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PATHOLOGICAL STUDY OF OVARIES OF NON-PREGNANT CAMELS (*Camelus dromedarius*) SLAUGHTERED IN IRAN

H. Nourani* and A. Khodakaram-Tafti

Department of Pathology, School of Veterinary Medicine, Shiraz University, P.O.Box 71345-1731, Shiraz, IRAN
*Department of Pathology, School of Veterinary Medicine, Shahrekord University, Shahrekord, IRAN

ABSTRACT

This study was undertaken to investigate the pathological changes and prevalence of ovarian abnormalities of camels in Iran. The ovaries of 96 non-pregnant dromedary camels of unknown history were collected and examined grossly and histopathologically. The pathological changes observed included: paraovarian cyst (2.08%), follicular cyst (2.08%), haemorrhagic cyst (1.04%), intrafollicular haemorrhage (5.2%), ovarian hydrobursitis (1.04%), oophoritis (3.12%) and benign cystic teratoma or dermoid cyst (1.04%). Also, in this study serous cystadenoma was diagnosed in the ovary of a dromedary camel. This is the first reported case of ovarian serous cystadenoma. Additionally, on the basis of gross and histopathological characteristics, this study suggest and support two hypotheses including occurrence of ovarian hydrobursitis due to haemorrhage of atretic follicles and existence of a probable relationship between ovarian luteinised haemorrhagic cyst and cystic hyperplastic endometritis in the dromedary camel.

Key words : Dromedary camel, Iran, ovary, pathology, slaughter

Pathological examinations of ovaries provide definite infromation more accurately than that obtained by clinical or other paraclinical examinations. In the literature, there are only few reports about ovarian abnormalities in dromedary camels (El-Khouly *et al*, 1990; Hassieb and Hussein, 1989; Ribadu *et al*, 1991; Tibary *et al*, 2001).

The present study was undertaken to determine the characteristics and prevalence of gross and microscopic ovarian lesions of non-pregnant dromedary camels in Iran.

Materials and Methods

Genital tracts of 96 non-pregnant dromedary camels of unknown history were collected from freshly slaughtered animals in Yazd Province of Iran. The ovaries of these tracts were examined carefully for gross abnormalities. For histo-pathological exami-nation, tissue samples were taken from the left and right ovaries of all cases. The specimens were fixed in 10% neutral buffered formalin, processed and embedded in paraffin. Sections of 5 µm thickness were cut, stained with Haematoxylin and Eosin (H and E) and studied microscopically.

Results

The results of pathological examination in the present study are summarised in table 1. Paraovarian cysts were diagnosed in two cases (2.08%). One of these cysts was located adjacent to the right ovary and the other, adjacent to the left uterine tube. These cysts had oval to spherical shape and their size were 2.5 cm and 8 mm in diameter, respectively (Fig 1). Microscopically, they had a wall of connective tissue and their muscular fibres were lined by cuboidal epithelium.

Follicular cyst was identified in two camels. These cysts were located on the left and right ovaries and their size were 4.5 and 5.5 cm in diameter. Blood vessels, thin follicular and thick luteinised regions were visible in the cyst wall (Fig 2).

Haemorrhagic cyst was seen on the right ovary of one camel. This cyst, had thick wall and contained brown material due to haemorrhage in central cavity (Fig 3). Microscopically, the cyst wall was composed of thick connective tissue and luteal cells.

Intrafollicular haemorrhage was observed in five cases (5.2%). Microscopically, erythrocytes were

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Table 1. Pathological changes observed in the ovaries of 96 slaughtered camels (*Camelus dromedarius*) in Iran.

Pathological changes	Number	Percent (%)
Paraovarian cyst	2	2.08
Follicular cyst	2	2.08
Haemorrhagic cyst	1	1.04
Intrafollicular haemorrhage	5	5.20
Ovarian hydrobursitis	1	1.04
Oophoritis	3	3.12
Bengin cystic teratoma (dermoid cyst)	1	1.04
Serous cystadenoma	1	1.04
Total	16	16.64

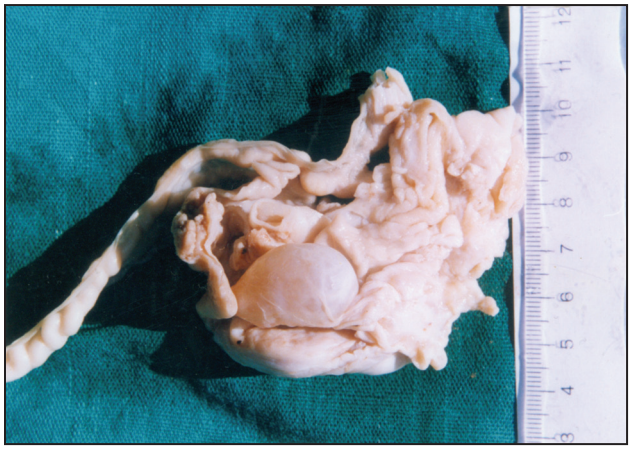

Fig 1. Paraovorian cyst. An oval shape cyst about 2.5 cm in diameter, is present adjacent to the ovary.

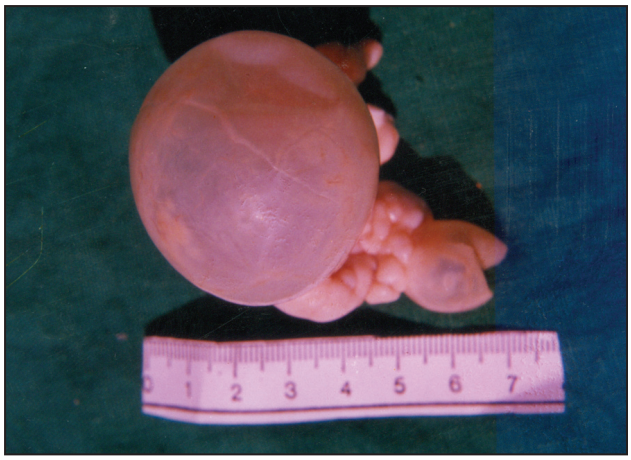

Fig 2. Note a follicular cyst with thick luteal and thin follicular wall in the ovary.

seen in the thecal layers and antrum of affected follicles.

Ovarian hydrobursitis was observed in the left ovarian bursa of one camel (Fig 4). After incision of the affected bursa and explusion of 2200 ml

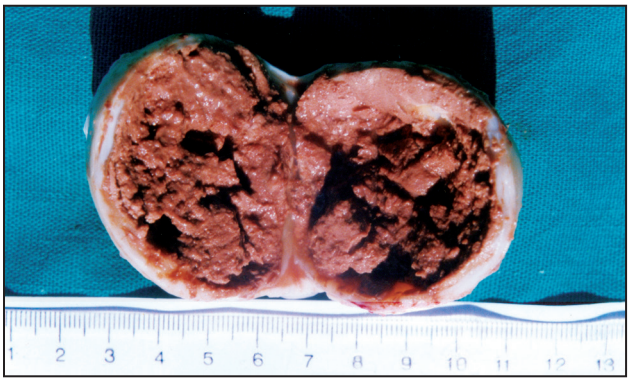

Fig 3. Haemorrhagic cyst in ovary with thick luteal wall contains brown material due to haemorrhage.

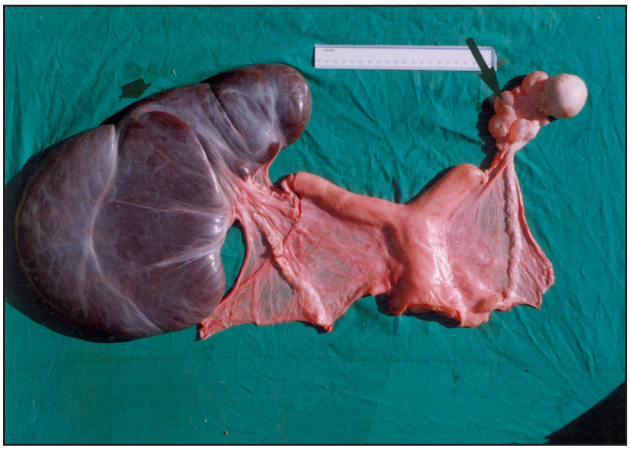

Fig 4. Ovarian hydrobursitis. Accumulation of large quantities of brown fluid are seen within the left ovarian bursa (arrow head) and hydrosalpinx (arrow).

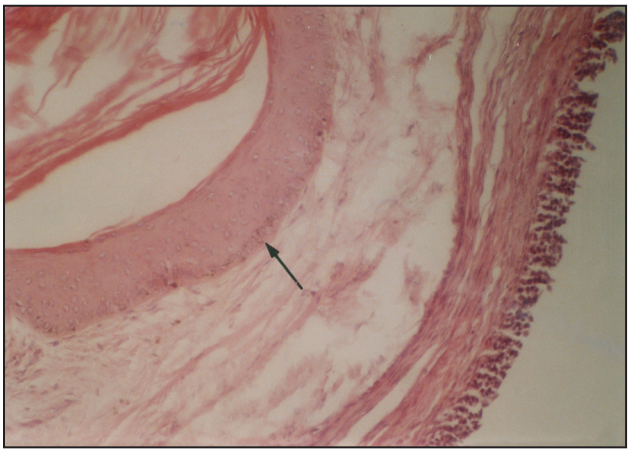

Fig 5. Dermoid cyst. Cystic space lined by keratinised stratified squamous epithelium (arrow) is seen adjacent to an ovarian follicle (H and E, X 250).

haemorrhagic fluid, a haemorrhagic region, 1 cm in diameter, was seen on the left ovary. Based on histopathological characteristics, this haemorrhagic region was diagnosed to be cystic atretic follicle. Fibrosis of thecal layers, loss of granulosa cells, cyst formation and haemorrhage were seen.

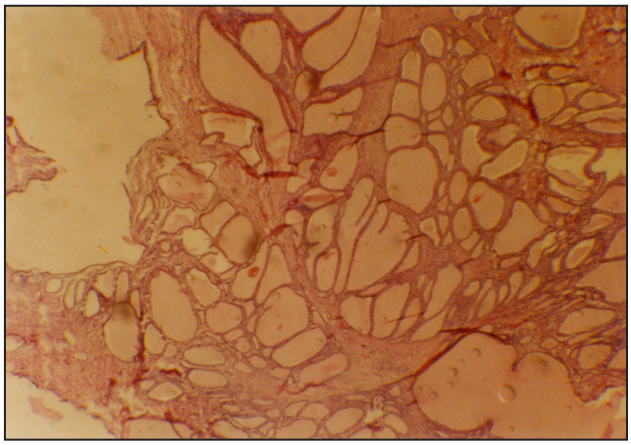

Fig 6. Serous cystadenoma in a camel's ovary. Numerous cysts full of serous fluid lined by cuboidal epithelium are seen in the stroma (H and E, X 40).

Oophoritis was diagnosed in three camels. Based on the type of inflammatory cells, the oophoritis was classified as eosinophilic and chronic oophoritis. Eosinophilic oophoritis was characterised by the focal infiltration of eosinophils in the cortex of one ovary. Chronic oophoritis was characterised by the focal infiltration of mononuclear cells, including macrophages, lymphocytes and plasma cells in the cortex and medulla of two ovaries.

Benign cystic teratoma (dermoid cyst) was diagnosed in the right ovary of one camel. Macroscopically, there was an abnormal spherical mass adjacent to ovarian follicles. On histopathological examination, the abnormal cyst in the ovarian cortex was lined by keratinised stratified squamous epithelium surrounded by connective tissue and hair follicles (Fig 5).

Serous cystadenoma was diagnosed in one camel. The affected right ovary displayed a lobulated surface (three regions) with different sized cysts. The ovary, when incised, a serous fluid flowed and different cysts were separated by septa. Microscopically, the ovary was made up of a connective tissue stroma containing different sized cysts lined by cuboidal epithelium (Fig 6).

Hyaline bodies or droplets were seen in the germinal epithelium of ovary in all of 96 camels examined in the present study. They were eosinophilc and intracytoplasmic.

Discussion

In this study, paraovarian cyst was observed in 2.08% of the camels. Paraovarian cysts were fluid filled structures located in the broad ligament adjacent to the paramesonephric duct (Acland, 2001; Tibary and Anouassi, 1997). Macroscopic and microscopic characteristics of paraovarian cysts observed in this study were similar to those of Kennedy and Miller (1993).

Follicular and haemorrhagic cysts were observed in 2.08% and 1.04% of the cases, respectively. These cysts are a normal evolution of the non ovulatory follicle in 30 to 40% of females. They can be as large as 12 cm in diameter (Tibary and Anouassi, 1997). In our study, haemorrhagic cyst had a thick wall composed of connective tissue and luteal cells. Tibary *et al* (2001) identified luteal structures based on ultrasonographic appearance and confirmed their diagnoses by elevated progesterone levels. They suggested that many of these luteal structures are luteinised haemorrhagic follicles that do not respond very well to the luteolytic effect of PGF_2 (Tibary *et al*, 2001). Nearly similar results were also recorded in llamas by Adams *et al* (1991). In our study, due to luteinisation of haemorrhagic cyst, it is concluded that the affected camel had a high progesteronemia. On the other hand, the affected camel had cystic hyperplastic endometritis. Therefore, it is suggested that a probable association between luteinised haemorrhagic cyst and cystic hyperplastic endometritis may be present.

Intrafollicular haemorrhage was observed in 5.2% of the camels. Haemorrhagic follicles and cysts have been recorded in old world and new world camelids (Adams *et al*, 1991 and Tibary *et al*, 2001). Intrafollicular haemorrhage, for unknown reasons, occurs commonly in calves, in follicular cysts of bitch, and occasionally in atretic follicles of cows (Kennedy and Miller, 1993). In addition, intrafollicular haemorrhages have been reported in mature follicles due to anovulation and in autumn follicles in mares (Bosu *et al*, 1982).

Ovarian hydrobursitis was diagnosed in 1.04%. This lesion is characterised by the accumulation of variable amounts of fluid within the ovarian bursa with encapsulation of the ovary. The incidence of hydrobursitis is higher in animals with a history of reproductive failure (Tibary and Anouassi, 2001). The etiopathogenesis of hydrobursitis is not well understood but some hypotheses are suggested including: 1- A possible relationship between recurrent anovulatory haemorrhagic follicles and hydrobursitis. 2- Relationship between hydrobursitis and uterine and oviductal lesions. 3- Presence of a genetic predisposition (Tibary and Anouassi, 1997). In our study the macroscopic and the histopathological

findings of hydrobursitis are more or less in agreement with the first hypothesis of Tibary and Anouassi (1997).

Oophoritis was diagnosed in 3.12%. There is no study about etiology of oophoritis in the dromedary camel. They may be secondary to ascending infections of uterus, peritonitis, perimetritis or arise from specific diseases such as tuberculosis, brucellosis and campylobacteriosis. Ovarian inflammation and adhesions can also result from haemorrhage due to harsh manipulation of the ovaries in attempts to rupture anovulatory haemorrhagic follicles (Tibary and Anouassi, 1997).

Bengin cystic teratoma or dermoid cyst was identified in 1.04%. Most of the reported ovarian tumors in camelidae are teratomas. They contain different types of tissues including cartilage, bone and hair (Tibary and Anouassi, 1997). In the present study, the ovarian mass contained only abnormal cysts with keratinised stratified squamous epithelium surrounded by connective tissue and hair follicles. Ovarian teratomas and dermoid cysts have been reported most commonly in horse, dog and buffalo (Dakshinkar *et al*, 1989; Khan *et al*, 1975; McCormick and McEntee, 1988; Panciera *et al*, 1991; Pandey and Dwivedi, 1978; Wilson *et al*, 1985).

Serous cystadenoma was seen in 1.04%. There is no report about occurrence of this ovarian epithelial tumor in camelidae. Serous cystadenoma has been reported primarily in the bitch. Many of these affected bitches have cystic hyperplasia of the endometrium (Kennedy and Miller, 1993). In the current study, the uterus of affected camel also showed cystic hyperplastic endometritis. This could not be associated unequivocally to the serous cystadenoma because of the presence of luteinised haemorrhagic cyst in the other ovary. Simultaneous occurrence of mucinous cystadenoma, follicular cyst and endometrial cystic hyperplasia have been recorded in cow (Garcia Iglesias *et al*, 1991). In our study, macroscopic and microscopic findings of serous cystadenoma are in agreement with those of Garcia Iglesias *et al* (1991).

Intracytoplasmic hyaline bodies were seen in the germinal epithelium of ovaries in all of studied camels. There is no report about these eosinophilic inclusion-like bodies. They can be normal cellular inclusions because they were identified in all of specimens.

In this study, the effects of the observed ovarian lesions on camel fertility are unknown because of the absence of their reproductive histories. For the first time, serous cystadenoma was identified in ovarian tissue of a dromedary camel. Additionally, based on gross and histopathological chara- cteristics, we suggest and support two hypotheses. The first is that the occurrence of ovarian hydrobursitis may be due to haemorrhage from atretic follicle. The second is that a probable relationship between ovarian luteinised hemorrhagic cyst and cystic hyperplastic endometritis in the dromedary camel may exist.

Acknowledgements

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Contribution to the study of abscess disease in the dromedary (*Camelus dromedarius*) in Nefzaoua Region (South-west of Tunisia)

M.M. Seddik, M.S.B. Said, M. Benzarti, T. Khorchani, L. Messadi and A. Amara

Results of an epidemiological, clinical and bacteriological survey of abscesses disease in Nefzaoua region, Tunisia, are persented. It studied, 33 herds in extensive conditions and animals exploited in the touristic sector. Clinical and bacteriological examinations were conducted in 38 animals from these herds. The disease was generally characterised by one or two abscesses in the external lymph nodes, usually in those at the base of the neck, and the prescapular nodes. The internal form of the disease was not observed in 72 camels slaughtered at the region slaughterhouse. Nine per cent of the animals had abscesses. The main factors that caused onset of the disease were tattooing, mixing animals from different herds and tick infection. Different bacteria were isolated, in particular *Staphylococcus* (53% of cases) *Corynebacterius pseudotuberculosis* (18%) and *Actinomyces pyogenes* (26%).

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