

RECTAL PROLAPSE IN DROMEDARY CAMELS

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ABSTRACT

Thirty camels of 3 different breeds suffering from rectal prolapse were reported. Age, gender, breed and history in addition to the duration of prolapse occurrence were noted. The prolapsed parts were examined for their shape, colour, texture and mucosal condition. All cases were classified into 3 types, according to the extent of the prolapse. The appropriate surgical intervention was performed for each case.

The results revealed that high incidence of rectal prolapse were recorded in age group 5 - 8 years (50%). The percentage of prolapse was higher in males (60%) than in females (40%). The frequency of prolapse were 56.7%, 30%, 13.3% in Mojaheem, Omani and Magateer breeds, respectively. Prolapse was associated with mating in 16 male camels (53.3%) and with diarrhoea in 14 camels (46.7%). The prolapsed part shape was either rounded, mushroom or cylindrical. The rectal wall was pink red, smooth and soft in recent cases and dark red with blackish areas and necrosis with induration in old cases. Types I, II and III rectal prolapse were recorded in 3 (10%), 22 (73.3%) and 5 cases (16.7%), respectively. Management of rectal prolapse either with reduction or resection of the extruded part was successful. Histopathology of type III prolapse showed degenerative changes and necrotic foci.

Key words: Camels, dromedary, pathology, prolapse, rectum

Rectal prolapse in camel has been reported (Ramadan, 1994; Tibary and Anouassi, 1997 and Tibary *et al*, 2008). Earlier studies (Arnold *et al*, 1978; Watkins *et al*, 1989 and Kay *et al*, 2008) have classified rectal prolapse into 4 types, based on the rectal layers and part of intestine associated. The involved tissues were mucosa or mucosa and submucosa (Type I), all layers of rectal wall (type II), rectum and small colon (type III) and intussusceptions of rectum or small colon through the anus (type IV).

The present study was designed to investigate the incidence of prolapse among breeds, age and gender. It was aimed to demonstrate the predisposing factors, the clinical features with the most relevant types and possible correction and treatment protocols of rectal prolapse in camels. Histopathological examination of the prolapsed tissue was also performed.

Materials and Methods

Thirty camels suffering from rectal prolapse were recorded at Veterinary Teaching Hospital (VTH) of King Faisal University (Table 1) between January 2008 and February 2010. The age, gender, breed, duration of the prolapse and history were recorded. The prolapsed part was examined clinically for its shape, colour, texture and mucosal condition. These were classified according to O'Connor (1943), Turner

and Fessler (1980), Ramadan *et al* (1986) and Turner (1987) into four types. Rectal palpation was performed to determine the presence of intussusceptions as a characteristic of type IV prolapse.

Table 1. Diverse variables recorded in rectal prolapse cases.

Variable	Classification
Breed	Mojaheem, Omani and Magateer
Age (year)	group I (1- 4), group II (5 - 8) and group III (9 - 12)
Gender	Male and female
Duration of prolapse	\leq 1 month, 2 - 4 months and \geq 12 months
Predisposing factors	Several matings and diarrhoea

The surgical interventions were carried out under epidural anesthesia by injection of 20 ml of 2% lignocaine hydrochloride (Tanwer *et al*, 1989). Six cases with apparently healthy rectal wall (6 camels) were handled by manual reduction, after application of 10% warm antiseptic fomentation using 5% povidone iodine to help in reduction of rectal oedema. A 5 mm suture tape (Bühner Band) was placed in purse-string fashion, 1-2 cm lateral to the anal opening (Freeman and Martin, 1992).

Animals with necrotic and ulcerated mucosal or rectal wall were sedated using xylazine

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hydrochloride 2% (0.2 mg/kg BW i.v.) before epidural anaesthesia. Such cases were treated by resection of mucosal or rectal wall. The area of operation was aseptically prepared. A plastic tube was placed into the rectal lumen to serve as a guide after which 6-8 horizontal mattress stay stitches were placed on the healthy rectal wall through all layers of the prolapsed rectum, using No.1 USP suture silk. The necrosed portion of rectal mucosa or wall, caudal to the stay stitches, was transected for one-third of the prolapse circumference. Anatomically, the transected rectal edges were opposed with simple interrupted suture using polyglactin No. 2 USP. These steps were repeated for the other two remaining thirds of the circumference until all unhealthy rectum had been removed. The mucosal edges were opposed with a simple continuous suture that was interrupted at three equidistant points around the circumference (Freeman and Martin, 1992 and Fossum *et al*, 1997). Fusidic acid (Fucidine)® 2% Leo pharmaceutical, Ballerup - Denmark, antibiotic ointment was applied over the suture line.

Postoperative care

All animals were given a systemic antibiotic oxytetracycline (Tetracycine)® (Laboratorios Argos, Santa Fe- Argentina) at a dose of 20 mg/Kg BW every 72 hrs, additionally anti-inflammatory flunixin meglumine (Flunixin)® (Laboratories Argos, Santa Fe- Argentina) at a dose of 1.1 mg/Kg BW for 7 days. The operated animals were kept on a soft diet (milk) for

15 days. The suture tape (Bühner Band) was removed on the tenth day.

Statistical analysis

Categorical variables were analysed by the Proc Frequency procedure (SAS, Institute Inc., 2002). The Pearson's χ^2 (Chi-square) statistics were calculated according to Steel and Torrie (1960). The values were used with Chi square table to determine the significance ($P < 0.05$) of rectal prolapse among 3 camel breeds and other variables.

Results

Camels included in this study were assigned according to age into 3 groups; group I (1- 4 years), group II (5 - 8 years) and group III (9 - 12 years). The age had no significant influence on the occurrence of rectal prolapse among the 3 camel breeds ($P > 0.05$), although the highest incidence was recorded at group II (50%), while the lowest (20%) was observed at group I. Mojaheem showed higher frequency of prolapse than Omani and Magateer breeds (Table 2). There was a significant ($P < 0.05$) effect of gender on the prevalence of prolapse and it was found to be 36.7% and 23.3% in males Mojaheem and Omani breed and 20% and 6.7% in the respective females (Table 3). In Magateer breed, rectal prolapse was recorded only in females (13.3%).

The history of the cases revealed that prolapse had occurred secondary either to several matings (in males) or diarrhoea. These 2 predisposing factors had

Table 2. Incidence of rectal prolapse expressed by frequency (F) and percentage (%) at different age groups among 3 camel breeds.

Age (year)	Camel breeds							
	Mojaheem		Omani		Magateer		Total	
	F	%	F	%	F	%	F	%
Age groups:								
• (1 - 4)	5	16.7	0	0	1	3.3	6	20.0
• (5 - 8)	7	23.3	5	16.7	3	10.0	15	50.0
• (9 - 12)	5	16.7	4	13.3	0	0	9	30.0
Total	17	56.7	9	30.0	4	13.3	30	100

Chi-square value (χ^2) = 5.251 at degrees of freedom (df) = 4 $P > 0.05$

Table 3. Incidence of rectal prolapse expressed by frequency (F) and percentage (%) at males and females among 3 camel breeds.

Gender	Camel breeds							
	Mojaheem		Omani		Magateer		Total	
	F	%	F	%	F	%	F	%
• Male	11	36.7	7	23.3	0	0	18	60
• Female	6	20.0	2	6.7	4	13.3	12	40
Total	17	56.7	9	30.0	4	13.3	30	100

Chi-square value (χ^2) = 7.342 at df = 2 $P < 0.05$

no significance ($P > 0.05$) on its commonness between breeds. The percentage of cases with mating history was slightly higher than that of those with history of diarrhoea (Table 4). Prolapse duration varied from one week to more than one year, so it was classified into 3 periods: ≤ 1 month, 2-4 months and ≥ 12 months. Prolapse duration at ≤ 1 month showed the highest frequency in Mojaheem (33.3%) followed by Omani (6.7%) and Magateer (3.3%) breed. Prolapse existing for 2-4 months, it was 16.7% for Mojaheem and 10% for the other 2 breeds. Concerning prolapse ≥ 12 months, Omani experience a higher rate (13.3%) than Mojaheem, and no cases were seen at Magateer breed (Table 5).

In this study, only types I, II and III rectal prolapse were diagnosed with no significance ($P > 0.05$) among camel breeds. Type I (partial or incomplete prolapse) was characterised by emerged mucosal and submucosal layers of rectum through

the anal opening (Fig 1). While in type II (complete prolapse), all layers of rectal wall were protruded (Fig 2). Type III was comparable to type II, in addition to prolapse of part of descending colon (Fig 3). Results declared that type II was the most common among camel breeds. It was 36.7%, 23.3% and 13.3% in Mojaheem, Omani and Magateer, respectively (Table 6). Incidence of types I and III were higher in Mojaheem (6.7% and 13.3%) than in Omani breed (3.3% and 3.3%).

The prolapsed part was either rounded, cylindrical or mushroom shaped. The cylindrical shape was the most widely seen in all breeds (66.7%), and it was associated with type II and III rectal prolapse with variable lengths. The incidence of the rounded contour was higher than the mushroom shaped one (Table 7) and it was observed in type I and II. Most cases of protruded rectal wall (80%) had multiple irregular black areas with necrosis, whereas

Table 4. Incidence of rectal prolapse expressed by frequency (F) and percentage (%) due to mating or diarrhoea among 3 camel breeds.

Associated conditions	Camel breeds							
	Mojaheem		Omani		Magateer		Total	
	F	%	F	%	F	%	F	%
• Mating	10	33.3	6	20.0	0	0	16	53.3
• Diarrhoea	7	23.4	3	10.0	4	13.3	14	46.7
Total	17	56.7	9	30.0	4	13.3	30	100

Chi-square value (χ^2) = 5.420 at df = 2 $P > 0.05$

Table 5. Incidence of rectal prolapse expressed by frequency (F) and percentage (%) at different duration periods among 3 camel breeds.

Duration of prolapse	Camel breeds							
	Mojaheem		Omani		Magateer		Total	
	F	%	F	%	F	%	F	%
• ≤ 1 month	10	33.3	2	6.7	1	3.3	13	43.3
• 2-4 months	5	16.7	3	10.0	3	10.0	11	36.7
• ≥ 12 months	2	6.7	4	13.3	0	0	6	20.0
Total	17	56.7	9	30.0	4	13.3	30	100

Chi-square value (χ^2) = 8.117 at df = 4 $P > 0.05$

Table 6. Incidence of different types of rectal prolapse expressed by frequency (F) and percentage (%) among 3 camel breeds.

Types of prolapse	Camel breeds							
	Mojaheem		Omani		Magateer		Total	
	F	%	F	%	F	%	F	%
• Type I	2	6.7	1	3.3	0	0	3	10.0
• Type II	11	36.7	7	23.3	4	13.3	22	73.3
• Type III	4	13.3	1	3.3	0	0	5	16.7
Total	17	56.7	9	30.0	4	13.3	30	100

Chi-square value (χ^2) = 2.362 at df = 4 $P > 0.05$

the rest (20%) showed only congestion (pink red colour) and smooth surface (Table 8). Consistency of prolapsed tissues was either soft oedematous or firm indurate. There were no significant differences among camel breeds (Table 9).

In the present study, 24 cases showed improvement after surgical excision of the prolapsed parts and 6 cases after reduction and purse string suture.

In Type III rectal prolapse, histopathological sections of the resected rectal wall revealed necrotic colitis, which was characterised by complete necrosis of the mucosal epithelium with underlying haemorrhagic inflammatory reaction (Fig 4A), excess of the inflammatory cell reactions, haemorrhages and degenerated submucosal glands (Fig 4B), degenerated and necrotic epithelium of the intestinal glands with surrounding areas of necrosis and haemorrhages (Fig 4C), areas of complete submucosal necrosis with replacement of the necrosed glands with mononuclear cell aggregations (Fig 4E), focal areas

of severe suppurative necrosis of the intestinal gland surrounded by several layers of neutrophilic infiltrations, and deep areas of mononuclear cell infiltrations and aggregations between the submucosal connective tissue elements (Fig 4F).

Discussion

In the present study the rectal prolapse was diagnosed in a wide range of age (1 - 12 years), however, the highest incidence was observed at the age of maturity (5 - 8 years), while Turner and Fessler (1980) and Ramadan *et al* (1986) mentioned that prolapse occurs at all age groups in horses and camels.

In contrary to Ramadan *et al* (1986) who stated that higher incidence of rectal prolapse was recorded in elderly female camels than in males, the present study found that male camels showed higher incidence than females. However, in horses Turner and Fessler (1980) mentioned that the condition is more common in females than males.

Table 7. Incidence of different shapes of rectal prolapse expressed by frequency (F) and percentage (%) among 3 camel breeds.

Shapes of prolapse	Camel breeds							
	Mojaheem		Omani		Magateer		Total	
	F	%	F	%	F	%	F	%
Rounded	3	10.0	3	10.0	0	0	6	20.0
Cylinder	10	33.3	6	20.0	4	13.3	20	66.7
Mushroom	4	13.3	0	0	0	0	4	13.3
Total	17	56.7	9	30.0	4	13.3	30	100

Chi-square value (χ^2) = 5.529 at df = 4 P > 0.05

Table 8. Incidence of different conditions of rectal prolapse expressed by frequency (F) and percentage (%) among 3 camel breeds.

Condition of prolapse	Camel breeds							
	Mojaheem		Omani		Magateer		Total	
	F	%	F	%	F	%	F	%
Healthy	5	16.7	1	3.3	0	0	6	20.0
Necrosis	12	40.0	8	26.7	4	13.3	24	80.0
Total	17	56.7	9	30.0	4	13.3	30	100

Chi-square value (χ^2) = 2.386 at df = 2 P > 0.05

Table 9. Incidence of different textures of rectal prolapse expressed by frequency (F) and percentage (%) among 3 camel breeds.

Texture of prolapse	Camel breeds							
	Mojaheem		Omani		Magateer		Total	
	F	%	F	%	F	%	F	%
Soft and edematous	11	36.7	2	6.7	1	3.3	14	46.7
Firm and indurated	6	20.0	7	23.3	3	10.0	16	53.3
Total	17	56.7	9	30.0	4	13.3	30	100

Chi-square value (χ^2) = 5.138 at df = 2 P > 0.05



a



b

Fig 1. Type I rectal prolapse; a: Twelve years old male Omani camel with dark red mucosal prolapse. b: After surgical excision.



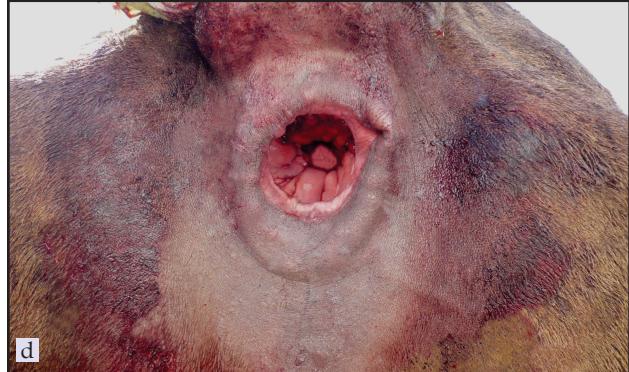
a



b



c



d



e



f

Fig 2. Type II rectal prolapse: a: A seven years old male Mojaheem camel, the prolapsed part resembling mushroom with necrosis of rectal wall. c: A seven years old male Mojaheem camel, the prolapsed part resembling small cylinder with apparently healthy rectal wall. e: A ten years old male Mojaheem, the prolapsed part is rounded with necrosis of rectal wall. b, d & f: After surgical excision.



Fig 3. Type III rectal prolapse in the form of large cylinder. **a:** An eight years old Omani camel, the prolapsed part showing necrosis and laceration. **c:** An 11 years old male Mojaheem camel, the prolapsed rectum is blackish with necrosis. **b** and **d:** The same cases after surgical excision.

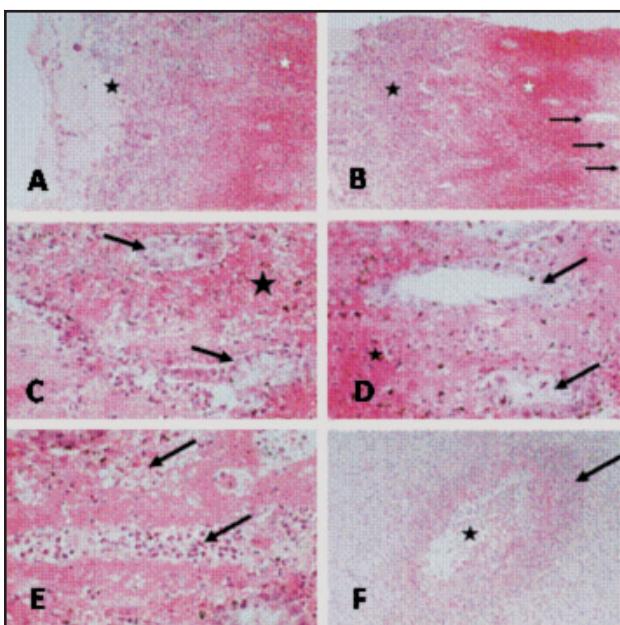


Fig 4. Histopathology of rectal wall segment; **A:** Complete necrosis of the mucosal epithelium (black asterisk) with underlying haemorrhagic inflammatory reaction (white asterisk). HE stain. X250. **B:** Excess of the inflammatory cell reactions (black asterisk), haemorrhages (white asterisk) and degenerated submucosal glands (arrows). HE stain. X250. **C:** Degenerated and necrotic epithelium of the intestinal glands (arrows) with surrounding areas of necrosis and hemorrhages (asterisk). HE stain. X400. **D:** High power to show the degenerated and necrotic epithelium of the intestinal glands (arrows) with surrounding areas of necrosis and hemorrhages (asterisk). HE stain. X400. **E:** Area of complete submucosal necrosis with replacement of the necrotic glands by mononuclear cell aggregations (arrows). **F:** Focal area of severe suppurative necrosis of the intestinal gland (asterisk) surrounded by several layers of neutrophilic infiltrations (arrow). HE stain X400.

Male camels at 5 - 8 years revealed high incidence for prolapse, as this is the age at which animal could be used as stud (Arthur *et al*, 1985). The males become super active during this period and try mating frequently, leading to variable degree of straining. Moreover, some camel breeders are offering their males large quantities of cereals such as barley during the rutting season. Cereals (barley) are phytoestrogen rich food (Ward and Thompson, 2001). This high oestrogen content can lead to relaxation of pelvic and rectal muscles and may be a factor in rectal prolapse occurrence.

Straining due to intestinal neoplasia, foreign bodies, perineal hernia, constipation and congenital defects might lead to rectal prolapse (Jhirwal, 2004). The present study incriminates mating as one of the predisposing factors for rectal prolapse in male camels. The position of a male on a she-camel during mating can increase the intra-abdominal pressure and encourage occurrence of prolapse. Moreover, the relatively short breeding season with an excessive number of females to be served by one male and the long coitus time of 1 - 4 minutes (Hafez and Hafez, 2001) may play a role in the incidence of prolapse.

Incidence of rectal prolapse associated with a history of continuous diarrhoea was also high (46.7%). Such results showed that diarrhoea is one of the most common predisposing factors for prolapse in camels. Furthermore, Ramadan *et al* (1986), Ramadan (1994) and Tibary *et al* (2008) mentioned that tenesmus and diarrhoea are predisposing factors for rectal prolapse.

Time elapsed from prolapse occurrence until arrival to VTH, affected largely the pathological condition of the protruded part. Camels with prolapse duration \leq 1 month showed dark red, soft oedematous rectal wall and those with prolapse period \geq 12 months, had reddish to black, necrotic and firm and indurated texture tissues. Histopathological findings revealed necrotic colitis that coincide with the clinical picture. Irritation from the tail together with harsh environmental conditions (sand) lead to inflammation of the rectal wall with fibrosis in long standing cases giving indurated consistency. The same findings were also recorded by O'Connor (1943); Ramadan (1994) and Kay *et al* (2008).

The most common types of rectal prolapse in camels were of type II (73.3%), III (16.7%) and I (10%). Type IV was not diagnosed even when the prolapsed rectum was left untreated for a period of one year or more in 6 of the affected camels. This finding is considered unlike to what is usually

happening in horses, and it might be attributed to the short mesocolon (Smuts *et al*, 1987) or slow intestinal motility. The degree of prolapse was judged clinically and confirmed through surgical intervention.

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