

UNILATERAL HYDRONEPHROSIS AND URETERAL EXTRINSIC OBSTRUCTION ASSOCIATED TO NODULAR STEATONECROSIS IN A DOMESTIC FERRET (*Mustela putorius furo*)

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Case Report:

This case report describes a 1,5-years-old spayed domestic ferret (*Mustela putorius furo*) with a firm palpable mass in the cranial abdomen detected during a routine physical examination. According to the owners, the patient doesn't show any symptoms and no further abnormalities were detected on clinical examination. The radiological study reveal a right renomegaly (5.5cmx3.5cm; reference values¹: 2.21-2.31cmx1.09-1.14cm). Ultrasonography demonstrate a right kidney with severe hydronephrosis and hydroureter. The kidney appears as a fluid-filled cavity with a rim of parenchyma remaining that is only a few millimeters thick with peripheral bands. An ovoid 0.5-cm-wide heterogeneous mixed echogenicity structure located next to ureteral dilatation ending is also identified. In this case, due to the extreme atrophy of renal tissue observed sonographically, no specific imaging tests are performed to assess the viability of the affected kidney such as excretory urography or CT urography. Blood is obtained for a complete blood cell count (CBC) and serum biochemical profile. The CBC and renal biochemical profile results (BUN 26 mg/dL, Creatinine 0.7 mg/dL, Sodium 154 mmol/L, Potassium 5.1 mmol/L, Chloride 116 mmol/L, Calcium 9 mg/dL, Phosphorus 6.4 mg/dL) are within reference intervals², indicating the good functionality of the contralateral kidney.



Figure 1: Longitudinal images obtained during ultrasonographic examination.



Figure 2: Surgical images.

Exploratory celiotomy confirm severe right hydronephrosis and hydroureter. A 1-cm x 0.5-cm mass is identified. At macroscopical examination the mass appears ovoid, well-demarcated, solid and yellowish. This mass is intimately adhered to the wall of the right ureter blocking urine outflow. A unilateral nephrectomy with removal of the affected ureter and detected mass is performed. Surgical procedures such as ureteroneocystostomy or mass resection with ureteral reconstruction are discarded due to the appearance of the right kidney.

Histopathological examination indicate that the excised mass is composed by abdominal focus unencapsulated nodular necrotic adipose tissue with infiltration of numerous macrophages and multinucleated giant cells, and scant lymphocytes and neutrophils in the margins of the lesion. The final microscopic diagnosis is a nodular fat necrosis with granulomatous steatitis.

The renal function is good two years postoperatively, and the ferret does not show any symptoms related to the case.

Discussion:

Hydronephrosis and hydroureter are relatively uncommon in ferrets, and most of the reported cases have resulted from inadvertent ligation of the ureters during ovariohysterectomy^{3,4,5,6}. Hydronephrosis in the ferret has also been reported secondary to obstruction with ureteral calculi, paraurethral cysts, prostatomegaly, cystitis, herniation of the bladder or carcinoma of undetermined origin involving the renal pelvis^{3,7,8}.

The author is not aware of publications or clinical cases of ferrets with ureteral obstruction and hydronephrosis associated with nodular steatonecrosis, but some cases have been reported in other species. One publication describes the case of a cat with hydronephrosis caused by a mass composed by necrotic retroperitoneal adipose tissue and fibrosis⁹. Furthermore, another case report describes a case of a dog with partial ureteral obstruction caused by an ovarian pedicle granuloma formation associated with the reaction to the suture material used during ovariohysterectomy performed on the animal five years before the filing of hydronephrosis¹⁰.

In this case report, the ferret was sterilized at eight months old, ten months before the incidental finding of hydronephrosis. The most likely cause of the nodular steatonecrosis is local ischemia or trauma caused during ovariohysterectomy. Although pancreatitis or bile peritonitis are other possible causes of fat necrosis at this level¹¹. However, it has not been possible to confirm the cause that induced the appearance of nodular fat necrosis in our patient.

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Figure 3: Image of hydronephrosis and hydroureter. You can see the mass causing obstruction.