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Uterine histopathology as a tool for diagnosis of infertility in female camels

(Camelus dromedarius)

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Introduction

The reproductive efficiency of dromedary camels is generally considered to be low (Tibary et al., 2006). Establishing the cause of infertility relies on performing an extensive examination of the reproductive tract that includes a general physical examination, palpation and ultrasonography of the reproductive tract and evaluation of endometrial biopsy samples (Powers et al., 1990; Tibary, 2004). This paper was designed to study the causes of reproductive problems in female dromedaries with great emphasis on the uterine histopathologic changes accompanying infertility.

Materials and Methods

One hundred infertile female dromedaries (5–18 years old) were used in this study during the period November to April in two successive years. Their previous breeding history was obtained and a complete gynecological examination of each female dromedary was performed. The uterine biopsy technique used in camels is similar to that used in mares (Powers et al, 1990). Biopsies were collected from the left horn, fixed in 10% formalin, stained with haematoxylin and eosin and processed for microscopic examination. The data was divided according to season and age of females and analyzed using SPSS program (2007).

Results

Clinical examination of the female camels revealed four infertility problems: pyometra, repeat breeder, endometritis and mucometra. Table 1. shows that the highest frequency of repeat breeders was found during Winter, whereas the number of endometritis cases was significantly higher during Autumn. Table 2. depicts a significantly higher percentage of pyometra cases in age groups B and C, however the number of endometritis cases was significantly higher in age group B and the number of repeat breeders was significantly higher in age groups A and B.
### Table 1: Effect of season on causes of female camel infertility

<table>
<thead>
<tr>
<th>Season</th>
<th>Pyometra (%)</th>
<th>Repeat Breeder (%)</th>
<th>Endometritis (%)</th>
<th>Mucometra (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autumn (Nov.-Dec.)</td>
<td>26.47 (n=9)</td>
<td>17.86(^b) (n=5)</td>
<td>54.17(^a) (n=13)</td>
<td>28.57 (n=4)</td>
</tr>
<tr>
<td>Winter (Jan.-Feb.)</td>
<td>35.29 (n=12)</td>
<td>60.71(^a) (n=17)</td>
<td>16.67(^b) (n=4)</td>
<td>35.71 (n=5)</td>
</tr>
<tr>
<td>Spring (Mar.-April)</td>
<td>38.24 (n=13)</td>
<td>21.43(^b) (n=6)</td>
<td>29.17(^b) (n=7)</td>
<td>35.71 (n=5)</td>
</tr>
<tr>
<td>All groups</td>
<td>34</td>
<td>28</td>
<td>24</td>
<td>14</td>
</tr>
</tbody>
</table>

Percentages in the same column not sharing common superscript letters differ significantly \(P<0.05\)

### Table 2: Effect of age on causes of female camel infertility

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Pyometra (%)</th>
<th>Repeat Breeder (%)</th>
<th>Endometritis (%)</th>
<th>Mucometra (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (4 – 6)</td>
<td>11.76(^a) (n=4)</td>
<td>35.71(^a) (n=10)</td>
<td>25.00(^b) (n=6)</td>
<td>21.43(^a) (n=3)</td>
</tr>
<tr>
<td>B (7 – 9)</td>
<td>29.41(^b) (n=10)</td>
<td>39.29(^a) (n=11)</td>
<td>37.50(^a) (n=9)</td>
<td>28.57(^a) (n=4)</td>
</tr>
<tr>
<td>C (10 – 12)</td>
<td>41.18(^b) (n=14)</td>
<td>7.14(^b) (n=2)</td>
<td>20.83(^b) (n=5)</td>
<td>42.86(^a) (n=6)</td>
</tr>
<tr>
<td>D (12 &lt; )</td>
<td>17.65(^a) (n=6)</td>
<td>17.86(^b) (n=5)</td>
<td>16.67(^b) (n=4)</td>
<td>7.14(^b) (n=1)</td>
</tr>
<tr>
<td>All groups</td>
<td>34</td>
<td>28</td>
<td>24</td>
<td>14</td>
</tr>
</tbody>
</table>

Percentages in the same column not sharing common superscript letters differ significantly \(P<0.05\)

**Figure 1:** (Grade 1A): uterus showing normal endometrium with normal uterine glands (arrow). X100;  **Figure 2:** (Grade 1B): uterus showing few polymorphnuclear cells with increased secretory activity of uterine glands (arrow). X100;  **Figure 3:** (Grade 2A): uterus showing extensive numbers of polymorphnuclear cells in lamina propria of stratum compactum (arrow). X400;  **Figure 4:** (Grade 2B): uterus showing periglandular fibrosis (< 10 fibrocytic layers, arrow). X400;  **Figure 5:** (Grade 2B): uterus showing cystic dilatation of uterine glands with secretions and desquamated cells (arrow). X400;  **Figure 6:** (Grade 3A): uterus showing periglandular fibrosis (> 10 fibrocytic layers, arrow). X400.
The endometrial biopsies from the 24 camels (24%) with endometritis were examined histologically and assigned the following Grades (grading according to Powers et al., 1990):
Grade 1A (figure1): was observed in one case (4.17%); Grade 1B (figure 2): in four cases (16.67%); Grade 2A (figure 3): in five cases (20.83%); Grade 2B (figures 4,5): in ten cases (41.67%); Grade 3A (figure 6): in four cases (16.67%).

Discussion

The uterus of female dromedaries could be the site of acquired abnormalities such as endometritis, pyometra and mucometra or be the reason for repeat breeding, all of which seriously affect female fertility (Tibary and Anouassi, 1997). In this study clinical diagnosis of infertile female dromedaries revealed similar abnormalities. The incidence of repeat breeders was 28% and were mostly recorded in Winter in the younger aged females. Higher percentages (76% & 40%) however, were reported in an earlier study by Tibary and Anouassi, (1997) and these occurred mainly during the Autumn. This could be due to the reduced follicular maturation that is observed at the beginning of the breeding season (Sghiri and Driancourt, 1999).

The percentage of pyometra cases in this study was much higher than the number of cases reported in earlier studies by Ribadu et al, (1991) where they ranged from 0.4 – 12.1%. Here the majority of pyometra cases were found during Spring, maybe because most parturitions occurred during Spring due to the influence of season on gestation length (Musa et al, 1993). In this study the greatest numbers of pyometra cases were recorded in age groups B and C, perhaps because at this age female dromedaries are at the peak of their reproductive performance with frequent mating, parturitions, postpartum complications and cervical adhesions.

The highest percentage of endometritis cases were reported during Autumn, probably because Autumn is the beginning of the breeding season when the cervical barrier is wide open and microorganisms can easily be carried into the uterine cavity as (Tibary and Anouassi, 1997). Endometritis was also most frequently recorded in age group B, mainly because the majority of female dromedaries in this age group are either at the puerperium period of first parturition or are mated during the first estrous period after parturition and these are times of high risk of uterine infection (Tibary and Anouassi, 1997). Endometrial biopsy samples from 24 dromedaries with clinical diagnosis of endometritis had abnormal histology findings in all but one case (4.17%), whereas in llamas there was a higher ratio (16.70%) of normal histology specimens in animals clinically diagnosed with endometritis (Powers et al, 1990). In this
study, the percentages of endometritis grades 1B (16.7%), 2A (20.8%), 2B (41.7%) and 3A (16.7%) found in camels were different from those reported in llamas which were 25.6%, 50.0%, 3.3% and 2.2%, respectively (Powers et al, 1990).

Four dromedaries in this study had uterine gland fibrosis severe enough to be classified as grade 3A. In mares with Grade-3 endometrium the pregnancy rate was 70.3%, but foal production rate was 35.1%, indicating appreciable resorption or abortion rate related to gland fibrosis (Shideler et al, 1982). In conclusion, uterine biopsy was readily performed without complications and could be considered as a good diagnostic tool of endometritis.

References

SPSS: Statistical Package for Social Science. SPSS Inc, Chicago, IL, USA Copyright© for Windows 2007; version 16.0.