



CASE REPORT

Unilateral Nephrectomy in a Female Dromedary Camel with Chronic Suppurative Pyelonephritis Caused by *Staphylococcus lugdunensis*

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ABSTRACT

The present study describes the diagnosis and surgical treatment of unilateral suppurative pyelonephritis in a 6-years-old female dromedary camel, weighing 330 kg. The animal was presented with a history of anorexia and decreased urine output for 11 days. Based on the clinical, laboratory and ultrasonographic examinations, the case was diagnosed to be a right kidney suppurative pyelonephritis. The she camel was subjected to right nephrectomy. The surgically removed kidney was enlarged, weighing 3.4 kg. Microscopic and biochemical examination of the pus sample taken from the affected kidney showed the presence of pure *Staphylococcus lugdunensis*. Histopathologically, the glomeruli showed congestion and periglomerular fibrosis. During the post-operative follow-up period, the she camel showed gradual improvement till complete recovery. In conclusion, the collaboration between clinical, laboratory, ultrasonographic and histopathological evaluation would constitute a reliable approach for a precise diagnosis and preoperative planning for unilateral nephrectomy in a female dromedary camel.

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INTRODUCTION

Pyelonephritis is a common renal disease in ruminants, which mostly occurs due to ascending infection, but in rare cases, it may also have a hematogenous origin (Put *et al.*, 2015). However, it is rarely reported in camelids. In cattle, the infection is mainly caused by *Corynebacterium* spp. and *Escherichia coli* (Yeruham *et al.*, 2006). *Staphylococcus lugdunensis* is one of the coagulase-negative staphylococci (CoNS), which causes infections similar to those of *S. aureus* and considered as an emerging human pathogen (Klotchko *et al.*, 2011). It causes severe infections in humans (Böcher *et al.*, 2009), including urinary tract infections (Haile *et al.*, 2002). However, there are no reports in the literature regarding association of *Staphylococcus lugdunensis* with urinary tract infections in animals, including camels.

Nephrectomy is indicated in large animals to overcome unilateral renal problems like pyelonephritis (Braun *et al.*, 2008), nephrolithiasis (Rocken *et al.*, 2007), ectopic ureter

(Hammer *et al.*, 2000), renal neoplasms (Gerspach *et al.*, 2008) and hydronephrosis (Rocken *et al.*, 2007). Diagnosis of pyelonephritis is difficult, as several renal pathologies share similar clinical symptoms and require differential management. A combination of different diagnostic techniques such as clinical, hemato-biochemical, ultrasonographic, histopathological and bacteriological examinations can be used for precise diagnosis of the disease. This report demonstrates the outcomes of the fore mentioned examinations for evaluation and subsequent decision making in unilateral nephrectomy in a female dromedary camel with chronic suppurative pyelonephritis caused by *Staphylococcus lugdunensis*.

Case history and clinical examination: A 6-years old female dromedary camel, weighing 330 kg, was presented to the Veterinary Teaching Hospital, Qassim University, Saudi Arabia with a history of anorexia and decreased urine output for 11 days. No previous interventions were reported. Clinical examination revealed that the she camel

was in a febrile, dull, depressed and lethargic condition. Physical examination of the animal was performed according to Köhler-Rollefson *et al.* (2001). The she camel was maintained and treated according to the Laboratory Animal Control Guidelines of Qassim University, which basically conform to the Guide for the Care and Use of Laboratory Animals of the National Institutes of Health in the USA (NIH publications No. 86 to 23, revised 1996).

Hematobiochemical findings of the affected camel with reference values for healthy camels, are shown in table 1. Compared to reference values, values of hematocrit, erythrocytes, hemoglobin, leukocytes, neutrophils and mean corpuscular hemoglobin concentration were decreased. On the contrary, lymphocytes, mean corpuscular volume and mean corpuscular hemoglobin were increased. Among biochemical parameters, serum concentrations of total protein, globulin, glucose, blood urea nitrogen, creatinine, creatine kinase, calcium, γ -gamma-glutamyl transferase, alkaline phosphatase, inorganic phosphorus, magnesium and potassium were increased, while concentrations of albumin, aspartate aminotransferase, sodium and chloride were decreased.

Transrectal ultrasonography using 3.5 MHz sector and 7.5 MHz linear transducers (SSD-500, Aloka, Tokyo, Japan) revealed normal left kidney, and enlarged caudally displaced right kidney, where its caudal pole with normal contour was easily felt. The urinary bladder appeared normal with reduced amount of urine. Transcutaneous ultrasonography of the right kidney showed that the apical pole contained multi-chambers with heterogeneous contents (Fig. 1), which appeared as thin pyogenic material on transcutaneous aspiration. A presumptive diagnosis of pyelonephritis was made and nephrectomy of the affected kidney was suggested.

Nephrectomy: Feed was withheld for 12 hours prior to surgery. Preoperative antibiotic, penicillin-streptomycin (Pen & Strep, Norbrook Laboratories, UK) at a dose rate of 30,000 IU/kg for the penicillin and 10mg/kg streptomycin and flunixin meglumine (Finadyin, Schering-Plough) at 1.1 mg/kg were administered intravenously (IV). Sedation was conducted via IV injection of xylazine hydrochloride (Seton 2%, Laboratorios Calier, S.A., Barcelona, Spain) at 0.3 mg/kg. Then, the incision site was anaesthetized with linear infiltration local analgesia using 70ml of 2% lidocaine hydrochloride (Norbrook Laboratories, UK). The anaesthetized she camel was positioned in sternal recumbency. The right flank region was prepared for aseptic surgery and a 25cm skin incision was made in relation to the site of right kidney. The right kidney was exposed, renal artery and vein were clamped, and the right kidney was removed, following Van Hoogmoed *et al.* (1997). The abdomen was thoroughly flushed with saline solution containing 1 mg/ml penicillin G sodium (Penicillin. G Sodium, Sandoz, Novartis Limited). Subsequently, the celiotomy wound was closed as usual. Operation wound was drained, and the drain was cleaned with sterile saline once daily until its removal 48 hour after surgery. The preoperative antibiotic and anti-inflammatory were continued for five successive days. The she camel was confined in a stall rest for three weeks and monitored daily for healing progress.



Fig. 1: Transrectal ultrasonographic view of the affected kidney showing heterogeneous contents with multi-chambers.

Table 1: Values for various hematobiochemical parameters in the female dromedary camel with pyelonephritis caused by *Staphylococcus lugdunensis*

Parameters	Values for affected camel	Reference values Tharwat <i>et al.</i> (2014).
Hematocrit (%)	26.8	28.9±2.7
Erythrocytes ($\times 10^6/\mu\text{L}$)	0.7	11.3±1.4
Hemoglobin (g/dL)	12.6	16.0±2.3
Mean corpuscular volume (fl)	35.0	25.5±1.5
Mean corpuscular hemoglobin (pg)	16.4	14.7±2.4
Mean corpuscular hemoglobin concentration (g/dL)	47.2	57.6±9.0
Leukocytes (/ μL)	34500.0	16.9±2.7
Neutrophils (/ μL)	32500.0	9.8±3.0
Lymphocytes (/ μL)	1400.0	5.9±2.4
Total protein (g/dL)	9.2	7.9±0.4
Albumin (g/dL)	2.5	4.2±0.4
Globulin (g/dL)	6.7	3.7±0.5
Glucose (mg/dL)	271.0	61±19
Blood urea nitrogen (mg/dL)	27.0	17±10.0
Creatinine (mg/dL)	2.1	1.3±0.2
Creatine kinase (U/L)	275.0	139±22
Calcium (mg/dL)	9.2	8.6±0.7
Aspartate aminotransferase (U/L)	46.0	69±44
γ -gamma-glutamyltransferase (U/L)	38.0	12±5.0
Alkaline phosphatase (U/L)	133.0	7±3
Inorganic phosphorus (mg/dL)	5.6	2.6±0.4
Magnesium (mg/dL)	1.6	0.26±0.03
Sodium (mmol/L)	138.0	156.3±2.9
Potassium (mmol/L)	4.5	3.9±0.3
Chloride (mmol/L)	109.0	116.8±0.1

During postoperative follow up, the appetite and general health of the she camel improved gradually but steadily without any complication. Complete recovery occurred one month after surgery.

At gross examination, the surgically removed right kidney was enlarged with soft texture, weighing 3.4 kg and had a cortico-medullary abscess (Fig. 2A, B). Bacteriological examination of the pus sample taken from the affected kidney showed that the colonies were spherical, convex and haemolytic, measuring 1-2 mm in diameter. The isolate was biochemically identified as *S. lugdunensis*.

Histopathological examination of the affected kidney revealed congestion and periglomerular fibrosis, the tubules were atrophied and showed hyaline and RBCs casts; the interstitial tissue showed fibrosis, thick walled blood vessels and dense mixed inflammatory cell infiltrates. Area of necrosis with suppurative exudation was seen (Fig. 3A, B). These histopathological findings are suggestive of chronic suppurative pyelonephritis.

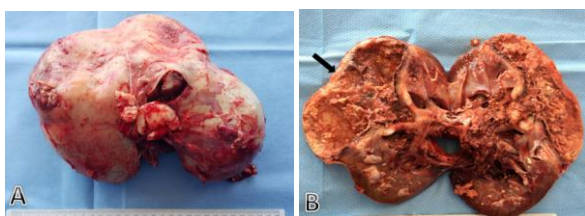


Fig. 2: Gross pathological findings of the affected kidney showing; A) enlarged abscessed kidney, B) Longitudinal section of the excised kidney with corticomedullary abscess (black arrow).

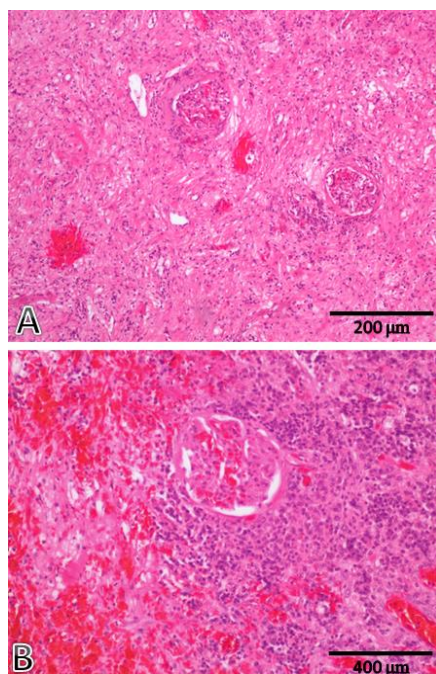


Fig. 3: Histopathological section of the affected kidney showing congestion and periglomerular fibrosis, with atrophic tubules, hyaline and RBCs casts. The interstitial tissue shows fibrosis, thick walled blood vessels and dense mixed inflammatory cell infiltrates. Area of necrosis with suppurative exudation is also seen (HE, A \times 200; B \times 400).

DISCUSSION

Kidney infections are most frequently ascending in nature, especially in female animals after recent calving, abortion or urinary catheterization (Yeruham *et al.*, 2006). The bacteriological finding in this report is of paramount importance. *S. lugdunensis* is considered as an emerging human pathogen (Klotchko *et al.*, 2011), causing several life-threatening infections in humans, including urinary tract infections (Haile *et al.*, 2002; Böcher *et al.*, 2009). It causes infections similar to those of *S. aureus* and unlike to those of CoNS. Its association with pyelonephritis is being reported for the first time in camels. Further, this finding would increase the zoonotic importance of this emerging animal pathogen.

Ultrasonographic description of the renal parenchyma in this case provided the first step in diagnosis of renal disorder in the female dromedary camels (Tharwat *et al.*, 2012). A case of renal cell carcinoma is found at second step in diagnosis of pyelonephritis and renal abscess, on the basis of renal aspiration, using a free-hand technique under ultrasound guidance (Tharwat and Oikawa, 2008). Confirmatory diagnosis of pyelonephritis depended on histopathological examination of the affected kidney.

Nephrectomy in large animals is indicated for treatment of unilateral pyelonephritis (Braun *et al.*, 2008). Reported surgical approaches for unilateral nephrectomy in large animals vary by species, age, affected kidney and concurrent diseases. In young animals, a median celiotomy provides adequate exposure to either kidney, although a flank approach is usually preferred (Hammer *et al.*, 2000). However, in adult ruminants, unilateral nephrectomy is feasible from each flank approach in standing or recumbent position (Braun *et al.*, 2008). In this case report, successful right flank laparotomy was performed for nephrectomy and post-operative follow up for one month revealed improved condition of the operated case, which is in agreement with Hammer *et al.* (2000).

Conclusions: The collaboration between clinical, laboratory, ultrasonographic and histopathological evaluation would constitute a reliable approach for a precise diagnosis and preoperative planning for unilateral nephrectomy in a female dromedary camel.

Authors contribution: MT, MS and EE conceived and designed the experiments; MS, EE and AA performed the experiments; ES performed the microbiological examination and MS prepared the manuscript. All authors critically reviewed the manuscript and approved the final version.

REFERENCES

- Böcher S, Tønning B, Skov RL, *et al.*, 2009. *Staphylococcus lugdunensis*, a common cause of skin and soft tissue infections in the community. *J Clin Microbiol* 47:946-50.
- Braun U, Nuss K, Wehrbrink D, *et al.*, 2008. Clinical and ultrasonographic findings, diagnosis and treatment of pyelonephritis in 17 cows. *Vet J* 175:240-8.
- Gerspach C, Hull BL, Rings DM, *et al.*, 2008. Hematuria and transitional cell papilloma of the renal pelvis treated via unilateral nephrectomy in an alpaca. *J Am Vet Med Assoc* 232:1206-9.
- Haile DT, Hughes J, Vetter E, *et al.*, 2002. Frequency of isolation of *Staphylococcus lugdunensis* in consecutive urine cultures and relationship to urinary tract infection. *J Clin Microbiol* 40:654-6.
- Hammer EJ, Divers TJ, Tulleners EP, *et al.*, 2000. Case report-nephrectomy for the treatment of ectopic ureter in a Holstein heifer calf. *Bovine Pract* 34:101-3.
- Klotchko A, Wallace MR, Licita C, *et al.*, 2011. *Staphylococcus lugdunensis*: An emerging pathogen. *South Med J* 104:509-14.
- Köhler-Rollefson I, Mundy P and Mathias E, 2001. Managing and treating camels. In: *A field manual of camel diseases: traditional and modern healthcare for the dromedary*. Practical Action Publishing, London, UK, pp:1-68.
- Put E, Valgaeren B, Pardon B, *et al.*, 2015. Surgical correction of pyelonephritis caused by multidrug-resistant *Escherichia coli* in a dairy cow. *Vlaams Diergeneeskd Tijdschr* 84:94-100.
- Rocken M, Mosel G, Stehle C, *et al.*, 2007. Left- and right-sided laparoscopic-assisted nephrectomy in standing horses with unilateral renal disease. *Vet Surg* 36:568-72.
- Tharwat M and Oikawa S, 2008. Efficacy and safety of ultrasound-guided percutaneous biopsy of the right kidney in cattle. *J Vet Med Sci* 70:175-9.
- Tharwat M, Al-Sobayil F, Ali A, *et al.*, 2012. Ultrasonography of the liver and kidneys of healthy camels (*Camelus dromedarius*). *Can Vet J* 53:1273-8.
- Tharwat M, Ali A, Al-Sobayil F, *et al.*, 2014. Influence of stimulation by electro-ejaculation on myocardial function, acid-base and electrolyte status and haematobiochemical profiles in male dromedary camels. *Theriogenology* 82:800-6.
- Van Hoogmoed L, Snyder JR, Roberts G, *et al.*, 1997. Unilateral nephrectomy in a juvenile llama. *Vet Surg* 26:497-501.
- Yeruham I, Elad D, Avidar Y, *et al.*, 2006. A herd level analysis of urinary tract infection in dairy cattle. *Vet J* 171:172-6.