained Diff-Quick. We examine the slide with Olympus microscope (100X objective) and obtain image with Olympus Soft Imaging Solutions, UC30. We evaluated the following cytological aspects: the present or absent of epithelial cell with eventually bacterial colonization, the presences of inflammatory cells (neutrophiles, euzinophils, and macrophages), and the presences of free bacterial/yeasts with his number.

After cytological examination we identify kerathinizated epithelial squamous cells in all samples from anal sacs (Fig. 1). The most notable differences were the number of this cell (much higher in affected dogs from those that came from healthy one). This number of cell is in direct correlation with severity of the anal sacs diseases.

Fig. 1. Kerathinized epithelial squamous cells from anal sacs liquid

The present of inflammatory cell (intact cell, or degenerated) in our study was found only in dogs with anal sacs abscess. This aspect is different from those described in specialty literature (1), (2) and (3). In our cases degenerated neutrophiles was found in abscess cases and was in direct correlation with present of dehydratedpuss. Extracellular bacteria were found in all the samples, but the number is in direct correlation with the severity of the anal sacs affections. This aspect was reported also from other author (3). Intracellular bacteria was found only in cases of anal sacs abscess, this aspect is different from those describe (1) and (2).
The present of neutrophiles and intracellular bacteria from anal sac liquid could represent one good criterion for establish diagnosis of anal sacs abscess (Fig 2) and justified decision for parenteral antibiotic administration in those patients.

![Image]

**Fig. 2. Cytological aspect from one patient with anal sacs abscess**

<table>
<thead>
<tr>
<th>Case</th>
<th>Color</th>
<th>Consistence’s</th>
<th>Quantity</th>
<th>Puss</th>
<th>Clinical diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yellow - brown</td>
<td>Pasty</td>
<td>1 ml</td>
<td>No</td>
<td>Impaction</td>
</tr>
<tr>
<td>2</td>
<td>Yellow</td>
<td>Liquid</td>
<td>&lt; 0,1 ml</td>
<td>No</td>
<td>Clinical healthy</td>
</tr>
<tr>
<td>3</td>
<td>Yellow - brown</td>
<td>Viscous</td>
<td>0,5 ml</td>
<td>No</td>
<td>Sacculites</td>
</tr>
<tr>
<td>4</td>
<td>Brown</td>
<td>Liquid</td>
<td>0,2 ml</td>
<td>No</td>
<td>Clinical healthy</td>
</tr>
<tr>
<td>5</td>
<td>Brown</td>
<td>Viscous</td>
<td>3-4 ml</td>
<td>Yes</td>
<td>Abscess</td>
</tr>
<tr>
<td>6</td>
<td>Brown</td>
<td>Pasty</td>
<td>4 ml</td>
<td>No</td>
<td>Impaction</td>
</tr>
<tr>
<td>7</td>
<td>Yellow - brown</td>
<td>Liquid</td>
<td>4 ml</td>
<td>Yes</td>
<td>Abscess</td>
</tr>
<tr>
<td>8</td>
<td>Yellow - brown</td>
<td>Liquid</td>
<td>1 ml</td>
<td>No</td>
<td>Clinical healthy</td>
</tr>
<tr>
<td>9</td>
<td>Yellow - brown</td>
<td>Liquid</td>
<td>2 ml</td>
<td>Yes</td>
<td>Abscess</td>
</tr>
<tr>
<td>10</td>
<td>Yellow - brown</td>
<td>Liquid</td>
<td>2 ml</td>
<td>Yes</td>
<td>Abscess</td>
</tr>
</tbody>
</table>

Yeast from *Malassezia* spp. was identifying in only one case without any clinical correlation with aspects of liquid from anal sacs or clinical manifestation.
Conclusions

Only in the patients with anal sacs abscess we identified in cytological sample collected from anal sacs, the present of inflammatory cell and intracellular bacteria.

In patients with affection of anal sacs in cytological exam we identify one big number of keratinized epithelial squamous cells (this number is in direct correlation with the severity of affection), also we found one big number of extracellular bacteria.

Recommendations

The present of neutrophiles and intracellular bacteria in anal sacs liquid in correlation with clinical signs of anal sac abscess justified the decision of antibiotic treatment in sic dogs.

References

1. James, D.J., Griffin, C.E., Polissar, N.L., Neradilek, M.B., Comparison of the anal sac cytology findings and behavior in clinically normal dogs and those affected with anal sac disease, Veterinary Dermatology, 2010, 22, 80-87.
CORRELATIONS BETWEEN PHARYNGEAL AND ANAL SAC S
MICROBISM IN DOGS

C. POPOVICI, MARIA-ANDREAA MĂRINCUȘ, R.C. PURDOIU, G. NADĂȘ, M. MIRCEĂN

University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Mănășturt Street, No. 3-5, 400372, Cluj-Napoca, Romania
E-mail: popovici_vet@yahoo.com

Summary

In this study 10 dogs from women 3 were complete healthy (martor group) were clinically evaluated and samples from the pharynx and the anal sacs were collected in sterile containers. Following the bacteriological examination of the samples, the bacteria from the pharynx and anal sacs were identified and the correlation between the two was assessed, as well as the correlation between the macroscopic aspects of the anal sacs content and the pathology of the perianal area.

The aim of this study was to confirm or deny the presence of sacculitis-tonsilitis syndrome in dogs by demonstrating a positive or negative correlation between the bacterial flora found in the pharynx and the one found in the anal sacs.

Following the bacteriological examination of the samples and the statistical data analysis, there was no correlation between the pharyngeal and the anal sacs microbes in the evaluated patients. The only bacteria with a positive correlation, in 20% of the cases, was Streptococcus non-haemolitic, causing local inflammatory signs and macroscopic alterations of the anal sacs content.

Key words: sacculitis-tonsilitis syndrome, dog, anal sacs, pharynx

Pharyngeal and anal sacs affection is frequently diagnose in dogs (1). In Romanian scientific literatures is described one syndrome sacculitis-tonsilitis. In these syndrome bacteria from anal sacs, by liking, enter in pharyngeal aria and colonized the tonsils (2).

For identify the correlation between bacterial flora from anal sacs and pharynx we take sample from 7 dogs with different pathology of anal sacs and tonsils, and sample from 3 healthy dogs. After the isolation of the bacteria from collected sample, we compare the results obtain from pharynx and from anal sacs, to observe if is exist some correlation between this two area.

Materials and methods

The clinical cases are representing by dogs that came for consultation in Emergency Hospital and Internal medicine Clinic of USAMV Cluj-Napoca in period between December 2014 and December 2015. From the total number of dogs, 7 were mixed breed and the other breed was represented by: Cane Corso (N=1),
Amstaff (N=1), Fox-terrier (N=1); 3 male and 7 female, with age between 7 months and 8 years. From this, 3 represent healthy dogs (negative witness patients – that has not presented clinical signs of tonsillitis and affection of anal sacs). The 7 cases were represented by 4 dogs with anal sacs abscess, 2 dogs with anal sacs impastation and 1 dog with sacculites – tonsillitis. In anamnesis we confirm that this dog have prior affection of both anal sacs and pharynx. After the clinic consultations we take sterile sample from anal sacs after sedation of the dogs (medetomidine).

From pharynx the sample was collected with the help of laryngoscope (Fig. 1.), after sedation to identified the color, aspect and the size of tonsils (Fig. 2).

Fig. 1. Collection of pharynx sample with the help of laryngoscope

The sample that was collected from anal sacs in two ways in conformity with volume of anal sacs (turgidity): with 22 G intravenous catheter (big turgidity), or with manual evacuation after we cleaned the area with one sterile saline soaked gauze swab (after the technique described by Robson, 2003) directly to one sterile tampon.

**Bacteriologic study:** The sample was inoculated on Muller-Hinton agar and agar with blood and then incubated at 37°C. After 24-48 hours we read the results and we have effectuated an antibiogramme.

For quantifying purpose we note the probe with:
- “-“ when none of colony grow on the plate;
- “-/+“ when was less than 10 colony grow on the plate;
- “+“ when more than 10 colony grow on the plate.

Antibiogram tested the sensibility of the culture for 8 different antibiotics that are frequently used for treatment of bacterial infection in dogs: amoxicillin, enrofloxacin,
ceftiofur, penicillin/erythromycin, doxycycline, trimethoprim/ sulfamethoxazole, colistin and cefovecin (Convenia).

Results and discussions

Our dogs was mixed breed (7) and the other breed represented was: Cane Corso (1), Amstaff (1), Fox-terrier (1); with medium to big height. This aspect is deferent from other study in which anal sacs affection is more proud in small height dogs, sedentary life style (3). From epidemiology regarding to deferent sexes we found that these affection is more frequent in female 71.42%, in male 28.52 %, this aspect is similar with those described in other study (78.5% female, 21.5 % male)(3). The median age of our dogs was 3.85±3.1 years, much smaller then 5.6±2.8 years describe in other study (3). From this 3 represent healthy dogs (negative witness patients -that has not presented clinical signs of tonsillitis and affection of anal sacs). The other 7 cases was represented by 4 dogs with anal sacs abscess, 2 dogs with anal sacs impactation and 1 dogs with sacculites–tonsillitis.

Anal sacs sample was macroscopically examine and classified in 3 color group: yellow, yellow-brown and brown. The quantity removed from anal sacs was from 0,1 ml to 4 ml, with one good correlation between quantity and the presences of deferent affection to this level (Table 1).

The consistency of the sample was from liquid, viscous and pasty, in the same time we observe the present of dehydrated puss. This dehydrated puss was in direct correlation with anal sacs abscess. The color and the consistencies was without any clinical significances, this aspect it is also reported be other research (4).
The bacteriological exam reveal polymorphic bacterial flora from pharynx (Table 2) and from anal sacs (Table 3). In the majority of the cases (80%) was identify at least 2 deferent type of bacteria from bought collected sample.

In clinically healthy patients (30 % of exanimate cases) microbiological flora identify from anal sacs and pharynx was represented by germs from *Staphylococcus, Streptococcus, Klebsiella* and *Bacillus* species. In cases of dogs with deferent affection to anal sacs the heterogeneity of microbial flora was much higher (Table 4).

From those sample the most common bacteria identify in bought sample (anal sac liquid and pharynx) was *Staphylococcus* spp. and *Streptococcus* spp. (in 50% from pharynx sample and 80% from anal sac liquid). These results are similar with those obtain by 5 and 6, than consider these bacteria one normal findings in microbiological flora of anal sacs. In other study some researcher found *E. coli* in anal sacs fluid (5, 7), but in our study we didn’t identify these bacteria.

We didn’t observe any correlation between identified microbial flora and the macroscopically characteristic of anal sac liquid, or with existed affection to these levels. The only species on bacteria found in healthy patient and in sic one was *Staphylococcus* beta-haemolytic, but his present was in small number and whitout any corelation whith clinical signs.

| Table 1

<table>
<thead>
<tr>
<th>Case</th>
<th>Color</th>
<th>Consistencies</th>
<th>Quantity</th>
<th>Puss</th>
<th>Clinical diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yellow - brown</td>
<td>Pasty</td>
<td>1 ml</td>
<td>No</td>
<td>Impaction</td>
</tr>
<tr>
<td>2</td>
<td>Yellow</td>
<td>Liquid</td>
<td>&lt;0.1 ml</td>
<td>No</td>
<td>Clinical healthy</td>
</tr>
<tr>
<td>3</td>
<td>Yellow - brown</td>
<td>Viscous</td>
<td>0.5 ml</td>
<td>No</td>
<td>Sacculites</td>
</tr>
<tr>
<td>4</td>
<td>Brown</td>
<td>Liquid</td>
<td>0.2 ml</td>
<td>No</td>
<td>Clinical healthy</td>
</tr>
<tr>
<td>5</td>
<td>Brown</td>
<td>Viscous</td>
<td>3-4 ml</td>
<td>Yes</td>
<td>Abscess</td>
</tr>
<tr>
<td>6</td>
<td>Brown</td>
<td>Pasty</td>
<td>4 ml</td>
<td>No</td>
<td>Impaction</td>
</tr>
<tr>
<td>7</td>
<td>Yellow - brown</td>
<td>Liquid</td>
<td>4 ml</td>
<td>Yes</td>
<td>Abscess</td>
</tr>
<tr>
<td>8</td>
<td>Yellow - brown</td>
<td>Liquid</td>
<td>1 ml</td>
<td>No</td>
<td>Clinical healthy</td>
</tr>
<tr>
<td>9</td>
<td>Yellow - brown</td>
<td>Liquid</td>
<td>2 ml</td>
<td>Yes</td>
<td>Abscess</td>
</tr>
<tr>
<td>10</td>
<td>Yellow - brown</td>
<td>Liquid</td>
<td>2 ml</td>
<td>Yes</td>
<td>Abscess</td>
</tr>
</tbody>
</table>
Table 2

Results of bacteriological examination of pharingian sample

<table>
<thead>
<tr>
<th>Identify germ</th>
<th>Cases (%) (n=10)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Staphylococcus</em></td>
<td></td>
</tr>
<tr>
<td>Nonhaemolytic</td>
<td>40 %</td>
</tr>
<tr>
<td>Alfa-haemolytic</td>
<td>20 %</td>
</tr>
<tr>
<td><em>Streptococcus</em></td>
<td></td>
</tr>
<tr>
<td>Nonhaemolytic</td>
<td>20 %</td>
</tr>
<tr>
<td>Alfa-haemolytic</td>
<td>70 %</td>
</tr>
<tr>
<td><em>Klebsiella spp.</em></td>
<td></td>
</tr>
<tr>
<td>20 %</td>
<td></td>
</tr>
<tr>
<td><em>Bacillus spp.</em></td>
<td></td>
</tr>
<tr>
<td>20 %</td>
<td></td>
</tr>
<tr>
<td><em>Micrococcus spp.</em></td>
<td></td>
</tr>
<tr>
<td>10 %</td>
<td></td>
</tr>
<tr>
<td><em>Neisseria spp.</em></td>
<td></td>
</tr>
<tr>
<td>10 %</td>
<td></td>
</tr>
</tbody>
</table>

Table 3

Results of bacteriological examination of anal sacs

<table>
<thead>
<tr>
<th>Identify germ</th>
<th>Cases (%) (n=10)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Staphylococcus</em></td>
<td></td>
</tr>
<tr>
<td>Nonhaemolytic</td>
<td>30 %</td>
</tr>
<tr>
<td>Alfa-haemolytic</td>
<td>20 %</td>
</tr>
<tr>
<td>Beta- haemolytic</td>
<td>40 %</td>
</tr>
<tr>
<td><em>Streptococcus</em></td>
<td></td>
</tr>
<tr>
<td>Nonhaemolytic</td>
<td>20 %</td>
</tr>
<tr>
<td>Alfa- haemolytic</td>
<td>50 %</td>
</tr>
<tr>
<td><em>Klebsiella spp.</em></td>
<td></td>
</tr>
<tr>
<td>10 %</td>
<td></td>
</tr>
<tr>
<td><em>Proteus spp.</em></td>
<td></td>
</tr>
<tr>
<td>10 %</td>
<td></td>
</tr>
<tr>
<td><em>Bacillus spp.</em></td>
<td></td>
</tr>
<tr>
<td>10 %</td>
<td></td>
</tr>
<tr>
<td><em>Malassezia spp.</em></td>
<td></td>
</tr>
<tr>
<td>10 %</td>
<td></td>
</tr>
</tbody>
</table>

Table 4

Results of bacteriological examination of anal sacs liquid from examinated patients

<table>
<thead>
<tr>
<th>Afection</th>
<th>Identify germ (microflora procent/ type of affection)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinically healthy (n=3)</td>
<td><em>Staphylococcus</em> Nonhaemolytic (33 %)</td>
</tr>
<tr>
<td></td>
<td><em>Staphylococcus</em> beta-haemolytic (33 %)</td>
</tr>
<tr>
<td></td>
<td><em>Streptococcus</em> alfa-haemolytic (66%)</td>
</tr>
<tr>
<td></td>
<td><em>Bacillus</em> spp. (33%)</td>
</tr>
<tr>
<td>Sacculites (n=1)</td>
<td><em>Staphylococcus</em> beta-haemolytic (100%)</td>
</tr>
<tr>
<td>Impaction (n=2)</td>
<td><em>Staphylococcus</em> alfa-haemolytic (50%)</td>
</tr>
<tr>
<td></td>
<td><em>Staphylococcus</em> beta-haemolytic (50%)</td>
</tr>
<tr>
<td></td>
<td><em>Streptococcus</em> alfa-haemolytic (50%)</td>
</tr>
</tbody>
</table>
In the bacteriological strains we test different antibiotic (Table 5), and from those the most efficient was enrofloxacin (100%), doxycycline (60%) and cefovecon (30%).

<table>
<thead>
<tr>
<th>Proteus spp. (50%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abscess (n=4)</td>
</tr>
<tr>
<td>StaphylococcusNonhaemolytic (50%)</td>
</tr>
<tr>
<td>Staphylococcus alfa-haemolytic (25%)</td>
</tr>
<tr>
<td>Staphylococcus beta-haemolytic (25%)</td>
</tr>
<tr>
<td>StreptococcusNonhaemolytic (25%)</td>
</tr>
<tr>
<td>Streptococcus alfa-haemolytic (50%)</td>
</tr>
<tr>
<td>Klebsiellaspp. (25%)</td>
</tr>
</tbody>
</table>

Table 5

<table>
<thead>
<tr>
<th>Tested antibiotic</th>
<th>Sensibility (%)</th>
<th>Resistences (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoxicilline</td>
<td>10%</td>
<td>90%</td>
</tr>
<tr>
<td>Enrofloxacin</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Ceftiofur</td>
<td>20%</td>
<td>80%</td>
</tr>
<tr>
<td>Doxycycline</td>
<td>60 %</td>
<td>40 %</td>
</tr>
<tr>
<td>Penicilline/Erythromycine</td>
<td>0%</td>
<td>100 %</td>
</tr>
<tr>
<td>Trimethoprim/sulfamethoxazole</td>
<td>0 %</td>
<td>100%</td>
</tr>
<tr>
<td>Cefovecin (Convenia)</td>
<td>30 %</td>
<td>70 %</td>
</tr>
<tr>
<td>Colistin</td>
<td>10 %</td>
<td>90 %</td>
</tr>
</tbody>
</table>

The microbiological flora identify in liquid from anal sacs and pharinx has resistant to penicilline / erythromycin and trimethoprim / sulfamethoxazole, for this reason we didn’t recommend "empirical" use of those antibiotic for treatment of anal sacs or pharingian affection.

Statistical interpretation of data. We compare the data obtain from sample obtained from anal sacs and from these obtained from pharinx. The null hypothesis has represent that this two flora is indipended and doesn't exist any direct corelation between affection from tonsiles and the present of anal sacs affection.

Statistical evaluation of obtain data has done with SPSS v20 (IBM Software, IBM Corporation Statele Unite) programe, and using $\chi^2$ test with Fisher corection. This correction is needed because the total number of animal from study group was 10 (and for applying Pearson $\chi^2$ test we need 40 examine individuals).

Patogen statistical comparation between the germs identify from anal sacs liquid and tonsils reveal nostatistical values for Staphylococcus spp., Klebsiella spp and bacteria from Bacillus spp. The only statistical significative findings were for Streptococcus non haemolytic.

In 20% of the patients (N=2) we identify Streptococcus non haemolytic (Fig. 3) from both sample (anal sacs liquid and tonsils). In this situation $\chi^2$ test with
Fisher correction is significant, p<0.05 (p=0.022) (Table 6) for these germs the null hypothesis is rejected. But because the present of these germs is not always correlated with pathological alterations of anal sacs, or with abscess of anal sacs these represent most probably one saprophyte flora.

Table 6

<table>
<thead>
<tr>
<th></th>
<th>Streptococcus non haemolytic F</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Absent</td>
<td>Present</td>
</tr>
<tr>
<td><strong>Absent</strong></td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Count</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>% within Streptococcus non haemolytic A</td>
<td>100.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>% within Streptococcus non haemolytic F</td>
<td>100.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>% of Total</td>
<td>80.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Count</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>% within Streptococcus non haemolytic A</td>
<td>0.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>% within Streptococcus non haemolytic F</td>
<td>0.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>% of Total</td>
<td>0.0%</td>
<td>20.0%</td>
</tr>
<tr>
<td>Count</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>% within Streptococcus non haemolytic A</td>
<td>80.0%</td>
<td>20.0%</td>
</tr>
<tr>
<td>% within Streptococcus non haemolytic F</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>% of Total</td>
<td>80.0%</td>
<td>20.0%</td>
</tr>
</tbody>
</table>

Table 7

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
<th>Exact Sig. (2-sided)</th>
<th>Exact Sig. (1-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>10.000*</td>
<td>1</td>
<td>.002</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ContinuityCorrection</td>
<td>4.727</td>
<td>1</td>
<td>.030</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LikelihoodRatio</td>
<td>10.008</td>
<td>1</td>
<td>.002</td>
<td></td>
<td>.022</td>
</tr>
<tr>
<td>Fisher's Exact Test</td>
<td></td>
<td></td>
<td></td>
<td>.022</td>
<td>.022</td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>9.000</td>
<td>1</td>
<td>.003</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. 3 cells (75.0%) have expected count less than 5. The minimum expected count is .40.
b. Computed only for a 2x2 table
For alpha haemolytic *Streptococcus* tha twas present in 3 patients (Fig. 4) with anal sacs abscesses on the tonsil area but no alteration of these was observ. For these germs we didnt found any pathogenity for pharinx area.

For the only situation when we have both tonsillites and sacculites (Fig. 5) we found in pharinx area *Staphylococcus* nonhaemolytic and *Streptococcus* alpha-haemolytic (Fig. 6), but these germs we didnt found in anal sacs liquid. Is mean that for these germs didnt exist any correlation between colonization of pharinx from licking anal sacs area.

Fig. 3. The present of *Streptococcus* non haemolytic in anal sacs liquid

Fig. 4. The present of *Streptococcus* alfa haemolytic in anal sacs liquid

Fig. 5. Correlation between tonsillitis and anal sacs affection

Fig. 6. Presence of *Staphylococcus* non haemolytic in anal sacs liquid
Conclusions

The anal sacs infection is most frequent in female that in male, from younger age (3.85±3.1 years) that was previous describe in scientific literature and in all category of dogs.

The quantity of anal sacs liquids is in direct correlation with the present of affection at this level.

In our study the no direct correlation between microbiological flora existing on anal sacs and the microbiological flora existing on pharynx. The only microbiological flora existing in bought area was represented by *Streptococcus* nonhaemolytic (saprophytes).

The present of *Staphylococcus* hemolytic in anal sacs is more frequent correlated with development of anal sacs abscess.

Recomandation

Is not advisable empirical administration of antibiotic from Penicillin/Erythromycin and trimethoprim/sulfamethoxazole group in dogs with anal sacs and pharynx affection. If does not exist the possibility to perform antibiogram for those case, the first line of antibiotic, in our opinion, must be enrofloxacine.

References

ULTRASOUND FINDINGS IN HIP JOINT IN DOGS WITH AVASCULAR NECROSIS OF THE FEMORAL HEAD

R. C. PURDOIU, R. LĂCĂTUȘ, C. POPOVICI, I. PAPUC

University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Mănăștur Street No. 3-5, 400372, Cluj-Napoca, Romania
E-mail: robert.purduiu@usamvcluj.ro

Summary

Avascular necrosis of the femoral head (AVNFH) known as Legg-Calvé-Perthes disease (LCP) is a disease that affects young individuals from small breeds, with an uncertain etiology. The affection is located in the hip joint and could be unilaterally or bilaterally.

Using B mode ultrasound for evaluation of changes in AVNFH affected hip.

A number of 10 dogs, of 8 month to 12 months old, small breed were brought for radiography examination presenting limping in the posterior legs. Radiographic exposures were done in dorso-ventral recumbency to examine the acetabulum and the femoral head. B mode ultrasonography was performed using a linear probe of 7-10 MHz. Doppler ultrasound procedure was used to assess the vascularization of the hip.

The diagnostic of avascular necrosis of the femoral head was put base on the radiographic exposure. The acetabular cavity was wider that normal and the femoral head have lost his normal round shape. Because of joint incongruence the joint subluxate easily. The B mode ultrasounds reveal an irregular contour of the femoral head and hyperechoic areas were visible on the femoral head surface, the joint capsule was thickened and periarticular tissues have an increased echogenity with presence of small vessels.

B mode ultrasonography helps identifying the changes in the femoral head and also gives helpful information about the aspect and vascularisation of the adjacent tissues. Ultrasonography can be used as an alternative of radiography in assessing the changes of the hip joint.

Key words: avascular necrosis, dog, femoral head, ultrasonography

Avascular necrosis of the femoral head (AVNFH) is one of the causes of hind limbs lameness in dogs. The affection occurs in small dogs breed nearing skeletal maturity, most affected breeds are toy breed and terriers (1). The lesions could be localized uni or bilateral, the bilateral localization is up to 16% (1, 2).

The affection is known also under different synonyms, most often used are: “Perthes disease” and “Legg-Perthes” disease, “osteochondritis”, “coxae juvenilis”, “coxa plana” and “idiopathic osteosis” (1). The term of avascular/ischemic necrosis of the femoral head is used mainly in veterinary medicine and describe the ischemia induced necrosis of the subchondral bone (3, 4).

Ischemic necrosis of the femoral head was first described in human in 1937 (4, 5) and in veterinary medicine a similar condition was described by
Moltzen-Nielsen (4). Multiple theories were emitted concerning the etiology of the disease, the most common are:

- Juvenile osteoarthritis;
- Embolism;
- Congenital and hereditary factors;
- Acute or chronic repetitive trauma;
- Infection;
- Endocrine disorders (6).

The diagnostic of the disease is done mainly radiographically, the aim of this study was to test the B mode ultrasound method in the diagnostics of avascular necrosis of the femoral head.

**Materials and methods**

The biologic material was represented by a group of 10 dogs small breed, age ranging between 8-12 months, male and female, that were brought for radiography examination, presenting limping in the posterior legs. To study the sensibility and the specificity of the ultrasound method, another group of 10 dogs was selected, small breed, same age like the first group, without any kind of pathology. First group represented the study group and the second was the witness group.

The dogs from both groups had undergone a clinical examination of the locomotor system, radiography of the pelvis and coxo-femoral joint in ventro-dorsal recumbency and a B mode ultrasound examination of the coxo-femoral joint.

Clinical examination evaluates the presence, localization and degree of hind legs lameness. For the radiographic evaluation the dogs were positioned in dorsal recumbency without sedation, being held by the owner. The parameters used for radiography were 66-75 kV and 20-25 mAs.

Ultrasound examination was done using a Mindray DC-6 ultrasound machine with linear transducer of 7-10 Mhz. The dogs were restrained by their owners in dorsal recumbence and ultrasound examination was done in both coxo-femoral joints.

Each method of diagnostics evaluates the shape and aspect of the femoral head and the acetabular cavity. Radiographically there are described five major changes: flattening and unregularly articular surface, irregular density of the epiphysis, irregularity in the density of the metaphysis, increase width of the femoral neck, increase width of the joint space (7, 8, 9). Ultrasound evaluation took in consideration the deformation of the femoral head, increase in vascularization of the coxo-femoral joint, irregularity of the acetabular cavity.
Results and discussions

Both imagistic methods were evaluated taken in consideration the rapidity of the diagnostic method, the costs, sensibility, specificity, predictive value (positive and negative), global value of the method and also was tested the capability of each method to identify the changes induced by the disease upon the coxo-femoral joint.

Clinical evaluation imply identifying the place of lameness in the coxo-femoral joint, evaluation of pain and excluding other causes of lameness like patellar luxation (2).

Radiographic method is more used in the diagnostic of ANFH, being a rapid evaluation method of the coxo-femoral joint. The radiography reveal irregular surface of the femoral head and acetabular cavity, patchy femoral head with area of increase and decrease opacity, wide femoral neck (fig. 1, 2). Appearance of patchy area with different opacity is pathognomonic for AVNFH (2). In conical cases there is evident de new bone formation (fig. 3).

Fig. 1. Unilateral AVNFH, radiolucent area on the surface of the femoral head
Fig. 2. Unilateral AVNFH, changes in the femoral head and acetabular cavity

Fig. 3 Unilateral AVNFH, chronic stage, new bone proliferation on the femoral head.
Radiographic method offer, in a short time, an image of the coxo-femoral joint, after the patient is restrained on the table, it require approximately 30.4±8.2 s to obtain a digital image. One exposure in dorso-ventral recumbency is enough to evidentiate the changes in de coxo-femoral joint. The disadvantages of radiographic method are: the invasive character (ionized radiation), cost of the equipment, insufficient information about the degree of vascularization and in some cases the necessity of patient tranquilization. Also an improper adjustment of the parameter can give a false positive or negative result.

Ultrasound evaluation using B mode shown irregularity of the femoral head, increase vascularization of the coxo-femoral joint capsule compared with a normal coxo-femoral joint (fig. 4, fig. 5, fig. 6).

Fig. 4. Unilateral AVNFH, (A) - deformation of the femoral head, appearance of fibrotic tissues, irregularity of the femoral head surface; (B) – normal ultrasonographic aspect of the femoral head
Fig. 5 A – Normal ultrasonographic aspect of the femoral head; B – Ultrasonographic aspect of the femoral head in AVNFH, new vessels are visible in the femoral head.

Fig. 6 A – AVNFH hypodense aspect of the femoral head, lack of mineralization, increase vascularization of the joint capsule; B – Normal aspect of the femoral head.

Ultrasonographic technique offers a detailed view of the surface aspect of the femoral head giving insight of the vascularization of the femoral head and...
surrounding area. Decrease mineralization permit ultrasound to penetrate deep in de bony structure. The disadvantages of this technique are represented by the increase time necessary for a proper evaluation (8.7±3 min), is an operator dependent method and do not offer a global view of the joint.

Regarding the cost of investigation both method are easy to be supported financially by the owner.

In term of sensibility and specificity of the methods we have taken in consideration the false positive and the false negative results (table 1, table 2) for both methods.

\[ \text{Table 1} \]

<table>
<thead>
<tr>
<th>Method</th>
<th>AVNFH</th>
<th>Healthy</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiology</td>
<td>Positive</td>
<td>9 (tp)</td>
<td>2 (fp)</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>1 (fn)</td>
<td>8 (tn)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

\[ \text{tp – true positive; fp – false positive; fn – false negative; tn – true negative}\]

\[ \text{Table 2} \]

<table>
<thead>
<tr>
<th>Method</th>
<th>AVNFH</th>
<th>Healthy</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ultrasonography</td>
<td>Positive</td>
<td>8 (tp)</td>
<td>3 (fp)</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>2 (fn)</td>
<td>7 (tn)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

\[ \text{tp – true positive; fp – false positive; fn – false negative; tn – true negative}\]

Base on the contingency tables we have calculated the sensibility (Se), specificity (Sp), predictive value of positive result (PVP), predictive value of negative results (PVN) and the global predictive value (GV) for both imagistic methods used in evaluation of the AVNFH (table 3).

\[ \text{Table 3} \]

<table>
<thead>
<tr>
<th>Method</th>
<th>Se%</th>
<th>Sp%</th>
<th>PVP%</th>
<th>PVN%</th>
<th>GV%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiology</td>
<td>90.00</td>
<td>80.00</td>
<td>81.82</td>
<td>88.89</td>
<td>85.00</td>
</tr>
<tr>
<td>Ultrasonography</td>
<td>80.00</td>
<td>70.00</td>
<td>72.73</td>
<td>77.78</td>
<td>75.00</td>
</tr>
</tbody>
</table>

According to data obtained base on contingency tables the high sensibility and specificity values in diagnostic of AVNFH has the radiographic technique
(Se=90%, Sp=80%) and global predictive value of 85% compared to the ultrasound metho
d.

Conclusions

For the diagnostic of AVNFH the best results are given by the radiographic technique, being a rapid method, with high sensibility and specificity and its offer a whole view of the coxo-femoral joint. Ultrasonographic method can be used as a method of diagnostic in chronic cases of AVNFH in absence of radiographic examination, increase sensibility and specificity of B mode ultrasound make a valuable technique of AVNFH screening.

B mode ultrasonography helps identifying the changes in the femoral head and also gives helpful information about the aspect and vascularisation of the adjacent tissues. Ultrasonography can be used as an alternative of radiography in assessing the changes of the hip joint.

References

Background: Chronic kidney disease (CKD) is one of the most common pathologies and leading cause of death in elderly cats. Clinical signs usually become multisystemic as the illness progresses.

Objective: The present retrospective study aims to analyze the major clinical findings and the possible contributing factors to the appearance and progression of renal disease.

Methods: The clinical records of all feline patients presented at the Faculty of Veterinary Medicine of Iasi were studied. The parameters taken into consideration were: vital signs, mentation, eating and digestive tract disorders, weight loss, type of food and urinary tract infections. All statistical analyses were performed with a statistical software package; using Mann Whitney and Ttest paired samples tests, with a significance level at p ˂ 0.05.

Results: From all patients diagnosed with kidney failure, 21 were included in this study. The inclusion criteria was based on complete clinical examination, blood and urine biochemical analyses, and abdominal ultrasound. In terms of severity of the illness 61.9 % of the patients were diagnosed with stage IV CKD. The majority of the cats (61.9%) were males, and 60 % of the felines from this group were older than 14 years.

Conclusion: Chronic kidney disease is a progressive and most of the time irreversible illness, affecting almost one third of the cats over 14 years old. Prevention and early detection is difficult, but the best methods still remain regular physical examination, routine bloodwork and thorough history-taking.

Key words: chronic kidney failure; clinical findings; blood biochemistry, cats.

Chronic kidney disease (CKD), known also as chronic kidney failure, represents one of the most diagnosed illnesses in geriatric cats, being as well a leading cause of death. The incidence of this diagnosis is two to three times more frequent in cats compared to dogs, and is characterized by variable and irreversible lesions of the renal mass and progressive loss of function.

This pathology has multiple etiologies, such as congenital problems, neoplasia, infections, and a variety of systemic condition, or an unidentified process. Most of the times the cause of CKD cannot be established.

Clinical signs as well as serum or plasma biochemical evidence usually appear when three quarters of renal functioning tissue is lost. Clinical history reveals a series of manifestations such as pyuria/polydipsia, anorexia, weight loss,
vomiting, that can be attributed to the reduced capacity of the kidneys to filter waste products and to regulate electrolyte balances within the body (1, 6, 7).

Materials and methods

The research was conducted in the Internal Medicine Clinic of the Faculty of Veterinary Medicine Iasi between October 2014 and February 2016. The clinical records of 72 cats were studied. Of these patients 38 had obvious clinical signs and diagnosis was confirmed by serum biochemical analysis. Of all patients 21 had chronic kidney diseases.

The diagnosis of chronic kidney failure was done after identifying early clinical manifestations observed by the owner prior to the consultation, after analyzing blood work results and ultrasound images of the kidneys.

Blood sampling was carried out mainly from cephalic and jugular vein in an amount of 3 to 5 ml, and distributed in clotting activator tubes and tubes with EDTA.

Blood work was done using Cormay Accent chemistry analyzer; complete blood cell count was performed using vet ABC Hematology Analyzer; ultrasound imaging was obtained using Aquila ProVet ultrasound machine from Esaote Piemedical.

The degree of impairment of renal function was established according to the IRIS staging system (table 1).

<table>
<thead>
<tr>
<th>Stage</th>
<th>Serum creatinine concentration (mg/dl)</th>
<th>Serum creatinine Concentration (μmol/L)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&lt; 1.6</td>
<td>&lt; 140</td>
<td>Nonazotemic. Often discovered fortuitously during routine examination. May have evidence of decreased urinary concentrating ability or proteinuria. Usually no obvious clinical signs. May be polyuric.</td>
</tr>
<tr>
<td>2</td>
<td>1.6-2.8</td>
<td>140-249</td>
<td>Mildly azotemic. Decreased urinary concentrating capacity. May have proteinuria. Clinical signs minimal. May have polyuria and polydipsia.</td>
</tr>
<tr>
<td>3</td>
<td>2.9-5.0</td>
<td>250-439</td>
<td>Moderate azotemia. Decreased urinary concentrating capacity. May have proteinuria. Many systemic clinical signs may be present.</td>
</tr>
<tr>
<td>4</td>
<td>&gt; 5.0</td>
<td>&gt; 440</td>
<td>Severe azotemia. Decreased urinary concentrating capacity, proteinuria. Systemic clinical signs present and may be severe.</td>
</tr>
</tbody>
</table>

Table 1: Serum creatinine concentrations for assignment of IRIS stage of CKD in cats (Chew D.J. et al, 2011)
Statistical analysis was performed with a statistical software package (IBM SPSS 21); using Mann Withney and Ttest paired samples tests, with a significance level at $p < 0.05$.

The parameters taken into consideration were: vital signs, mentation, eating and digestive tract disorders, weight loss, urinary tract infections, heart conditions, level of liver enzymes and type of food.

**Results and discussions**

Statistic analysis revealed that 60% of the patients included in the study were over 14 years old, mean age was 13.5. Most of the cats were neutered males (61.9 %), a identical proportion (61.9%) was represented by patients diagnosed with end stage (stage IV) kidney disease and specific clinical findings (table 2).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creatinine</td>
<td>1.66</td>
<td>28.70</td>
<td>6.9757</td>
<td>6.07793</td>
</tr>
<tr>
<td>Urea</td>
<td>71.20</td>
<td>689.10</td>
<td>272.7429</td>
<td>173.37893</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>3.00</td>
<td>24.30</td>
<td>10.9294</td>
<td>7.02048</td>
</tr>
<tr>
<td>Potassium</td>
<td>3.00</td>
<td>9.00</td>
<td>4.0625</td>
<td>1.42542</td>
</tr>
</tbody>
</table>

Digestive signs often reported were polydipsia, changes in appetite, transit and vomiting. Thus selective appetite was mentioned in 35.3 % of patients, in 64.7% of cats the appetite was absent. Vomiting was registered in 58.3 % of the subjects. Pica (28.6% of patients) was manifested through occasional consumption of small quantities of sand from the litter box, often followed by vomiting (table 3).

<table>
<thead>
<tr>
<th>Historical findings</th>
<th>Per cent patients</th>
<th>Physical findings</th>
<th>Percent patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>polydipsia</td>
<td>59</td>
<td>small kidneys (uni- or bilateral)</td>
<td>50</td>
</tr>
<tr>
<td>poor appetite</td>
<td>64.7</td>
<td>hypothermia</td>
<td>55.5</td>
</tr>
<tr>
<td>weight loss</td>
<td>94.4</td>
<td>BCS ≤ 2</td>
<td>38.8</td>
</tr>
<tr>
<td>vomiting</td>
<td>58.3</td>
<td>tachycardia/cardiac murmur</td>
<td></td>
</tr>
<tr>
<td>depressed</td>
<td>44.4</td>
<td>pale mucous membranes</td>
<td>63.4</td>
</tr>
<tr>
<td>dysphagia/oral discomfort</td>
<td>21.05</td>
<td>dehydration</td>
<td>89.4</td>
</tr>
<tr>
<td>digestive transit (reduced)</td>
<td>87.6</td>
<td>periodontal disease</td>
<td>29.5</td>
</tr>
</tbody>
</table>
Statistic analysis did not reveal a correlation between pica and phosphorus level ($r^2=294$), or the presence of anemia ($r^2=-186$), but a larger distribution of the cases with this eating disorder was recorded in the range 13.7-24.3 mg/dl of phosphorus value (Fig. 1).

Fig. 1. Distribution of patients in which pica was registered in correlation with phosphorus level

Lower urinary tract disease consisting in the presence of an inflammatory response of the urinary bladder was reported in 57.1 % of the patients. Diagnosis was based on the thickening of the bladder wall, observed on ultrasound, as well as on urinary cytology which was characterized by the presence of a high number of neutrophils and bacterial cells. The studies mentioned by Ettinger et al (2006) explain that lower urinary tract infection may occur in this type of cases as a result of a compromised immune system, secondary to CKD (5, 6).

Physical examination and complete blood cell count revealed anemia in 64.3% of the cats. Anemia in CKD appears usually due to erythropoietin deficiency, chronic blood loss, caused by the irritating effect of urea and other toxins have on mucous membranes and malnutrition. In the study by Chalhoub et al, was reported a 30-65% frequency of anemia in cats with CKD, with its progression as clinical signs get worse (table 3) (3, 6).

Cardiac examination (ECG and ultrasound) marked the presence of hypertrophic cardiomyopathy, and signs of arterial hypertension in 63.6 % of the cats.
In the study by Hickey et al (2014) was demonstrated that compared to young and adult cats without kidney disease, those with renal impairment were more susceptible to heart disease, especially hypertrophic cardiomyopathy with OR: 4.9, 95% CI: 1.4-18.1, p = .004 for young cats (under 5 years) and OR 4.7, 95% CI: 2.15-11.0, p <.001 for adult cats (over 7 years) (9).

Liver enzymes (ALT, AST, and GLDH) were elevated in 75 % of the patients; this is due to lipidosis, heart failure and even ischemic injury caused by severe anemia (6).

The types of food noted on the patient’s medical chart included in commercial dry foods, diets, cooked food and mixed diets (cooked and dry food). Majority of patients, 70.6% were fed with commercial dry food, 23.5 % were on different diets. Similar reports have been noted in the study by Green in 2014, from a total of 1,230 cats with CKD, 64% were fed dry food before being diagnosed. There are assumptions that the food, especially dry food, would pose a risk in the occurrence and progression of chronic kidney disease due to exposure to possible nutritional imbalances and the low content of water, which could expose animals to a state of chronic mild dehydration. Another risk factor for onset and progression of kidney disease can be free-feeding according to the study by Hughes et al. (2002). All patients included in this study were fed in this manner (8, 10).

In the case of patients diagnosed with CKD it is recommended that a feeding the patients with a diet with reduced content of protein and moisture content of at least 70% (2, 10, 11.)

Conclusions

Chronic kidney disease (CKD), known also as chronic kidney failure, represents one of the most diagnosed illnesses in geriatric cats. Clinical signs as well as serum or plasma biochemical evidence usually appear when three quarters of renal functioning tissue is lost. CKD is an multisystem pathology and can be accompanied by cardiac failure, anemia, digestive disorders and lower urinary tract disease.

References


ISOFLURANE INHALATION ANESTHESIA DEEP MONITORING, IN PIGEONS

LARISA SCHUSZLER, ROXANA DASCĂLU, ADELINA PROTEASA, A. SZABO, B. SICOE, D. BUMB, C. IGNA

Banat’s University of Agricultural Science and Veterinary Medicine, “King Mihai I of Romania” from Timisoara, Faculty of Veterinary Medicine, 300645, Calea Aradului, No 119, Timisoara, Romania
E-mail: larisaschuszler@yahoo.com

Summary

The study was conducted on ten healthy domestic pigeons (Columba livia var. Domestica). In the first phase of the study isoflurane was supplied by endotracheal tube for 45 minutes. In the second phase, the following 45 minutes, anesthetic gas was provided through the cannulated left caudal thoracic air sac. There were used different concentrations of isoflurane and different oxygen flows in semi-open respiratory system. The deep of general anesthesia was assessed using a scale and MAC concentration was measured. Statistical analysis was performed with Student t-test and for correlations between nonparametric data were used Friedman and Wilcoxon tests. Assessment of CNS inhibition depth only by testing reflexes is limited, nonparametric tests reveal significant differences in individual response and also raise the issue of necessity to establish the relevance of each reflex in assessing the depth of narcosis. MAC values greater than or equal to 1%, signifying a medium to deep anesthetic plane, were obtained in 13% of determinations in the first stage of the experiment and in 21% in the second stage, these values being obtained when the vaporizer was set at 2%.

Key words: pigeons. isoflurane. reflexes. MAC.

The concentration of anesthetic from the alveolar gas reasonably approximates it’s concentration in the brain. As a measure of the anesthetic "power", the so-called minimum alveolar concentration (MAC) is used. 1 x MAC will produce light anesthesia in 50% of patients (5). Due to the fact that birds don’t have lung alveoli, MAC defines minimum anesthetic concentration needed to prevent sudden movements of a bird on whose behalf the painful stimuli (7).

In this paper work, we intended to establish the depth of anesthesia and MAC values at pigeons maintained for a period of 90 minutes under isoflurane inhalation anesthesia. The isoflurane was administered via tracheally and via caudal thoracic air sac.

Materials and methods

The study was conducted on ten healthy, young domestic pigeons (Columba livia var. Domestica), having 365 g ± 70 body weight.
As premedication, the birds were given IM ketamine 10% solution (Ketamine®, Alfasan, Woerden) adjusted to a concentration of 1%, at a dosage of 20 mg/kg. The birds were then intubated and isoflurane (Isoflurane, Rhodia Limited) in oxygen was delivered through semi-open non rebreathing respiratory circuit. For induction of narcosis which lasts five minutes, isoflurane was administrated at a concentration of 4% in an oxygen flow of 500 ml/min. In the first phase of the study isoflurane was administered in three different concentrations, 0.5, 1 and 2 %, in stages of five minutes. For each concentration, there were used three different oxygen flows, 100, 200 and 300 ml/100 g body weight/minute. The same protocol was used in the second phase of the study, in which isoflurane was supplied by a tube placed in the left caudal thoracic airsac.

The deep of general anesthesiawas assessed using the following scale:

1 = superficial plane of anesthesia
- normal eyelide reflex,
- normal corneal reflex,
- lack of voluntary movements,
- no response to postural changes,
- lids tend to remain closed,
- immediate withdrawal reflex;

2 = middle plane of anesthesia
- absent eyelide reflex,
- diminished corneal reflex,
- without opposition to postural changes,
- head falls down,
- poor response to external stimuli (sound or hand movement in the visual field),
- diminished/delayed withdrawal reflex;

3 = profound plane of anesthesia
- absence of all reflexes,
- no response at leg finger pinching.

MAC concentration was measured using Capnomac Ultima monitor. The displayed values were noted every five minutes. Statistical analysis was performed with Student t-test, where values of p≤0.05 were considered significant differences. The resulting data were expressed as mean ± standard deviation.

For correlations between nonparametric data represented by reflexes tested to assess CNS inhibition, the Friedman and Wilcoxon tests were used, considering significant differences for values of p ≤ 0.05.

Results and discussions

By testing eyelid, corneal and foot withdrawal reflexes, by assessing muscle tone and observation of eyelid position, it was possible the subjective assessment of CNS inhibition degree, therefore the depth of anesthesia. It’s dynamics in pigeons enrolled in the study is shown in figures 1 and 2.
Wilcoxon test used to compare differences between the two stages of work, in part for each reflex, for each different concentration of narcotic and oxygen flow, reveals significant differences for:

- eyelid reflex at the 1% isoflurane concentration and oxygen flow of 200 ml/100 g (p=0.034) and 300 ml/100 g (p=0.038) and at the 2% isoflurane concentration and same oxygen flows (p=0.14 or 0.38);
- pedal reflex at 2% isoflurane concentration and oxygen flow of 200 ml/100 g (p=0.014) and 300 ml/100 g (p=0.015);
- muscle tone at 2% isoflurane concentration and oxygen flow of 300 ml/100 g (p=0.034).

These data reflect the increase of inhibition with the increasing of inhaled anesthetic concentration.

Fig. 1. The dynamics of general anesthesia in first phase of the experiment

Fig. 2. The dynamics of general anesthesia in the second phase of the experiment
Friedman test applied in order to reveal the differences between birds, at each phase of the study, taking into account all parameters, highlights significant differences in the individual response in both phases of the study ($p = 0.000$). This result indicates the limits of CNS inhibition assessment only by testing reflexes, and also the need to establish the share of each reflex in assessing the depth of narcosis and, not least, their order of testing, so that the response obtained when will be tested the next reflex will be not influenced. For example, in this study where no anesthetic association was used, and therefore the components of general anesthesia, muscle relaxation, analgesia, autonomic nervous system stability and narcosis, have not been achieved in a balanced way and at maximum potential, so testing the pedal reflex can stimulate the bird and the answer to the following reflexes become positive or exaggerated.

Statistical analysis of MAC reveals the following:
- throughout the entire group there are no statistically significant differences between the two phases of the experiment regarding MAC values at different oxygen flows or at different isoflurane concentrations ($p=0.178$);
- for each phase of the study, by analyzing the entire group, statistically significant MAC differences correlated with oxygen flows and anesthetic concentrations were found;
- by comparing individual evolution in the two phases of the experiment, it reveals in five doves a statistically significant difference (individuals 5, 6, 7, 8 and 9), meaning the majority of average MAC values were significantly higher in the second phase of the experiment (table 1). Overall, however, these differences did not affect the final outcome of the whole group. It should be noted that in four individuals during second phase, the overflow gas outlet from the breathing circuit was kept closed.

In other words, there is no change in MAC dynamic on how the anesthetic reaches the airways, namely by endotracheal tube or by tube introduced in one airsac. The results are somewhat surprising because the data in the literature show that if anesthesia is maintained by means of cannulated airsac, the normal pattern of gas flow changes on the cannulated side, and also, it would require a higher gas flow to make sure that the gases flow to the lungs (1).

As expected, MAC is influenced both by the flow of oxygen and the concentration of the anesthetic, increasing significantly with their growth. Every modification of one of these two items involve significant MAC changes.

In birds, inhaled anesthesia can be achieved with many breathing systems without rebreathing. This requires a relatively large flow of oxygen to remove carbon dioxide from the circuit. The high gas flow will bring an important benefit, namely will ensure the rapid equilibration of the anesthetic when changes are made in its concentration (4). However, the optimal value of the flow must be found in order to not remove carbon dioxide in such manner that apnea is induced due to hypocapnia (6).
Table 1

### MAC values (%) in pigeons in the two phases of the experiment (average ± standard deviation)

<table>
<thead>
<tr>
<th>Isoflurane concentration %</th>
<th>0.50</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen flow ml/100 g</td>
<td>0.50</td>
<td>0.38</td>
<td>0.34</td>
</tr>
<tr>
<td></td>
<td>± 0.16</td>
<td>± 0.08</td>
<td>± 0.11</td>
</tr>
<tr>
<td>MAC value in pigeons without significant statistically differences n=5</td>
<td>0.32</td>
<td>0.32</td>
<td>0.32</td>
</tr>
<tr>
<td></td>
<td>± 0.15</td>
<td>± 0.15</td>
<td>± 0.11</td>
</tr>
<tr>
<td>MAC value in pigeons with significant statistically differences n=5</td>
<td>0.34</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>± 0.15</td>
<td>± 0.12</td>
<td>± 0.12</td>
</tr>
<tr>
<td>MAC value in pigeons without significant statistically differences n=5</td>
<td>0.36</td>
<td>0.34</td>
<td>0.36</td>
</tr>
<tr>
<td></td>
<td>± 0.19</td>
<td>± 0.18</td>
<td>± 0.21</td>
</tr>
</tbody>
</table>

Up to now, there were no established specific oxygen flows for birds. Like mammals, when the breathing circuit includes the "T" shaped piece, it appears to be effective flows greater by two or three times than minute volume (4). In other words, for a dog it would be a flow of 340-900 ml/kg/minute (9). Other authors recommend a flow of 150-200 ml/kg/minute (10) or 300 ml/kg/minute (6). It should, however, be borne in mind two aspects. Considering patient weight, in some cases, the final oxygen flow is low, and anesthesia machines must have adapted flowmeters for these low flows (6). The anesthesia machine wherewith was worked has a not so great accuracy of the flow. On the other hand, in order to ensure an efficient vaporization of the anesthetic when the oxygen flow is passing through the vaporizer chamber, it should be a minimum of 500 ml/minute (3). The oxygen flow in this study was much higher, namely 1 l/kg/minute, 2 l/kg/minute and 3 l/kg/minute, which means in relation to pigeons' weights a final value of the oxygen flow between 295-438 ml/ minute, 590-876 ml/minute or 1180 to 1652 ml/minute. Considering the two issues mentioned above, we believe that the optimum flow that has been used is 2 l/ kg/minute (200 ml/ 100 g/minute). This is confirmed from data resulting through MAC values analysis in each work stage, and by the depth of anesthesia.

MAC values in the first phase of the study have ranged between 0.2 and 1.5%. Of the 90 measurements, only in 13% of them the MAC value was greater than or equal to 1%. These concentrations were obtained when the vaporizer was set at a concentration of 2%. In the second phase of the experiment, the limits
within which MAC was framed were larger, from 0.1% to 1.7%. The MAC value was greater than or equal to 1% in 21% of measurements, these values were obtained also when the vaporizer was set at 2%.

In studies conducted on the Pekin duck, it has been found that apnea and/or unacceptably high values of blood carbon dioxide occurs when MAC is greater than 1.5% (8), situations not encountered in this study.

MAC value is very similar for many species. Birds require nearly the same concentration of inhaled anesthetic as mammals due for an equivalent stimulus. Isoflurane MAC value in chickens is equal to 1.32%, and in duck 1.30% (4, 8). Other authors indicate values of 1.25%, respectively 1.32% (7). Anesthetic dose is expressed in multiples of the MAC. Surgical anesthesia is usually achieved at 1.2-1.5 x MAC when anesthesia is maintained only with an inhaled agent (5).

MAC values fall in numerous situations, including when prior to inhalation anesthesia, a premedication is given (5). Therefore, the values obtained in this study are not surprising, but as shown from the narcosis depth analysis correlated with the results of reflexes’ testing, with MAC values less than 1% it was registered an superficial anesthetic plane.

Since in the vast majority of situations, an anesthetic gas analyzer is not available, and MAC value remains unknown, it is recommended that, for the induction, when isoflurane anesthesia is made, to set the vaporizer at 4-5%, and maintenance to be carried out with concentrations of 2-3% (2). Some authors, however, state that to maintain surgical tolerance there are differences between the bird species, for pigeons being sufficient concentrations of 2.4±0.2% (6).

Conclusions

Assessment of CNS inhibition depth only by testing reflexes is limited, nonparametric tests revealing significant differences in individual response and also raises the issue of necessity to establish the relevance of each reflex in assessing the depth of narcosis.

There are no changes in the MAC dynamic correlated with how the anesthetic reaches the airways, by endotracheal tube or by tube placed in the caudal thoracic air sac.

MAC values greater than or equal to 1%, signifying an medium to deep anesthetic plane, were obtained in 13% of determinations in the first stage of the experiment and in 21% in the second stage, these values being obtained when the vaporizer was set at 2%.

In pigeons in which the air sac was the way in which the anesthetic gas was administered and the overflow gas outlet was kept closed, tended to reduce the respiration rate and higher values of the MAC compared to the first stage of the study were noted.
Acknowledgements

This research work was carried out with the support of the project Dezvoltarea infrastructurii de cercetare, educație si servicii in domeniile medicinei veterinare si tehnologiilor innovative pentru RO 05. cod SMIS_CSNR 2669.

References

CLINICAL, ELECTROCARDIOGRAPHIC AND ECHOGRAPHIC FEATURES IN HYPERTROPHIC CARDIOMYOPATHY IN CATS

I. SCURTU

USAMV Cluj-Napoca, Manastur Street No. 3-5, Cluj Napoca, Romania
E-mail: iuliu.scurtu@usamvcluj.ro

Summary

Hypertrophic cardiomyopathy represents the most frequent type of acquired heart pathology diagnosed in cats. This pathology is characterized by generalized or regional left posterior wall or interventricular septum enlargement. In this retrospective study we included sixty-five cats. Nine out of sixty-five cats were diagnosed with hypertrophic cardiomyopathy. The most frequent clinical signs diagnosed were: murmur, dyspnea, polypnea, posterior leg ataxia, weakness and weak pulse. Three out of nine cats were asymptomatic, HCM was diagnosed during a routine health checkup. On ECG we identified low R wave amplitude (in cats with pleural effusion), sinus tachycardia and ventricular tachycardia. Echographically we found global and regional left ventricular enlargement, left atrium dilation ± thrombi, pleural effusion, SAM with concurrent mitral regurgitation. Echographycally we found global and regional left ventricular enlargement, left atrium dilation ± thrombi, pleural effusion and SAM with concurrent mitral regurgitation. The cats presented different types of diastolic dysfunction. Six out of nine presented grade 2 pattern (impaired relaxation), one presented pseudo-normal pattern and two out of nine restrictive pattern.

Key words: HCM, cat, SAM, echocardiography, ECG

Hypertrophic cardiomyopathy (HCM) is the most common heart pathology diagnosed in cats. It is characterized by global or regional increasing of left ventricle wall thickness with consequently impaired diastolic function. Cats with HCM could be completely asymptomatic (9), but could also display an array of symptoms suggestive for HCM. HCM preclinical period can last the entire life or progress to congestive heart failure, thromboembolic events and sudden death (10). The prevalence of HCM is not known with certainty but is considered to be around 14-16% (12,13). The most reliable tool for HCM diagnosis is echocardiography. It is considered that left ventricle wall (LVWd)>6 mm in diastole is specific for HCM (4, 13)). A wall thickness between 5.5 and 6 mm is considered border line (19) while a wall thickness less than 5 mm is considered normal. Because wall thickness hypertrophy is not all the time generalized it is recommended to perform measurements in 2D rather than M Mode; M mode gives a good temporal resolution but may underestimate wall thickness by missing regional hypertrophy (5).
Materials and methods

Sixty-five cat owners were enrolled in this study, but only nine cats met inclusion criteria. Inclusion criteria: LVWd>6 mm (diffuse or regional). Exclusion criteria: hyperthyroidism, systolic hypertension, aortic stenosis and pseudohypertrophy (dehydration).

Hyperthyroidism was ruled out or confirmed based on T4 and TSH determinations. For systemic hypertension measurements (>180 mm Hg) we used a Doppler device, and aortic stenosis was ruled out after peak aortic velocity measurements from apical view. Pseudohypertrophy was ruled out or confirmed based on packed cell volume (PCV) and total protein concentration evaluation.

ECG was recorded with a digital device (Poly Spectrum) using 6 standard leads. For this record cats were gently restrained in their own basket.

Echocardiography was performed by the same trained investigator using a 7.5 MHz phased array probe (MyLab 40 Vet). Hair was clipped in the right and left thorax and echocardiography was performed using a cut-out table from underneath. IVSd and LVWd were measured in 2D mode, long axis (LAx) and/or short axis (SAx) from the first frame in which the mitral valve was closed. Left atrium to aorta ratio (LA:Ao) was approached from right side SAx. Left atrium was also examined from LAx and apical view.

Left ventricular outflow tract obstruction was defined as a late systolic accelerating Doppler velocity profile with a velocity >2.5 m/s in conjunction with the presence of systolic anterior motion of the mitral valve (SAM) (10).

Results and discussions

Two out of nine cats (22.22 %) presented systolic murmur with point of maximum intensity located over the left sternal border. Murmur grade in all cats was 3/6. The murmur was related with the presence of systolic anterior motion of mitral valve (SAM). One cat (11.11 %) had signs of thrombosis of the terminal aorta (ataxia, weak pulse, cold leg and cyanosis of the nail beds). Two out of nine (22.22 %) cats presented severe dyspnea due to pleural effusion and three out of nine (33.33 %) cats did not reveal any clinical sign, when diagnosed after a routine echocardiography. The average heart rate in nine cats (three asymptomatic HCM and six clinically manifested HCM) was 215 beats/min (range 120-300). The highest frequency was found in cats with dyspnea. Wagner found an average heart frequency of 190 (range 120-292) in cats with HCM. Similar results have been found by Smith, median heart frequency being 190/min.

In most cases, ECG revealed sinus tachycardia. One cat presented paroxistic ventricular tachycardia. In one report, arrhythmia was mentioned to occur in 13 % of cats, records performed while the cats were hospitalized (2). Jackson performing Holter exam in cats with HCM, found ventricular arrhythmias in all cats) (17/17), 82% (14/17) exhibiting complex arrhythmias (couplets, triplets or
ventricular tachycardia). It is interesting that normal cats from the control group (14/15) presented also ventricular arrhythmias, but only 3/15 exhibited complexity. The difference between cats with HCM and normal cats was arrhythmia complexity. Low R wave amplitude was noticed in case of pleural effusion.

Left atrium was enlarged in all cats (Fig. 2A, 2C). Left atrium width (from interatrial septum to left atrial posterior wall, parallel to the mitral valve) was 25.26±3.96 mm and LA:Ao ratio was 2.07±0.27 (cut off value <1.5). The cut off value for LA width is 16 mm (1). Substantial left atrial enlargement and dysfunction can be associated with shortened survival in cats with HCM and it is an indicator of chronic atrial pressure overload (3).

Left atrial thrombosis was found in one cat. The cat had one big thrombus attached by left atrium wall and other floating freely within left atrial chamber (Fig. 2B). Spontaneous contrast, also called „smoke”, was present as well. In the cat, left atrium (LA) was very large (30 mm), and La:Ao>3. The cat was able to walk at the time of examination, but 24 hours later signs of obstruction of terminal aorta (cyanosis, extremely weak pulse, paresis, cold legs) developed. The cat died 36 hours after diagnosis. In human patients, left atrial spontaneous echocardiographic contrast is a significant predictor of thrombus formation and thromboembolic events (3, 18). The frequency of left atrial thrombus has been reported to be from 5 to 17 % (7, 14) so our findings (11 % of cases presented LA thrombus) are in a direct correlation with literature data. Mortality rates due to cardiogenic arterial thromboembolism are 61%-67% (8, 17). In all nine cats diagnosed with HCM the left ventricular wall was thicker than 6 mm. LVWd>6 mm is cut off value for HCM in cats (13). Cats with LVDd<6, but > 5.5 are included into the „grey zone” and a further check up will be necessary. All nine cats from our study had global left ventricle hypertrophy (8.18±1.02 mm), but in some cats, hypertrophy could be limited to the interventricular septum or to the free wall only (Fig. 1A, 1B). HCM needs a differential diagnosis for acromegaly, lymphoma, congenital aortic stenosis (13) or hyperthyroidism. LVWd or IVSd>9 mm represent a risk factor for severe complications in cats with HCM (3).

Abnormal LVW thickness leads to diastolic dysfunction. By definition, diastolic dysfunction refers to abnormalities of active myocardial relaxation (slowed, delayed or incomplete return of myofibrils to pre-systolic length and tone) (16) and passive compliance (decreased myocardial viscoelasticity leading to decreased chamber volume relative to any change in pressure (15). Diastolic dysfunction is an early event in the pathophysiology of myocardial disease and severity of dysfunction is direct related to the severity of LV hypertrophy and a predictor of poor outcome (15). All the cats in our study presented different types of diastolic dysfunction. Six out of nine (66.66 %) presented impaired relaxation pattern, with E wave smaller than A wave (E:A<1). One cat (11.11%) presented pseudo normal pattern. Two cats (22.22%) presented restrictive filling pattern with very large E wave and small A wave (E:A>2) which indicates a severe diastolic dysfunction (Fig. 2D). Restrictive filling patterns are associated with increased risk of congestive
heart failure in cats with cardiomyopathy and provide important prognostic information (13, 15).

Fig.1. A. LAx with left ventricular free wall enlargement. B. Left ventricular free wall enlargement with a clot within LA. C. D. Different aspects of SAM

Fig.2. A. C. SAx – LA:Ao ratio. B. Two clots within LA. D. Apical view. Pulsed wave Doppler – restrictive filling appearance
Progression from one stage to the next is not always sequential and linear. Some cats progressing from mild to severe dysfunction steadily within several years while others can progress only within a few hours or days. Systolic anterior motion of mitral valve (Fig. 1C, 1D) was identified in two cats (22.22 %) cats that also presented restrictive diastolic pattern also. We do not consider that restrictive pattern must be related with SAM. Kittelson has found that SAM is often diagnosed in cats with HCM, evolving in asymptomatic cats, before left ventricular wall hypertrophy is evident (11). SAM is characterized by systolic displacement of anterior mitral valve leaflet towards the septum, which in turn, causes a narrowing of the LV outflow tract (6). Dynamic LV outflow tract obstruction is usually associated with a heart murmur (6).

Conclusions

HCM is the most frequently diagnosed disorder in cats. This disease could evolve silent for a longer period of time, but could also display an array of suggestive clinical signs. For a definitive diagnosis echocardiography is needed, which is the most important tool for HCM screening. Our data are strongly related with findings from literature.

References

3. **Fox, P., Schober, K.,** Management of asymptomatic (occult) feline cardiomyopathy, changes and realities, J of Vet Cardio, 2015, 17, S150-S158.
8. **Hogan, F.D., Fox, R.P., Jacob, K., Laste, N., Rosenthal, S., Weng, H. Y.,** Secondary prevention of cardiogenic arterial thromboembolism in the cat,
The double-blind, randomized, positive-controlled feline arterial thromboembolism; clopidogrel vs. aspirin trial (FAT CAT), J of Vet Card, 2015, 17, S306-S317.


13. Payne, J.R., Brodbelt, D.C., Fuentes Luis, V., Cardiomyopathy prevalence in 780 apparently healthy cats in rehoming centers (the CatScan study), J of Vet Cardio, 2015, 17, S244-S257.


LOW QRS VOLTAGE IN DOGS WITH \textit{D. immitis}

I. SCURTU

USAMV Cluj-Napoca, Manastur Street No. 3-5, Cluj-Napoca, Romania
E-mail: iuliu.scurtu@usamvcluj.ro

Summary

The ECG is an insensitive investigation tool for diagnostic of \textit{D. immitis}. Usually dogs with \textit{D. immitis} infection have normal electrocardiographic features. In advanced cases, there is a shift of mean electric axis to the right due to right ventricle dilation. Our study was carried out on 15 dogs diagnosed with \textit{D. immitis}. \textit{D. immitis} diagnostic was done based on Knott test and PCR test results. None of the dogs presented adult worms within right atrium, right ventricle, main pulmonary artery or right and left lobar pulmonary arteries. Pulmonary hypertension was not present. For PHT we evaluated tricuspid regurgitation peak velocity and pulmonary artery flow pattern. ECG showed normal sinus rhythm in fourteen dogs, and one had lone atrial fibrillation. Two out of 15 dogs had 1\textsuperscript{st} AV block. Six out of 15 dogs presented low QRS complex amplitude in the absence of pericardial or pleural effusion (0.75 ±0.19 mV). In these dogs hypothyroidism, based on Idexx Snap test, was not confirmed. In 9 dogs we considered that R wave had normal morphology and amplitude (1.96±0.31 mV).

Key words: ECG, echocardiography, PHT, \textit{D. immitis}, dogs

\textit{Dirofilaria immitis} is a nematode responsible for life-threatening heartworm disease in animals and human with worldwide distribution (7). \textit{D. immitis} is a “heat adapted” parasite which has its natural habitats in regions of higher average temperatures like southern European countries, but now it has also become endemic in large parts of central and Eastern Europe (6). A pivotal prerequisite for transmission of heartworm is a climate that provides adequate temperature and humidity to support a viable mosquito population and sustain sufficient heat to allow maturation of ingested microfilariae to become infective, third-stage larvae (L3) within this intermediate host (4). The climate in \textit{D. immitis} infection in dogs should be considered a pulmonary artery disease that might involve the right heart structures in its later stage (1, 9). Most infected dogs do not show any signs of the disease for months or years, depending on worm burden, individual reactivity and level of exercise (9). Signs of the disease develop gradually and may begin with a persistent cough, which may be followed by moderate to severe dyspnea, weakness, and occasionally, lipotimias after exercise or excitement (9). In the course of disease development of right cardiac congestive failure (ascites) are noted (9). Infection is characterized by endothelial proliferation, perivascular inflammation and thrombo-embolism, all leading to chronic pulmonary hypertension and right side congestive heart disease (2).
ECG is considered as a nonspecific tool for *D. immitis* diagnosis. In most of the cases normal sinus rhythm is found and in advanced cases deep S waves (3) are noted (signs of right ventricle dilation).

**Materials and methods**

All procedures in this study were approved by the Institutional Committee at the Veterinary Medicine Faculty. The study was performed in 15 privately-owned dogs (9 females and 6 males) of varying breed and body weight (26.4±10.41 kg). The average age was 5±1.3 years. Inclusion criteria for the study were: 1) positive Knot test for *Dirofilaria immitis*; 2) positive PCR test; 3) the absence of adult worms in right atrium, right ventricle and main pulmonary artery trunk (echocardiography).

All ECGs were performed in right lateral recumbency by the same investigators using a Poly Spectrum digital system. We used 6 lead ECG recording. All echocardiographic studies were performed by the same investigator using ESAOTE MyLab 40 Vet machine with transducer frequency matched to the size of the dog (4, 5, 7.5 MHz frequency). The right heart and pulmonary artery trunk were approached from right lateral recumbency, 4 chambers view, from short axis views to highlight right atrium, right ventricle and pulmonary trunk. Four chambers apical view and left cranial view were also used. For pulmonary hypertension (PHT) diagnosis we evaluated tricuspid regurgitation peak velocity (from apical four chambers view). Pulmonary artery regurgitation velocity and pulmonary artery pulsed wave Doppler flow (acceleration time-AT/ejection time-ET) were evaluated from short axis view (SAX), view optimized for pulmonary artery. Other parameters investigated for pulmonary artery hypertension (HPT) was presence/absence of interventricular septum (IVS) flattening, from SAX, view optimized for IVS.

For hypothyroidism diagnosis we used Idexx kit. Pericardial and pleural effusions, as potential causes for low R wave amplitude, were excluded throughout echo investigation.

**Results and discussions**

None of the dogs presented clinical signs. All of the patients were bright and alert. The Knott test was positive in all patients for *D. immitis*, microfilariae, characterization being made by an experienced researcher. PCR investigation was positive in all patients.

Based on clinical signs and clinical pathology, dogs with *D. immitis* are classified in 4 classes.

Class 1 usually encompasses asymptomatic patients, but signs as fatigue and coughing may be present.
Class 2 comprises dogs with abnormal echocardiographic features such as right ventricular enlargement, slight dilation of pulmonary artery, anemia, cough and fatigue.

Class 3 comprises dogs with severe heartworm disease. Dogs present echocardiographic and radiologic features of right heart and pulmonary artery dilation, anemia and proteinuria.

Class 4 comprises dogs with signs of caval syndrome.

Based on this classification, all our dogs were included in class I.

Echocardiography did not reveal any adult worm within right atrium, right ventricle or main pulmonary artery. Right atrium and ventricle were imaged from LAx, SAx and apical view. The main pulmonary trunk was imaged from SAx and left cranial approach. Right atrium and right ventricle seemed to have normal dimensions (eyeball evaluation). We did not see any signs of pulmonary hypertension. All the criteria investigated for PHT were within reference range. In all dogs diagnosed with *D. immitis* AT:ET>0.3. We did not identify tricuspid regurgitation. In two dogs, we found a trivial pulmonary valve regurgitation, an aspect that we considered as a normal feature.

ECG showed normal sinus rhythm in 14 dogs and one dog presented lone atrial fibrillation (AF) (fig.2.). Two out of 15 dogs had 1st AV block (fig. 1). Six out of 15 dogs presented low QRS complex amplitude (tab. 1) in the absence of pericardial or pleural effusion (0.75 ±0.19 mV) (fig. 1, 2). In these dogs hypothyroidism, based on thyroid function evaluation, was not confirmed. In 9 dogs we considered that R wave had normal morphology and amplitude (1.96±0.31 mV).

Almost all reports about the ECG changes in case of *D. immitis* have stated that normal ECG (10) is a predominant feature (normal sinus rhythm). In advanced cases (class 3 and 4), deep S waves and right mean electric axis deviation abnormality related with right ventricle enlargement, is mentioned (8, 10).

According to our information, Onyango (8), was the only one who mentioned about the low R wave amplitude in heartworm disease. He inserted artificially thirty *D. immitis* worms in the pulmonary artery and recorded ECG weekly in order to see the changes. He noticed a reduction in R wave amplitude after three, four and five weeks after he had inserted the worms and this abnormality was significantly different compared with records prior to infestation. Now we also have found low amplitude of R wave in dogs diagnosed positive for *D. immitis*. Probably, low R wave amplitude appears in early stages (class 1); for this stands Onyango experiment who noticed low R wave amplitude three, four and five weeks after *D. immitis* inoculation within pulmonary artery. Further investigations needs to be done to clarify if ECG could be used as an adjuvant tool in first class of *D. immitis* infection, when worms are localized only within pulmonary capillaries. We consider that our findings bring new information about the importance of ECG in heartworm pathology.
Table 1

Dogs diagnosed with *D. immitis* and low R wave amplitude

<table>
<thead>
<tr>
<th>No.</th>
<th>Breed</th>
<th>Sex</th>
<th>Weight (kilo)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Belgian Malinois</td>
<td>M</td>
<td>31</td>
</tr>
<tr>
<td>2.</td>
<td>Golden retriever</td>
<td>M</td>
<td>29</td>
</tr>
<tr>
<td>3.</td>
<td>Dogue de Bordeaux</td>
<td>F</td>
<td>48</td>
</tr>
<tr>
<td>4.</td>
<td>Cocker</td>
<td>M</td>
<td>18</td>
</tr>
<tr>
<td>5.</td>
<td>Mixed breed</td>
<td>F</td>
<td>23</td>
</tr>
<tr>
<td>6.</td>
<td>Mixed breed</td>
<td>M</td>
<td>25</td>
</tr>
</tbody>
</table>

Fig.1. Low R wave amplitude with 1st AV block (10 mm/mV, 50 mm/s)

Fig.2. Low R wave amplitude with lone atrial fibrillation (10 mm/mV, 50 mm/s)

Our study has a few limitations. The group was not identical in age and weight and we do not also know the time passed since infestation to the time of investigation. The author considers that low R wave amplitude in the absence of pericardial or pleural effusion and hypothyroidism might be considered as a very early feature that stands for heartworm disease in dogs.
Conclusions

Our findings are in contrast with the most of the paper written about ECG abnormalities in *D. immitis* infection. We consider that further researches are needed in order to clarify the earliest changes in heartworm disease.

References

TESTING AND USE OF BARBED SUTURES IN CLASSICAL VETERINARY MEDICINE – A BIBLIOGRAPHICAL REVIEW

B. SICOE, C. IGNA

Banat’s University of Agricultural Sciences and Veterinary Medicine „King Michael I of Romania” Timişoara, Faculty of Veterinary Medicine, 300645, Aradului Street, No. 119, Timişoara, Romania
E-mail: bogdan.sicoe@yahoo.com

Summary

Modern surgery benefits from a multitude of options regarding suture materials, but not one of them, for the moment, meets, altogether, the physical, biological and chemical properties of the ideal suture material.

Barbed sutures were recently introduced in the great family of suture materials, and are fabricated from synthetic materials, both absorbable and nonabsorbable, having the advantage of some known properties, such as: tensile strength, absorption time, tissue reactions, maneuverability, etc.

Barbed sutures are basically monofilament fibres, in which barbes are created by micro-cutting the fibre at different angles, and in different patterns. Barbed sutures also come in two varieties: unidirectional and bidirectional.

Barbed sutures have proven, in many instances, to be superior to conventional sutures, in means of suturing time, aesthetic aspects of scars, maneuverability, tension distribution throughout the suture, whilst having similar tensile strength and complications incidence, with conventional suture materials.

There are few studies regarding the use of barbed sutures in veterinary medicine, most of them concerning orthopedics, obstetrics and gynecology, and gastroenterology.

Although many veterinary studies have proven barbed sutures to be superior to conventional sutures, there are some that do not recommend them in certain situations.

There is however, an aspect that many authors agree upon: more studies are further required, and on larger groups, to establish, as accurate as possible, the recommendations and contraindications of barbed sutures in veterinary medicine.

Key words: barbed suture, knotless suture, veterinary studies, knotless vs. conventional sutures

The innovating aspect of barbed sutures is that they do not require any knot tying, anchoring in tissues being carried out by the uniform distributed barbes along the suture. Suturing with this new material is carried out by simply passing the suture device in a continuous pattern through tissues (26). Due to the fact that knot tying is no longer required when using this type of suture device, important time is saved, considerably reducing the assigned time necessary for tissue integrity restoring (9, 26, 28).

Regarding barb’s orientation, there are two varieties: unidirectional (Fig. 1), and bidirectional, respectively (Fig. 2). Regarding the latter, at the middle of the
suture device, barbs are placed in two opposing directions, both tips of the suture device ending with a needle.

Fig. 1. Unidirectional sutures: Stratafix™ Knotless Tissue Control Device (up) and V-Loc™ Wound Closure Device (down)(31)

Fig. 2. Quill™ Bidirectional barbed suture (32)

Due to the fact that these sutures are made from synthetic materials, tissue reactions are much lower, compared to other types of materials (9). Due to the fact that these sutures are made from different substances, the resorption time is well known for each material, and their indications, are, also, known (27, 29, 30).

Within the suture, the highest density and amount of material is represented by the knots, thus inflammatory reactions are directly proportional to these (24, 25).

Being monofilament, the suture devices are less traumatic to tissues (17), compared to multifilament materials (12, 16), and capillarity, a feature specific to some multifilament materials and some monofilament materials, resorbable and nonresorbable (12), is also absent.
Technical features

Sutures conducted with these devices are in a continuous pattern, and are done by simply passing the suture device through the tissues, which, also, ensures tension throughout the wound. When the wound is closed, the device is driven from the inside out, perpendicular to the skin, and the device is cut tangential to the skin (26).

One big disadvantage of these devices is that they require more care when passing them through tissues, as wrong entries cannot be corrected by retraction of the device.

A large number of studies were conducted in order to compare barbed sutures to conventional sutures, in means of necessary time to complete tissue closure (6,10, 20, 23, 28), with a small part of these studies being conducted in the veterinary domain. These studies have proven that using barbed suture devices reduces time needed to perform sutures, ligatures, and the overall surgery time, and the time the patient is under general anesthesia.

Ehrhart N.P. et al. (3), in an experimental study conducted on 14 mix breed dogs, proved that using barbed sutures for single layer closure of gastrotomies and enterotomies, reduces the time needed to perform closure of the jejunum.

The ease with which these devices are used when performing sutures and ligatures, recommend them in laparoscopy, where conducting these techniques is done with difficulty, especially knot tying (28).

Surgical knots and the their adjacent areas, respectively, are the sites more likely to disrupt (22). The absence of knots, thus the risk for disruption, leads, theoretically, to an increased resistance.

Barbed suture strength

Being relatively new to the surgery domain, barbed devices, and sutures performed with barbed devices, begun to being tested from many approaches, including burst strength.

And so, in one ex vivo comparative study, conducted by Templeton et al. (21), on 32 canine diaphragms, with the purpose to compare the maximum load of the V-Loc™ (2-0) 180 Wound Closure Device, Covidien, with that of Maxon™ (2-0), Covidien, both made from polyglyconate, obtained the following results: 54.5 ± 10.27 N for the former, and 56.9 ± 10.87 N, for the latter, respectively.

In the aforementioned study, Ehrhart N.P. et al. (3), proved that gastrotomies and enterotomies closed with barbed devices withstand burst forces comparable to those closed with monofilament sutures.

In another ex vivo experimental study carried out on four canine cadavers, with purpose to compare sealing and the maximum burst pressure of enterotomies closed with V-Loc™ Wound Closure Device, Covidien, 4-0 glycomer 631, and glycomer 631 monofilament suture (3-0 and 4-0), respectively, Hansen L.A. et al.
(11) concluded that the suture performed with the barbed device withstood a higher bursting pressure than the suture performed with the monofilament suture.

In a laparoscopic study conducted on a pig model, Gözen A.S. et al. (7) proved that using barbed sutures to perform closure of the bladder, ensures a faster and more effective sealing of the bladder, compared to other sutures.

Barbed sutures in veterinary orthopedics

Although in human orthopedics, barbed sutures were tested in some surgical procedures (e.g. total knee arthroplasty), in veterinary medicine, they were tested mainly in tenorrhaphies, in different animal models, and compared to tenorrhaphies performed with conventional materials.

Duffy D.J. et al. (2) investigated the efficiency and strength to gap formation of tenorrhaphies performed with V-Loc™ Wound Closure Device, Covidien, and compared them with those of tenorrhaphies performed with smooth polypropylene – Prolene, Ethicon™. This ex vivo study was conducted on 36 mixed breed dogs, from which the tendons from both superficial flexor muscles were collected, then transversely sectioned and sutured, after which the repaired tendons were subjected to longitudinally forces of traction. Tenorrhaphies performed with smooth sutures broke at an average force of 109.3 ± 30.2 N, while the tenorrhaphies performed with the V-Loc™ device, broke at an average force of 57.7 ± 18.9 N (p<0.0001). Incidence of 1 and 3 mm gap formation between the tendons’ two ends was higher in the V-Loc™ group, namely 33 / 36 (91.7%), compared to 20 / 36 (55.6%) (p=0.001) for the 1 mm gap formation, and 29 / 36 (80.6 %) compared to 18 / 36 (50 %)(p=0.006) for the 3 mm gap formation, respectively, while the force required to produce a 1 mm gap did not differ considerable (2). Also, there was noted a higher incidence of suture breakage of 97.2 % (35 / 36) in the V-Loc™ group, compared to the smooth suture group – 55.6 % (20 / 36). However, suture slippage was more frequent in the smooth suture group. The authors believe that the barbed sutures’ performances are due to barbs’ realignment, secondary to submitting them to tractional forces.

Ingle N.P. et al. (13) state that barbs need to be designed according to the tissues on which the sutures are going to be used on, stating that barbs designed for skin closure need to be should be more flexible than those designed for tenorrhaphies.

In another experimental study conducted on gastrocnemius muscle tendon repair, with the purpose to compare barbed suture to smooth suture on 33 paired tendons, Perry B.S. et al. (18), demonstrated that tenorrhaphies performed with barbed sutures have a much lower ultimate tensile strength compared to those performed with smooth suture. The author believes this is due to barbs’ failure to anchor adequately in tissues.

Joyce C.W. et al. (15), by comparing tenorrhaphies of the flexor digitorum profundus muscle, performed with barbed and conventional suture materials, on a pig model, concluded that tenorrhaphies performed with barbed sutures had an
average tensile strength of 54.51 ± 17.9 N, while tenorrhaphies performed with conventional sutures had an average tensile strength of 53.17 ± 16.35 N. By doing so, the author considers barbed sutures to be promising for tendon repair, and that further studies on animal models are needed to provide more clinical indications.

Promising results were also obtained by Clemente A. et al. (1), after testing the Quill™ Device on tenorrhaphies in a swine model. The repaired tendons were subjected to traction forces and withstood forces bigger than 40 – 50 N, force that is considered necessary to initiate early active motion.

Promising results were also obtained by Clemente A. et al. (1), after testing the Quill™ Device on tenorrhaphies in a swine model. The repaired tendons were subjected to traction forces and withstood forces bigger than 40 – 50 N, force that is considered necessary to initiate early active motion.

In one biomechanical comparative study between two different unidirectional barbed suture devices – 3-0 V-Loc™ Wound Closure Device, Covidien, and 3-0 Stratafix™ Knotless Tissue Control Device, respectively, conducted by Jordan M.C. et al. (14), on 40 fresh swine flexor digitorum profundus, it was shown that tenorrhaphies performed with Stratafix™ had a maximum load of 42.3 ± 7.2 N, compared to 50.7 ± 8.8 N, for the V-Loc™ tenorrhaphies (p<0.05). Other recorded parameters were the force required to produce a 2 mm gap between the two ends (24.8 ± 2.04 N for the Stratafix™ group, and 26.5 ± 2.12 N for the V-Loc™ group), rigidity and suture pull-through; differences between these parameters were found to not be significant.

**Barbed sutures in veterinary gynecology**

As complications are common, and some severe, in human gynecology, barbed sutures started being tested, as well, in veterinary medicine, to verify their performances, and postoperative complications (adhesion formation).

In one pilot study performed on 9 pregnant sheep on which caesarean operations were performed, where both barbed and smooth sutures were used for closure of the uterus and rectal fascia, Greenberg J.A. et al. (8) found that barbed sutures performed similar to smooth sutures regarding hysterorrhaphy, while in the rectal fascia repairs, both types of sutures failed, leading to fascia dehiscence.

In another study conducted in a sheep model, Einarsson J.I. et al. (5), performed a 5 cm defect in both uterine horns of the same sheep, one being sutured with 2-0 Vicryl™, and the other with a barbed 0 PDO. The aim of this study was to compare adhesion formation after application of the two sutures. After a 3 month period, necropsic examinations were performed, following ewes’ euthanasia, and was found that adhesion formation and severity did not differ between the two groups.

**Tissue reactions to barbed sutures**

Being monofilament, damages to tissues are of lesser intensity (17).

As a result of the latter study, Einarsson J.I. et al. (4), collected tissue samples from the uterine sutures, created with both suture devices, and have demonstrated through immunohistochemical testing, that there are no differences regarding cellular composition and proliferation of the wounds after using the
mentioned sutures, proving that the impact of both suture devices on the healing process is similar.

Petruţ B. et al. (19), by evaluating tissue response to the V-Loc™ Wound Closure Device in one in vivo study on 48 Wistar rats, on which a 1 cm cistotomies were performed, followed by closure with the previous mentioned suture device, as well as Vicryl™ and PDS II™, has concluded that in a three and six week interval, the V-Loc™ device maintained it's stiffness and shape, suffering a low resorption process, the material being visible within the bladder wall, compared to the other two materials. On microscopic level, at a three week interval, the PDS II™ suture induced an intense tissue response, with ongoing phagocytosis; the Vicryl™ suture induced a moderate tissue response, the phagocytosis also ongoing. At a six week interval, the PDS II™ material was no longer visible, while the Vicryl™ material was almost completely resorbed, with tissue response still being visible. In the case of the V-Loc™ suture, however, due to the hardness of the suture device, the material could not be cut and examined directly; in this case, tissue reaction – phagocytosis, was minimum, the suture material showing little resorption process after six weeks.

Conclusions

Barbed sutures represent a new option from the array of suture materials, having proved advantages, as well as disadvantages.

In veterinary medicine, barbed sutures are poorly studied. Although most studies in veterinary medicine are promising, there are, also, discouraging results, or contradictory, imposing a necessity for experimentation in animal models, as well as on larger groups.

Aknowledgements

This study was carried out with the support of the project Dezvoltarea infrastructurii de cercetare, educație și servicii în domeniile medicenei veterinare și tehnologiilor inovative pentru RO 05. cod SMIS_CSNR 2669.

References


HEMODIALYSIS – THERAPEUTIC MANAGEMENT IN A DOG WITH EHRLICHIOSIS - CASE REPORT

A.B. VIŢĂLARU, ALINA ŞTEFĂNESCU

Faculty of Veterinary Medicine Bucharest, 050097 Splaiul Independenţei 105, Sec. 5, Bucharest, Bucharest, Romania
E-mail: alexandrumv@yahoo.com

Summary

A 7 years old Rottweiler dog, 37 kg, intact male, was presented without appetite, with vomitus, decreased effort resistance, anorexia, rectal temperature 39.70ºC, severe dehydration (5-6 seconds delay in skin return). The dog was treated for 5 days in a private practice for enteritis. First venous blood work showed mild acidosis (pH 7.30, RR: 7.31-7.42, pCO₂ 31.0 - RR: 32-49 mmHg, HCO₃ 14.1 - RR: 20-29 mmol/L, AnGap 23 mmol/L, tCO₂ 15.0 - RR: 21-31 mmol/L, Na 141.0 - RR: 144-160 mmol/L, K 3.7 - RR: 3.5-5.8 mmol/L, Cl 108.0 - RR: 109-122 mmol/L). Biochemistry revealed elevated BUN 117.0 mg/dl (RR: 7-27 mg/dl), CREA 11.4 mg/dl (RR: 0.5-1.8 mg/dl). Complete blood count showed anemia with reticulocitosis and leukocytosis. The patient was positive for Ehrlichia canis at 4DX test.

Etiological therapy was applied (Doxiciclin 10 mg/kg once a day PO) along with fluid therapy (balanced electrolyte solution of NaCl 0.9%), metil-prednisolone 1 mg/kg two times per day for autoimmune anemia and general support. Hemodialysis was decided for sustaining renal function. A central venous double lumen catheter was placed under a short anesthesia with butorphanol 0.2 mg/kg, IV and propofol 5 mg/kg, IV in bolus. Hemodialysis was performed five times with an A/V set for Dialog and a low 18 LOPS dialyzer, with 150 ml/minute hemodialysis flux in a period of five consecutive days.

For this case hemodialysis along with the sustaining therapy represented the key for positive prognosis since we manage to reduce the renal acute injury from BUN 117.0 mg/dl and CREA 11.4 mg/dl to BUN 26 mg/dl, CREA 2.3 mg/dl after hemodialysis in order to maintain a positive evolution for this patient. The BUN reached normal values at the last hemodialysis, the patient being submitted to enteric dialysis, oral treatment with phosphorus chelation and renal diet and creatinine normalized after another 7 days.

Key words: hemodialysis, dog, ehrlichiosis, BUN, creatinine

Ehrlichiosis is a genus of rickettsiales bacteria that is transmitted by the brown dog tick, and also from contaminated blood components from blood donors. Variable signs of anorexia, depression, loss of stamina, stiffness and reluctance to walk, edema of the limbs or scrotum, and coughing or dyspnea may be seen. Most acute cases are seen in the warmer months, coincident with the greatest activity of the tick vector. Chronic cases may present at any time of year. During the acute phase of E. canis infection in dogs, the CBC is usually normal but may reflect a mild normocytic, normochromic anemia; leukopenia; or mild leukocytosis. Thrombocytopenia is common, but petechiae may not be evident, and platelet decreases may be mild in some animals. Vasculitis and immune-mediated
Mechanisms induce a thrombocytopenia and hemorrhagic tendencies. Lymph node aspiration reveals hyperplasia. Death is rare during this phase; spontaneous recovery may occur, the dog may remain asymptomatic, or chronic disease may ensue. Clinical findings vary, based on the predominant organs affected and may include marked splenomegaly, glomerulonephritis, renal failure, interstitial pneumonitis, anterior uveitis, and meningitis with associated cerebellar ataxia, depression, paresis and hyperesthesia. Severe weight loss is a prominent finding. The CBC is usually markedly abnormal in chronic cases. Severe thrombocytopenia may cause epistaxis, hematuria, melena, and petechiae and ecchymosis of the skin. Variably severe pancytopenia (mature leukopenia, nonregenerative anemia, thrombocytopenia, or any combination thereof) may be seen. Aspiration cytology reveals reactive lymph nodes and, usually, marked plasmacytosis. Frequently, polyclonal, or occasionally monoclonal, hypergammaglobulinemia develops (9).

History and signalment
A 7 years old, 37 kg, male, intact Rottweiler dog was presented without appetite, vomitus, decreased effort resistance, anorexia, rectal temperature 39.70°C, severe dehydration (5-6 seconds delay in skin return).

Diagnostic work
First venous blood work showed mild acidosis (pH 7.30, RR: 7.31-7.42, pCO₂ 31.0 - RR: 32-49 mmHg, HCO₃ 14.1 - RR: 20-29 mmol/L, AnGap 23 mmol/L, tCO₂ 15.0 - RR: 21-31 mmol/L, Na 141.0 - RR: 144-160 mmol/L, K 3.7 - RR: 3.5-5.8 mmol/L, Cl 108.0 - RR: 109-122 mmol/L). Biochemistry revealed elevated BUN 117.0 mg/dl (RR: 7-27 mg/dl), CREA 11.4 mg/dl (RR: 0.5-1.8 mg/dl). Complete blood count showed anemia with reticulocitosis and leukocytosis. The patient was positive for Ehrlichia canis at 4DX test.

Therapy and outcome
Upon presentation etiological therapy was applied (Doxiciclin 10 mg/kg once a day PO) along with fluid therapy C.R.I. (balanced electrolyte solution of NaCl 0.9%), blood transfusion, erythropoietin (100 I.U./kg), metil-prednisolone (1 mg/kg two times per day PO) for autoimmune anemia and general support (6).

Hemodialysis was decided for sustaining renal function.
A central venous double lumen catheter (3) was placed under a short anesthesia with butorphanol 0.2 mg/kg, IV and propofol 5 mg/kg, IV in bolus (5). The patient received 100 I.U./kg heparin before the hemodialysis therapy. Hemodialysis was performed five times with an A/V set for Dialog and a low flux 18 LOPS dialyzer, with 150 ml/minute blood flux in five consecutive days with dialysate composition set to: bicarbonate conductivity 14.2 m/s, ultrafiltration volume 200 ml and a dialysate flow of 300 ml/min in every hemodialysis session (Fig. 1.).

140
For the first 1 hour and a half of hemodialysis the initial blood flow was set to 6 ml/kg (150 ml/min) for 90 minutes (7). After this first session the patient presented BUN 76 mg/dl and CREA 5.8 mg/dl.

Table 1

The evolution of urea and creatinine before and after each hemodialysis session

<table>
<thead>
<tr>
<th>BLOOD TESTS DIALYSIS</th>
<th>BEFORE DIALYSIS</th>
<th>AFTER DIALYSIS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRST DIALYSIS</strong></td>
<td>BUN 117 mg/dL (7.0-27.0), CREA 11.4 mg/dL (0.5-1.8),</td>
<td>BUN 76 mg/dL (7.0-27.0), CREA 5.8 mg/dL (0.5-1.8),</td>
</tr>
<tr>
<td><strong>SECOND DIALYSIS</strong></td>
<td>BUN 96 mg/dL (7.0-27.0), CREA 7.3 mg/dL (0.5-1.8),</td>
<td>BUN 58 mg/dL (7.0-27.0), CREA 4.1 mg/dL (0.5-1.8),</td>
</tr>
<tr>
<td><strong>THIRD DIALYSIS</strong></td>
<td>BUN 85 mg/dL (7.0-27.0), CREA 5.7 mg/dL (0.5-1.8),</td>
<td>BUN 41 mg/dL (7.0-27.0), CREA 2.6 mg/dL (0.5-1.8),</td>
</tr>
<tr>
<td><strong>FOURTH DIALYSIS</strong></td>
<td>BUN 80 mg/dL (7.0-27.0), CREA 5.1 mg/dL (0.5-1.8),</td>
<td>BUN 35 mg/dL (7.0-27.0), CREA 2.4 mg/dL (0.5-1.8),</td>
</tr>
<tr>
<td><strong>FIFTH DIALYSIS</strong></td>
<td>BUN 64 mg/dL (7.0-27.0), CREA 4.3 mg/dL (0.5-1.8),</td>
<td>BUN 26 mg/dL (7.0-27.0), CREA 2.3 mg/dL (0.5-1.8),</td>
</tr>
</tbody>
</table>

During the next three days we increased the duration of hemodialysis. The second one had 2.5 hours, the third 3.5 hours and the fourth and the fifth had 4
hours (8). After the second hemodialysis, blood test showed: BUN 58 mg/dl, CREA 4.1 mg/dl. After the fifth hemodialysis, the sessions continued every other day until the 5th session. Blood tests after the third hemodialysis showed BUN 26 mg/dl, CREA 2.3 mg/dl. After the fifth hemodialysis, we decided to take the patient off hemodialysis and the therapy emerged to enteric dialysis, phosphor chelators, renal diet and vitamin-mineral support addressing anemia (1). Ten days after the start of treatment our patient had normal CBC, ionogram and biochemistry results (BUN 23 mg/dl and CREA 1.7 mg/dl).

Conclusions

Ehrlichiosis is a serious condition that affects through its complications the renal and hepatic function and by the etiological treatment leads to more acute or chronic damages.

In this case hemodialysis along with the sustaining therapy represented the key for a good prognosis since we manage to reduce the renal acute injury and to lower the urea and creatinine in a short period of time.

The sooner the patient with ehrlichiosis is submitted to hemodialysis, the faster is the recovery.

The longer a patient with ehrlichiosis is treated with antibiotics without renal support, the more difficult will become his recovery, or it will become chronic and he will finally collapse.

References

A COMPARATIVE ANALYSIS OF THE ELECTROCARDIOGRAPHIC PARAMETERS IN THE CARDIAC DOGS ACCORDING TO THEIR CONSTITUTIONAL TYPE

F. SIMIZ¹, V. CIULAN¹, D. MORAR¹, CRISTINA PETRUSE¹, DANIELA ELENA BRĂSLĂȘU², M. C. BRĂSLĂȘU², T. MOȚ¹

¹Banat’s University of Agricultural Sciences and Veterinary Medicine “King Michael I of Romania” from Timisoara, Faculty of Veterinary Medicine, 300645, Aradului Street No. 119, Timisoara, Romania
²University of Agronomic Science and Veterinary Medicine of Bucharest, Faculty of Veterinary Medicine
E-mail: florinvet@yahoo.com

Summary

The investigations were carried out on 84 dogs diagnosed with heart disease divided according to their constitutional type into two categories: 23 bulging chested dogs and 61 flat chested dogs.

The heart rate of the flat chested dogs recorded superior values to those with bulging chest.

The flat chested dogs with symptomatic heart failure showed left axis deviation (LAD) in a higher percentage than the bulging chested dogs, while the latest recorded higher values of the P wave duration compared to the literature and to the flat chested dogs.

The cardiac bulging chested dogs indicated average values above the maximum physiological PR interval (0.13 s), compared to flat chested dogs because they presented a higher percentage of sinoatrial disorder.

The average ventricular QRS complex of the bulging chested dogs (cardiomegaly with bundle branch block) was superior to those of the flat chested dogs, while the increased average values of the amplitude of the left ventricular QRS complex occurred in flat chested dogs that are more likely to present cardiac hypertrophy.

The cardiac flat chested dogs exhibited greater average QT interval-rate compared to the other category, and the average amplitude of the ST segment was between 0.05-0.06 s for both categories of dogs. Those limits remained steady for every dog investigated in the study.

Key words: dog, P wave, PR interval, QRS complex, QT interval

The electrocardiogram, as a complementary diagnostic method, is a non-invasive procedure that has become a veterinary medicine routine in the diagnosis of the heart diseases (1, 6).

The ECG provides useful information in abnormal hemodynamic of the atria and / or ventricles (valvular, congenital, hypertensive cardiopathies) in the diagnosis of certain cardiac arrhythmias, in most of the ischemic and electrolytic disorders, in myocardium and pericardium diseases being useful in monitoring the patients during difficult surgery (3, 4, 5).
This study is aimed to examine electrocardiographically and statistically the interpretation of data obtained by analysing the recorded parameters in bipolar derivations DI, DII, DIII and unipolar derivations aVR, aVL, aVF in order to diagnose various heart diseases (left hypertrophic cardiomegaly, cardiac hypertrophy, changes in heart rate, cardiac axis deviation) in dogs, taking into account their constitutional type (2,7).

Materials and methods

The investigations were carried out on 84 dogs diagnosed with heart diseases divided according to their constitutional type into two categories: 23 bulging chested dogs and 61 flat chested dogs.

The electrocardiographic recordings were performed using a digital Delta 1 CARDIOLINE electrocardiograph with 12 derivations at a speed of 25mm/sec. The electrocardiograph is equipped with a high resolution thermal printer using 60 mm paper roll. For the cables provided at the ends with crocodile clips, we wet the electrodes with alcohol.

The average and dispersion indices have been calculated for each of the two categories of dogs. The Student's t parametric hypothesis test has been used in order to test the significance of the differences between the average results.

Results and discussions

The results obtained and statistically processed are shown in Fig. 1-12.

The histogram analysis representing the heart rate in the studied dogs indicated that 86.95% of the cardiac bulging chested dogs had a heart rate between 70 and 160 bpm, 8.7% below 70 bpm and 4.35% higher than the physiological limit. While 19.4% of the cardiac flat chested dogs registered higher heart rate values compared to the physiological limit (fig. 1).
The histogram of the 84 studied dogs, divided according to their type of chest, revealed that 91.3% of the bulging chested dogs had their heart's electrical axis within the physiological limits and 8.7% had values below 40°. While for 86.1% of the flat chested dogs, the value of the heart's electrical axis ranged from +40° to +100°, and 13.9% of the cases, less than 40° (fig. 2).
By analysing the average P wave duration, we found lower values, ranging between $0.0417 \pm 0.0019$ (aVL) and $0.0514 \pm 0.0021$ s (DII) in the flat chested dogs. However, there were higher values, ranging between $0.0430 \pm 0.0035$ (aVL) and $0.0543 \pm 0.0033$ s (DI) in the bulging chested dogs, but the differences were not statistically significant ($p > 0.05$) in any of the 6 analysed derivatives (Fig. 3).

Regarding the P wave amplitude, higher values were recorded in the flat chested dogs compared to the bulging chested dogs. The differences between the two categories were statistically insignificant ($p > 0.05$) (Fig. 4).
The lowest values were present in the aVL derivation (0.1054 ± 0.009 mV, in the bulging chested dogs, respectively 0.121 ± 0.0104 mV, in the flat chested dogs) and the highest values were found in the DII derivation (0.2348 ± 0.0212 mV- in the bulging chested dogs, respectively; 0.2858 ± 0.0176 mV- in the flat chested dogs).

By analysing the data (fig. 5), it has been proved that the bulging chested dogs recorded higher values of the PR interval duration (0.1226 ± 0.0072 DII), compared to the average values recorded in the flat chested dogs (0.1168 ± 0.0042 s) (fig. 5)

In the bipolar DII derivation there was a higher value than the threshold mentioned by the literature (PR <0.12 s), which may indicate the existence of some sinoatrial blocks (7).

The PR interval duration histogram revealed that 73.62% of the 84 dogs with cardiac symptoms had a PR interval within the physiological limits, 22.82% higher than the maximum limit and 3.57% below the minimum values compared to those mentioned in the literature (fig. 6)
64.5% of the bulging chested dogs, registered physiological PR interval values, 29.7% greater than 0.13 s (the maximum limit) and 5.8% had a duration of 0.06 s (the minimum limit).

A statistical analysis of the ventricular QRS complex demonstrated that the average duration for both groups studied showed no significant differences ($p>0.05$). Also, it was established that for the bulging chested dogs with cardiac symptoms, the QRS duration was greater than that recorded in the flat chested dogs, proving that the bulging chested dogs are more likely to develop left cardiomegaly (fig. 7).
The same types of dogs registered significant differences ($p<0.05$) in DI and aVL, ($p<0.01$) in DII, DIII and aVR and ($p<0.001$) in aVR regarding the QRS complex amplitude. Higher values of the QRS amplitudes have been observed in the flat chested dogs compared to those obtained by the bulging chested dogs (fig. 8).

Following the statistical calculation of the QTint (Fig. 9) its average value ranged between $0.1826 \pm 0.0106$ s aVF, $0.1939 \pm 0.0067$ and the DII (for the bulging chested dogs) and $0.172 \pm 0.0070$ s in aVF, $0.1874 \pm 0.0094$ s DIII (for the flat chested dogs). The differences between the average values in the two groups of dogs were statistically insignificant ($p>0.05$).
The QT interval histogram showed that 85.5% of the 84 cardiac dogs investigated in this study recorded values between 0.15 and 0.25 s (the physiological limits), 10.9% were below 0.15 s, and for 3.6% of the dogs, the QT interval was greater than 0.25 s (fig. 10).

The average amplitude of the ST segment in the bulging chested dogs was positive in DI, DIII, aVR, aVL and aVF, and the average value of the ST segment in the flat chested dogs was positive in DI, aVR and aVL (fig. 11).
The histogram discovered an isoelectric ST segment for 53.7% of the bulging chested dogs presenting heart symptoms, 28.2% of those dogs recorded elevated uneven ST segment and 18.1% depressed uneven ST segment. While among the flat chested dogs, 35.8% had an isoelectric ST segment, 34.6% elevated uneven ST segment and 29.6% depressed uneven ST segment (fig. 12).

**Conclusions**

A higher percentage of the flat chested dogs with symptomatic heart failure presented left axis deviation compared to the studied group of the bulging chested dogs, demonstrating that more flat chested dogs suffer more frequently from left hypertrophic cardiomegaly.

There were more cases of flat chested dogs than bulging chested dogs who experienced a heart rate above the upper limit of their species during our experiment.

The average value of the P wave-duration in the bulging chested dogs was higher compared to that of the flat chested dogs, meaning that a greater
percentage of the dogs belonging to the first category were suffering from left dilated cardiomyopathy (DCM).

The cardiac bulging chested dogs registered average values of the PR interval over the physiological limit in a higher percentage than those with flat chest, as a result of their sinoatrial conduction disorders.

The average duration of the ventricular QRS complex in bulging chested dogs with symptomatic heart failure registered higher values compared to that obtained by the flat chested dogs investigated in our study, emphasising their predisposition to cardiomegaly and bundle branch block.

Increased average values of the ventricular QRS complex amplitude were recorded in the flat chested dogs who were more susceptible to cardiac hypertrophy.

A higher average duration of the QT interval was reported in the group of the cardiac flat chested dogs compared to the other category of the dogs investigated in this paper.

The average values of the ST amplitude of all the cardiac dogs from both categories ranged between 0.05-0.06 s. The above mentioned limits remained steady for all the individuals/dogs in the study.

References

ARTERIAL BLOOD PRESSURE IN CATS WITH POLYCYSTIC KIDNEY DISEASE

D. MORAR, V. CIULAN, F. SIMIZ, CRISTINA PETRUSE, RUJA IONELA, ADELINA PELA, T. MOȚ

Banat’s University of Agricultural Sciences and Veterinary Medicine "King Michael I of Romania" from Timisoara, Faculty of Veterinary Medicine, 300645, Aradului Street No. 119, Timisoara, Romania
E-mail: doru.morar@yahoo.com

Summary

This study was conducted to evaluate arterial blood pressure in azotemic and non-azotemic cats with polycystic kidney disease. Six non-azotemic cats and seven azotemic cats diagnosed with polycystic kidney disease were included in this study. Systolic blood pressure (SBP), diastolic blood pressure (DBP), mean blood pressure (MBP) and pulse rate were recorded by use of a noninvasive oscillometric technique. The mean values of SBP, DBP and MBP were significantly higher (p<0.05) in azotemic cats than in non-azotemic cats with PKD. Arterial hypertension of mild or moderate degree was found only in azotemic cats with polycystic kidney disease.

Key words: cats, blood pressure, polycystic kidney disease

Chronic renal diseases are the most frequent causes of the arterial hypertension in cats (3, 4, 8). In Persian cats and Persian related breed cats, the prevalence of autosomal dominant polycystic kidney disease was found between 40 – 50% (1, 2, 5). In humans with polycystic kidney disease, arterial hypertension is one of the most common cardiovascular complication and frequently precedes renal failure (7).

The aim of this study was to evaluate arterial blood pressure in azotemic and non-azotemic cats with polycystic kidney disease.

Materials and methods

Thirteen client-owned Persian and Persian mixed cats diagnosed with polycystic kidney disease were included in this study. The cats were divided into two groups, one including seven azotemic cats and one six non-azotemic cats. Systolic blood pressure (SBP), diastolic blood pressure (DBP), mean blood pressure (MBP) and pulse rate were recorded by use of a noninvasive oscillometric technique. Blood pressure was measured on the left thoracic limb with a device designed for veterinary use (Cardell Veterinary Monitor 9401). In all cats, ultrasonographic diagnosis of PKD was performed with multifrequent 3 – 9 MHz convex transducer and renal function was assessed by serum creatinine concentration.
Results and discussions

In all group of cats with PKD, the mean values of arterial systolic, diastolic and mean blood pressure were 140.2 ± 20.1 mmHg, 95.0 ± 16.7 mmHg and 112.5 ± 18.2, respectively (table 1).

<table>
<thead>
<tr>
<th>Variables</th>
<th>n</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Standard error mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBP (mmHg)</td>
<td>13</td>
<td>140.2</td>
<td>20.1</td>
<td>5.5</td>
</tr>
<tr>
<td>DBP (mmHg)</td>
<td>13</td>
<td>95.0</td>
<td>16.7</td>
<td>4.6</td>
</tr>
<tr>
<td>MBP (mmHg)</td>
<td>13</td>
<td>112.5</td>
<td>18.2</td>
<td>5.0</td>
</tr>
<tr>
<td>Pulse frequency</td>
<td>13</td>
<td>131.0</td>
<td>29.0</td>
<td>8.0</td>
</tr>
</tbody>
</table>

The mean values of blood pressure obtained from cats with PKD were higher than those registered in other clinical study (10) performed on clinically healthy cats, where blood pressure were measured by oscillometric method (figure 1).

![Fig.1. The mean values of the arterial blood pressure in the cats with PKD compared with healthy and conscious cats](image)

In another study, Pedersen et al. observed that mean arterial blood pressure was higher in Persian cats with PKD than in normal Persian cats (11). Comparing azotemic cats to the non-azotemic cats with PKD, SBP, DBP and MBP were significantly higher (p<0.05) in azotemic cats than in non-azotemic cats.
cats with PKD (figure 2). This is not surprising because other studies have shown that non-azotemic cats with PKD were normotensive (9, 11).

In this study arterial hypertension was defined as SBP/DBP > 150/95. In both azotemic cats and nonazotemic cats with PKD the overall prevalence of arterial hypertension was 38% (figure 3). All hypertensive cats were from azotemic cats group. According to the degree of risk of target-organ damage, the severity of arterial hypertension was mild, moderate and severe in 3/13 (23.07 %), 1/13 (7.69%) and 1/13 (7.69%) cases, respectively (fig. 3).

Fig. 2. The mean values of the arterial blood pressure in azotemic cats and non-azotemic cats with PKD

Fig. 3. Degree of severity of arterial hypertension in cats with PKD
Conclusions

The prevalence of arterial hypertension in cats with polycystic kidney disease was mild.
Arterial hypertension of mild or moderate degree is common in azotemic cats with polycystic kidney disease.
Arterial hypertension was not found in non-azotemic cats with polycystic kidney disease.

Acknowledgements

Part of this work was conducted in the Laboratory of Functional and Metabolic Explorations funded by POS CCE Project SMIS-CNSR 2669.

References


AUTHORS INDEX

A
Andrei Ioana – 57
Ardelean A. – 5, 12
Ardelean F. – 64
Ardelean V. – 5, 12, 35, 57

B
Barabási Ildikó – 79
Bonca Gh. – 5, 12, 35
Brezovan Diana – 47
Brăslaşu Daniela Elena – 70, 144
Brăslaşu M. C. – 70, 144
Bumb D. – 113

C
Ciulan V. – 17, 70, 144, 154
Codea R. – 86

D
Dascalu Roxana – 47, 113
Dohotariu D. – 64
Drăgan R. – 79

F
Fernoaga Cristina – 21, 29
Fit N. – 86

G
Godja G. – 5, 12, 35

I
Ignă C. – 40, 47, 113, 131
Ignă Violeta – 57

L
Lăcătuş R. – 64, 99

M
Marc Zarcula Simona – 5, 12, 35
Marin Andreea – 17
Matei Ileana – 64
Mărincuş Maria-Andreea – 86, 90
Mircean M. – 90
Mircu C. – 5, 12, 35
Morar D. – 17, 70, 144, 154
Morariu Florica – 17
Moţ T. – 17, 70, 144, 154
Muntean S. – 79
Muselin F. – 57

N
Nadaş G. – 90
Năsălean Alina – 79
Neagu Daniela – 86
Nechiti N. – 5
Niculescu Ş. – 79

O
Ognean L. – 79
Olariu Jurca A. – 17
Otvăţ G. – 5, 12, 35, 57

P
Papuc I. – 64, 99
Pazuric I. – 5
Pela Ruja Ionela Adelina – 154
Petruse Cristina – 17, 70, 144, 154
Popovici C. – 86, 90, 99
Proteasa Adelina – 113
Purduiu R.C. – 64, 90, 99

R
Rebedea Cezarina – 40
S
Saftencu Paula Maria – 107
Schuszler Larisa – 47, 113
Scurtu I. – 120, 126
Sicoe B. – 40, 113, 131
Simiz F. – 17, 70, 144, 154
Solcan Gh. – 107
Szabo A. – 113

Ș
Ștefănescu Alina – 139

T
Tomule A.G. – 5
Trif Alexandra – 57

V
Vițălaru A.B. – 139
CONTENT

ARDELEAN V., N. NECHITI, I. PAZURIC, A.G. TOMULE, C. MIRCU, GH. BONCA, SIMONA MARC ZARCULA, G. GODJA, A. ARDELEAN, G. OTAVĂ

Results from monitoring herd, weaning piglets, oestrus and parturition synchronisation of sows and gilts from S.C. NUTRIPIG S.R.L. Farm, Sălacea, Bihor County

ARDELEAN V., C. MIRCU, G. OTAVĂ, SIMONA MARC ZARCULA, G. GODJA, A. ARDELEAN, GH. BONCA

Results obtained in treatment of cows with chronic puerperal endometritis

CIULAN V., T. MOȚ, CRISTINA PETRUSE, D. MORAR, F. SIMIZ, ANDREEA MARIN, A. OLARIU-JURCA, FLORICA MORARIU

Laboratory research in metabolic acidosis at rams

FERNOAGA CRISTINA

Cerebrovascular events in dogs

FERNOAGA CRISTINA

Idiopathic epilepsy in dogs

GODJA G., C. MIRCU, V. ARDELEAN, G. OTAVA, GH. BONCA, SIMONA MARC ZARCULA

Morphological aspects and nuclear maturation in bovine oocytes cultured in medium with/without sheep FSH

IGNA C., B. SICOE, CEZARINA REBEDEA

Contribution of traumatic factors to etiology of inflammation and hypertrophy with the nictitant gland’s prolapsed

IGNA C., LARISA SCHUSZLER, ROXANA DASCAŁU, DIANA BREZOVAR

Peripheral nerve sheath tumours of the brachial plexus in a dog: A case report
An assessment of rat sperm motility, concentration and morphology

CT-angiography of the thorax and abdomen in cat

The development of the electrocardiographic and echocardiographic parameters in canine cardiomyopathy before and after Pimobendan administration

Report a delayed haemolytic reactions in a dog with chronic renal insufficiency after a transfusion of integral blood

Correlation between clinical and cytological aspects of anal sac inflammation in dogs

Correlations between pharyngeal and anal sacs microbism in dogs

Ultrasound findings in hip joint in dogs with avascular necrosis of the femoral head

Historical and clinical examination findings in cats with end-stage chronic kidney failure

Isoflurane inhalation anesthesia deep monitoring, in pigeons
<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCURTU I.</td>
<td>Clinical, electrocardiographic and echographic features in hypertrophic cardiomyopathy in cats</td>
<td>120</td>
</tr>
<tr>
<td>SCURTU I.</td>
<td>Low QRS voltage in dogs with <em>D. immitis</em></td>
<td>126</td>
</tr>
<tr>
<td>SICOE B., C. IGNA</td>
<td>Testing and use of barbed sutures in classical veterinary medicine – A bibliographical review</td>
<td>131</td>
</tr>
<tr>
<td>VIŢĂLARU A.B., ALINA ŞTEFĂNESCU</td>
<td>Hemodialysis – therapeutic management in a dog with ehrlichiosis - Case report</td>
<td>139</td>
</tr>
<tr>
<td>SIMIZ F., V. CIULAN, D. MORAR, CRISTINA PETRUSE, DANIELA ELENA BRĂSLAŞU, M. C. BRĂSLAŞU, T. MOŢ</td>
<td>A comparative analysis of the electrocardiographic parameters in the cardiac dogs according to their constitutional type</td>
<td>144</td>
</tr>
<tr>
<td>MORAR D., V. CIULAN, F. SIMIZ, CRISTINA PETRUSE, RUJA IONELA ADELINA PELA, T. MOŢ</td>
<td>Arterial blood pressure in cats with polycystic kidney disease</td>
<td>154</td>
</tr>
<tr>
<td>AUTHORS INDEX</td>
<td></td>
<td>159</td>
</tr>
</tbody>
</table>