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PATHOLOGICAL AND BACTERIOLOGICAL STUDIES IN UTERUS, CERVIX AND VAGINA OF THE FEMALE CAMELS (*Camelus dromedarius*) SLAUGHTERED AT TAMBOUL ABATTOIR, SUDAN

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ABSTRACT

This study was carried out to investigate the different pathological lesions of the uterus, cervix and vagina of 2158 female camels at different ages of *Arabi* breed slaughtered at Tamboul abattoir, Sudan. Gross lesions of affected organs were observed and recorded. Representative samples from the gross lesions were obtained, fixed in 10% neutral formal saline, processed, sectioned and stained with haematoxylin and eosin (H & E) for histopathological examinations. Tissue samples and swabs from these organs were taken for bacteriological examination. The results showed that 214 organs were affected representing 9.92% of the total she-camels investigated. The various pathological lesions and conditions as calculated from total affected organs included uterine haemorrhage (23.37%), uterine congestion (20.56%), uterine white purulent spots (16.82%), uterine thickening and corrugation (9.35%), pyometra (5.60%), vaginal prolapse (4.67%), uterine abscess (3.73%), vaginal necrosis (2.80%), cervical abscess (2.80%), uterine necrosis (2.80%), uterine prolapse (1.87%), vaginal abscess (1.87%), uterine diminution (0.94%), uterine oedema (0.94%), uterine fibrosis (0.94%) and cervical oedema (0.94%). Tissues for bacteriological examination were taken from 37 samples representing all the pathological lesions encountered in this study revealed 37 isolates. The isolates consisted of 32 Gram-positive isolates (86.49%) and 5 Gram-negative ones (13.51%). The percentage of isolates in order of frequency as calculated from the total isolates were; *Staphylococcus* spp. 22(59.45%), *Streptococcus* spp. 2 (5.41%), *Bacillus* spp. 6 (16.22%) and *Corynebacterium* spp. 2 (5.41%). The Gram-negative bacteria isolates were *Escherichia coli* 4 (10.81%) and *Pseudomonas* spp. 1 (2.70%). It should be stressed that *Staphylococcus aureus* and *Pseudomonas* spp. were isolated for the first time from white purulent spots lesions in the uterus of dromedary camel.

Key words: Bacteriological study, camels, reproductive system, Sudan

Diseases and infections of the reproductive system of camels may cause complications resulting in infertility or poor reproductive performance and consequent loss of productivity (Tibary and Anoussi, 2001; Yagoub, 2005; Tibary *et al,* 2006; Shawky *et al,* 2004 and Al-Afaleq *et al,* 2012).

Generally, infection of the reproductive tract during the prepartum period leads to metritis and endometritis with consequent lowering of the reproductive efficiency and repeat-breeding (Gani *et al,* 2008; Mshelia *et al,* 2012). Some bacterial diseases of camel's reproductive system have been reported. Fayed (1992) and Refai (1992) classified the main genital tract infections in Egyptian camels as acute catarrhal, suppurative endometritis, chronic endometritis, pyometra and abscesses of the uterine wall. Literature on camel diseases and in particular those related to reproductive system is very scanty (Wernery and Kaaden, 2002).

The purpose of the present study was to investigate the different pathological lesions and bacteriological causes in the uterus, cervix and vagina in camels slaughtered at Tamboul abattoir, Sudan.

Materials and Methods

The genital tract of 2158 female Arabi camels of different ages slaughtered at Tamboul slaughterhouse were examined and affected genital organs were collected. Gross examination was done and observations were recorded. Representative specimens from the gross lesions were obtained, fixed in 10% neutral formal saline. Sections were processed, prepared and stained with haematoxylin and eosin (H & E) for histopathological examination (Bancroft *et al,* 1996). Tissue samples and swabs from affected organs were taken for bacteriological examination according to the method of Barrow and Feltham (1993).

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Results

Gross and histopathological examination:

The results showed that 214 organs were affected representing 9.92% of the total camels investigated (Table 1). The pathological lesions per cent as calculated from total affected organs comprised uterine haemorrhage (23.37%), uterine congestion (20.56%), uterine white purulent spots (micro abscesses) (16.82%), uterine thickening and corrugation (9.35%), pyometra (5.60%), vaginal prolapse (4.67%), uterine abscesses (3.73%), vaginal necrosis (2.80%), cervical abscesses (2.80%), uterine necrosis (2.80%), uterine prolapse (1.87%), vaginal abscesses (1.87%), uterine atrophy (decrease in size) (0.94%), uterine oedema (0.94%), uterine fibrosis (0.94%) and cervical oedema (0.94%).

Uterus

The diverse pathological conditions recorded in the uterus are summarised below.

Pyometra

This condition was characterised by accumulation of a large amount of pus in the uterine horns, distension of the uterus and thinning of its walls. The pus showed different colours (white, grey, green or yellow) according to the causative pyogenic bacteria (Fig 1). Congestion, oedema, necrosis of mucosal epithelium of uterus and infiltration of neutrophils and mononuclear cells were seen microscopically. Various organisms isolated from affected cases were *Staphylococcus aureus, Streptococcus* spp., *Corynebacterium* spp. and *E. coli*.

Table 1. Pathological usionl condions of the female genital tract in camels slaughtered at Tamboul abattoir.

Organ	Pathological lesion	Number of lesions	% of lesions
Uterus	Haemorrhage	50	23.37
	Congestion	44	20.56
	White purulent spots	36	16.82
	Thickening and corrugation	20	9.35
	Pyometra	12	5.60
	Abscess	8	3.73
	Necrosis	6	2.80
	Uterine prolapse	4	1.87
	Fibrosis	2	0.94
	Oedema	2	0.94
	Decrease in size	2	0.94
Cervix	Oedema	2	0.94
	Abscess	6	2.80
Vagina	Vaginal prolapse	10	4.67
	Vaginitis	6	2.80
	Abscess	4	1.87
Total affected organs		**214**	**100%**
Total examined animals		**2158**	

*Overall percentage (%) of affected organs to total examined animals = 9.92%.

White purulent spots (Micro abscesses)

White spots (micro-abscesses) were found scattered on the endometrial surface. The endometrium was congested and oedematous. Microscopic examination revealed endometrial purulent spots containing pus surrounded by fibrous capsules, neutrophils and mononuclear cells infiltration. Various bacteria isolated from affected cases were *Staphylococcus aureus* and *Pseudomonas* spp.

Thickening and corrugation

The uterus was enlarged and increased in weight and size. The external surface of uterine wall was corrugated and thickened. The endometrium was also thickened following recent history of abortions (Fig 5).

Uterine oedema

The uterus was enlarged, with an increase in weight and size due to oedematous uterine wall. Clear and serous fluid was released when the surface of the uterus was cut or opened (Fig 6).

Uterine abscess

The abscesses were embedded in the uterine wall either internally or exteriorly with, whitish and yellowish colour pus surrounded by a thick fibrous capsule (Fig 7). Microscopic examination showed liquefactive necrosis and leucocytic infiltration predominantly neutrophils surrounded by a fibrous tissue capsule.

Uterine atrophy

A she-camel had much smaller uterus than the normal one of similar age. The weight of the affected uterus was also lower than normal (Fig 8).

Uterine congestion and haemorrhage

The endometrium was severely congested, with petechial and echymotic haemorrhages (Fig 9). Blood plaques were found scattered throughout the endometrium (Fig 10). Microscopic examination revealed red blood cells leaking out of the endometrial blood vessels.

Uterine fibrosis

Fibrosis was often seen in the uterus that was affected with chronic metritis at angles of adhesion. The collagenous fibres were red in colour when stained with H&E (Fig 11).

Uterine prolapse

This condition was recorded in 4 cases and occurred after parturition. The protruding part of the uterus was oedematous, congested and haemorrhagic and in some cases the uterus was necrosed (Fig 12).

Cervix

Different pathological changes in the cervix are summarised as under:

Cervical oedema

The oedematous cervix was enlarged, with increase in size and fluid escaped when the surface was cut. The cervix contained clear serous transudate.

Abscess (Suppurative Cervicitis)

Gross examination revealed mucosal congestion of the cervix wall along with many abscesses (Fig 13). The latter contained a small or large amount of pus surrounded by a thick fibrous capsule.

Vagina

Different pathological changes in the vagina are summarised as under:

Vaginal prolapse

These were seen clinically in pregnant camels. The protruding part of the vagina was congested and haemorrhagic, (Fig 14). In some cases necrotic areas were also seen, while the protruding part of the vulva was pale.

Vaginitis

Gross examination revealed mucosal congestion of the vagina with accumulation of pus, hyperaemia and coagulative necrosis of the mucosa. This condition was noticed after parturition (Fig 15). Microscopic examination revealed congestion, necrotic area, accumulation of pus and infiltration of neutrophils surrounding the capsule of the abscess.

Bacteriological findings

Tissues for bacteriological examination were taken from 37 samples representing all types of pathological lesions encountered in this study. All samples were positive for bacterial growth with the exception of one tissue lesion that didn't show any growth in media.

The results showed 32 Gram-positive (86.49%) and 13 Gram-negative isolates (13.51%). The percentage of Gram-positive isolates in order of frequency were *Staphylococcus* spp. 22(59.45%), *Streptococcus* spp. 2(5.41%), *Bacillus* spp. 6(16.22%) and *Corynebacterium* spp. 2(5.41%). The Gram-negative bacterial isolates were *Escherichia coli* 4(10.81%) and *Pseudomonas* spp. 1(2.70%) (Table 2).

Table 2. Percentage of bacteria isolated from pathological lesions.

Bacterium	Total No. of isolates	%
Staphylococcus spp.	22	59.45
Bacillus spp.	6	16.22
Escherichia coli	4	10.81
Streptococcus spp.	2	5.41
Corynebacterium spp.	2	5.41
Pseudomonas spp.	1	2.70
Total	**37**	**100%**

Discussion

The incidence and pathological lesions of the genital tract affections of the she-camel could provide information that could aid in evaluating the reproductive status of these animals in the Sudan. The present study provided valuable data on the prevalence and causes of pathological changes of the uterus, cervix and vagina in camels slaughtered at Tamboul abattoir, Sudan.

The results revealed that the total incidence of female genital disturbances was 9.92%. This incidence is lower than that recorded in Saudi Arabia by Al-Afaleq *et al* (2012) who found an incidence between 15.43 and 17.14%. Incidence of genital tract affections of she-camel was 26% in Egypt (Shawky *et al* 2004).

The study also indicated that the uterine affections were the most frequently estimated affections, followed by the lesions of the vagina and cervix. These findings were in accordance with Shawky *et al* (2004) in Egypt. Concerning the gross pathological examination of she-camel uterus, the present study revealed that uterine affections constituted the highest incidence (8.62%) of all examined cases and represented 86.91%. This result is less than that reported by Shawky *et al* (2004) in Egypt (13.2%) and Al-Afaleq *et al* (2012) in Saudi Arabia (16.99%).

Pathological lesions in the camel uterus particularly haemorrhage and congestion in the present study has not been reported in female dromedary camels previously.

Fig 1. Gross examination revealed distended uterine horns and escape of pus from cut surface.

Fig 2. Gross examination revealed white spots scattered on the endometrial surface.

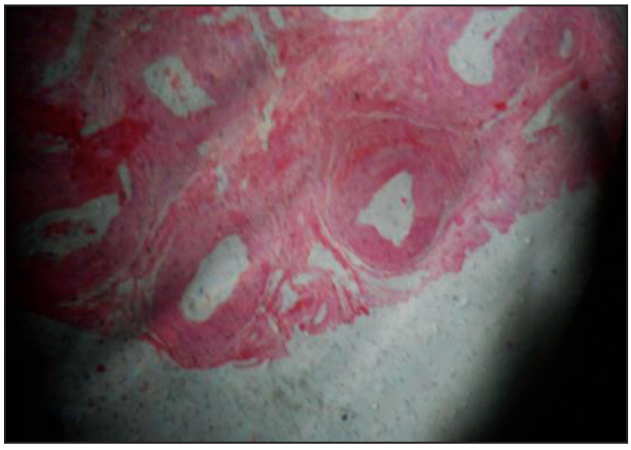

Fig 3. Gross examination revealed uterus showing white spots (micro-abscesses) surrounded by fibrous capsules.

The occurrence of small uterine abscesses scattered on the uterine endometrial surface and isolation of *Staphylococcus aureus* and *Pseudomonas* spp. from these lesions was reported previously.

Thickening and corrugation of the uterine wall was corroborated with the abortion of these animals two weeks before slaughtering.

Fig 4. Gross examination revealed corrugated and thickened external surface of the uterus.

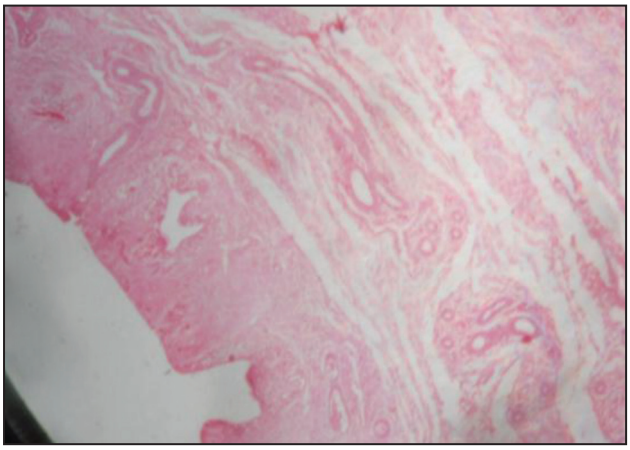

Fig 5. Photomicrograph showing thickened endometrium (H&E).

Fig 6. Gross examination revealed enlarged oedematous wall of uterus with released serous fluid.

Large uterine abscesses (2-3cm) found in this study have not been reported previously in dromedaries. The occurrences of pyometra was 5.60% in animals of present study, however, Al-Afaleq *et al* (2012) found it 3.19% and Shawky *et al* (2004) 6.4%.

The incidence of oedematous cervix in the present study was 0.94%, whereas Shawky *et al*

Fig 7. Gross examination of uterus revealed yellowish pus released from an abscess.

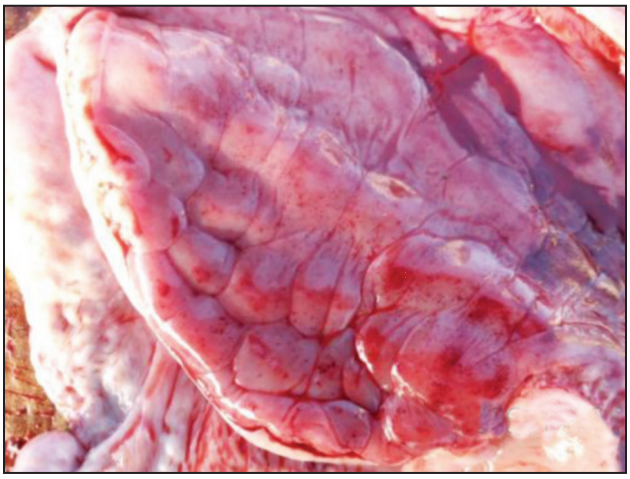

Fig 10. Gross examination revealed ecchymotic haemorrhages and blood plaques on the endometrium.

Fig 8. Gross examination of uterus revealed atrophied uterus which appeared smaller in size than normal.

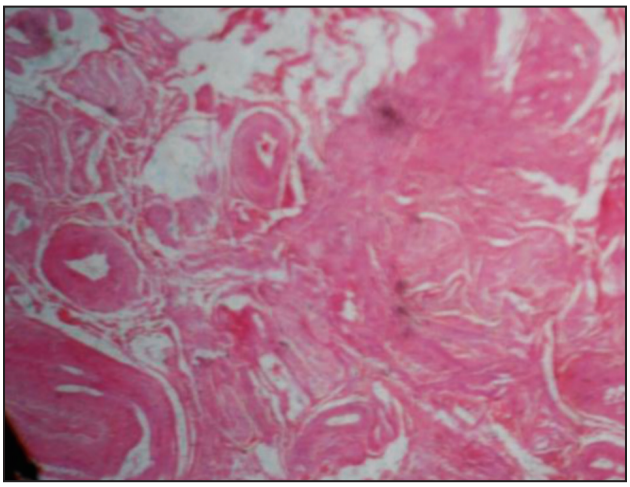

Fig 11. Histopathological examination showing collagenous fibres (H&E) indicating fibrosis of uterine wall.

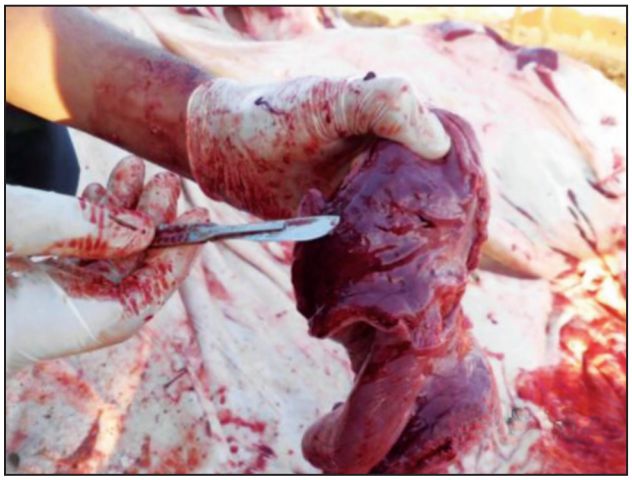

Fig 9. Gross examination revealed congested and haemorrhagic endometrium.

Fig 12. Gross examination revealed haemorrhagic prolapsed uterus.

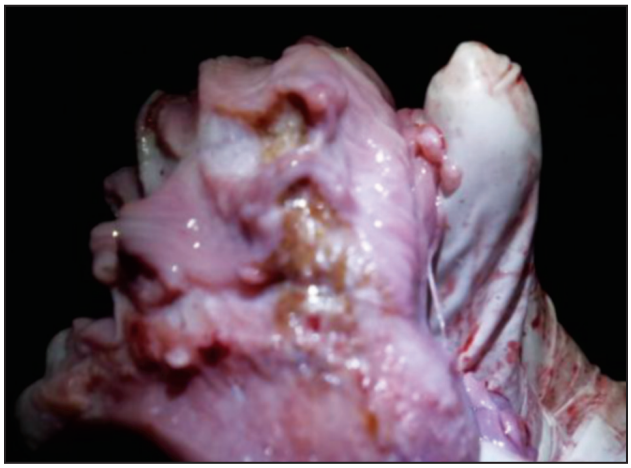

Fig 13. Gross examination revealed cervical abscesses.

Fig 14. Gross examination revealed congested, haemorrhagic prolapsed vagina.

(2004) reported it to be 0.4%. However, suppurative cervicitis and cervical abscesses have not been reported previously.

Different species of microorganisms isolated from the uterus, cervix and vagina in animals of present study which was similar to reports by other investigators (Yagoub, 2005, Tibary *et al,* 2006 and Al-Afaleq *et al,* 2012).

In the present study, *Staphylococcus aureus* and *Pseudomonas* spp. were isolated for the first time from white spots lesions in the uterus of camels.

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Fig 15. Gross examination revealed vaginal congestion and pus accumulation.

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