

## The Surgical Treatment of an Ectopic Ureter in a Dog

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### Abstract

### Review Article

An ectopic ureter is a very rare congenital defect in dogs with few cases reported in the literature. In this study, we reported an eight-month-old dog presenting with urinary incontinence and perivalvar dermatitis, her clinical sign was complicated by left kidney hydronephrosis. The ultrasonography and the intravenous pyelogram (I.V.P.) imaging revealed a diagnosis of the ectopic insertion of the ureter into the vagina. The dog underwent the neoureterostomies, a surgical approach was successfully used to treat the congenital ectopic ureter in this case. In conclusion, surgical repair is an effective treatment and provides an excellent outcome for dogs with a congenital ureter defect. This surgical technique can resolve urinary incontinence and can use as a treatment option to prevent further urinary bladder infection and to reduce the complications of renal tissue-damaging from the ectopic ureter.

**Keywords:** Congenital, ectopic ureter, dog, surgical treatment.

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## INTRODUCTION

The ureter anomaly is one of the rarest congenital defect of the urogenital system encountered in dogs and cats [1, 2]. An ectopic ureter is an abnormal development of one or both ureters into an ectopic area that causes urinary incontinence and infection [3]. Previous studies have reported that the congenital ectopic ureter's overall incidence in dogs was 0.016%, with a significant female predominance [4]. The cause of an ectopic ureter has been contributed to an embryological error in the development of the tract, and the ureters connect to the vagina or uterus instead of connecting to the urinary bladder. Ectopic ureter is classified as extramural, and intramural ureter bypasses the urinary bladder with no attachment. The ectopic ureter is normally finding with specific clinical signs such as urinary incontinence and urinary bladder infection [5]. Patients with severe clinical signs, such as chronic kidney failure, tend to undergo surgical repair. However, surgical treatment is expensive and often unsuccessful [6-9].

## CASE DESCRIPTION

The dog presented with a history of perivulvar dermatitis, urine incontinence, and no traumatic incident was reported. The dog was evaluated by abdominal radiography and ultrasonography. No abnormality urine has been detected on the urinalysis. Abdominal ultrasonography showed intramural of the ureter. Intravenous pyelogram demonstrated the left ureter was inserted into the neck of the urinary bladder. The dog underwent the surgical treatment to repair the ectopic ureter with absorbable suture, and neoureterostomy was performed to correct the defect. The dog showed improvement in clinical symptoms after surgical treatment, and urinalysis revealed the improvement of the urinary incontinence sign.

## LABORATORY INVESTIGATIONS

Blood samples were collected and submitted for routine hematological and biochemical investigations. Urine was collected by cystocentesis, and the specific gravity was measure using a refractometer. The hematology, blood chemistry and urinalysis results are showed in Table 1 and 2, respectively.

**Table-1: Signalment, hematological, and serum biochemical parameters before and after surgical repair**

Parameter	Before		After	Reference value
	13/02/2019	28/03/2019	7/04/2019	
Age	9 months			-
Gender	Female			-
Breed	Pomeranian			-
WBC ( $\times 10^3/\mu\text{L}$ )	14.26	12.53	8.63	6-17
RBC ( $\times 10^6/\mu\text{L}$ )	6.50	5.43	5.63	5-10
HGB (gm%)	15.00	12.60	13.10	12-18
PCV (%)	47.00	40.50	41.70	30-35
Band neutrophil ( $\times 10^3/\mu\text{L}$ )				0-0.3
Segmented neutrophil ( $\times 10^3/\mu\text{L}$ )	72.00	65.00	65.00	2.5-11.5
Lymphocyte ( $\times 10^3/\mu\text{L}$ )	21.00	24.00	65.00	1.5-4.8
Monocyte ( $\times 10^3/\mu\text{L}$ )	7.00	8.00	3.00	1.5-13.5
Eosinophil ( $\times 10^3/\mu\text{L}$ )		3.00	1.00	1.0-12.5
Basophil( $\times 10^3/\mu\text{L}$ )				
BUN (mg%)	20.40	25.00	15.60	15-34
Creatinine (mg%)	0.80	0.95	0.85	<1.8
ALT (U/L)	26	-	-	28-76

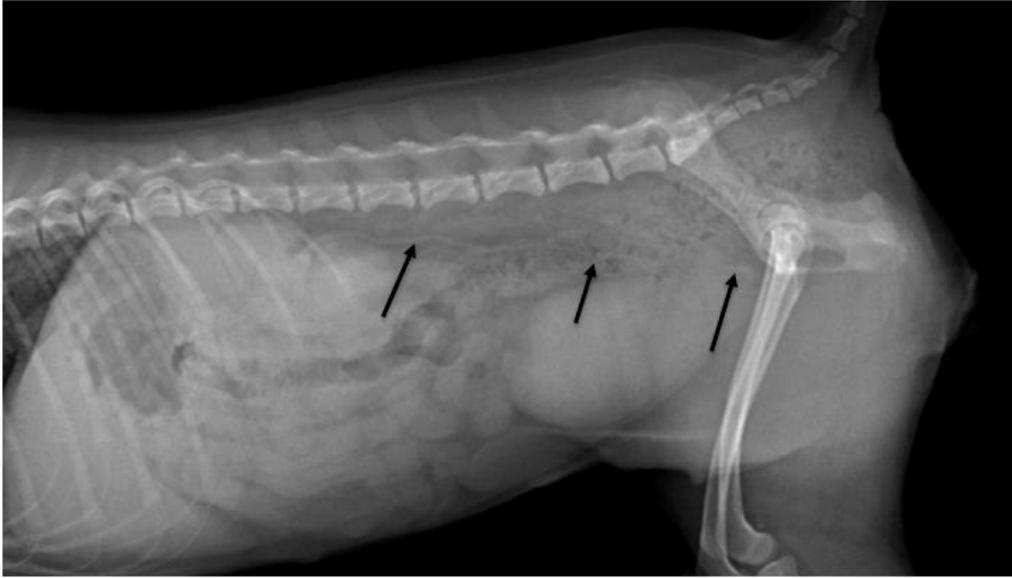
**Table-2: Urinalysis (perform by cystocentesis) parameters before and after surgical repair**

Parameter	Before	After
	28/03/2019	7/04/2019
Color	Light yellow	Light yellow
Transparency	Clear	Clear
Sp.Gr.	1.040	1.008
WBC	3+	2+
Nitrite	+	-
pH	7	6
Protein	+	-
Glucose	Normal	Normal
Ketone	-	-
Urobilirubinogen	-	-
Bilirubin	-	-
Hb/Blood	4+	2+
RBC	-	-
CRYSTALS	Calcium oxalate monohydrate 10/hpf	Calcium oxalate monohydrate 1/hpf
CELLS	Bacterial + RBC 100/hpf WBC 300/hpf	Bacterial + RBC 20/hpf WBC 1/hpf Transitional cell 1/hpf

**Intravenous Pyelogram**

Contrast radiography using intravenous pyelogram can use to support the diagnosis of ectopic ureter. The radiographic image such as the dilated,

massive enlarged and tortuous ureter is noted to bypass urinary bladder was observed. The dog was subjected to contrast radiographic image evaluation as shown in Figure-1.

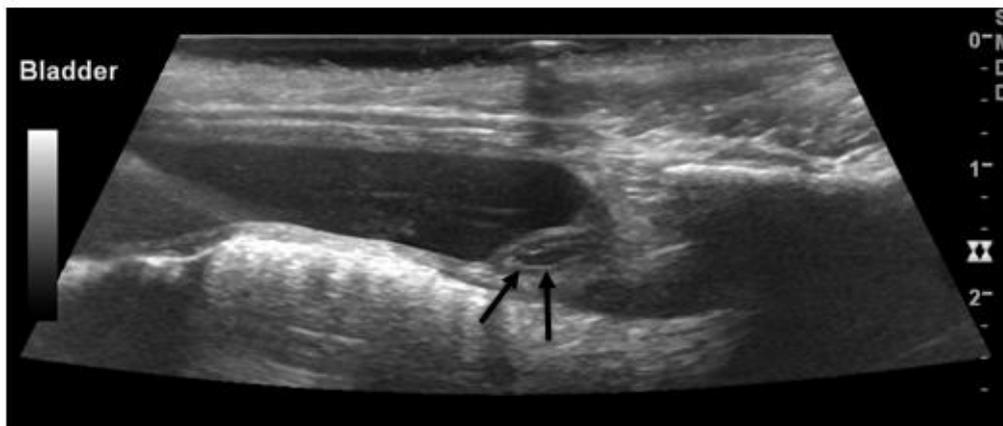


**Fig-1:** Lateral radiograph of intravenous pyelogram, the image is taken early after the iodine contrast administration, the arrows identified contrast opacified of the ectopic ureter that bypasses the urinary bladder

### Abdominal Ultrasonography

The patient underwent an abdominal ultrasonography by using a General Electric ultrasound system to check the ureter. The measurement was performed in a sagittal view in a lateral recumbent position with no sedation. Ultrasonography was

evaluated before and after surgical repair by one skillful sonographer. Ultrasonographic images were captured and stored for offline analysis. The ultrasonography finding showed the enlarged ureter that is identified at the dorsal of urinary bladder (Figure-2).



**Fig-2:** The ultrasonography finding show the image of the ectopic left ureter passing along the dorsal aspect of the bladder neck towards the pelvis. The dilation of the ureter can be seen as a thin-walled oval structure with anechoic content lying at the trigone (arrow)

### Surgical Treatment

Dog was pre-medicated with fentanyl (50 mcg/kg), and then followed by alfaxalone (1 mg/kg) for induction. The anesthesia was maintained by isoflurane with 2-5% concentration. A limb lead electrocardiogram was used to determine the cardiac rhythm. Surgical repair was done by double ligating the ectopic ureter and transected at its insertion. The defected ureter was corrected with neoureterostomy to reimplant the ureter into the bladder at the trigone region. After the ureter defect correction, the skin was sutured with surgical nylon and the Foley urethral catheter was placed.

### Evaluation

Patients showed incontinent urine and hematuria after surgical repair. The hematological examination in the dog revealed mild anemia with normal packed cell volume (PCV) and platelet count, an increased number of white blood cells characterized by leukocytosis. The biochemical blood profiles were normal, as shown in Table 1. After surgical repair, the new orifice's urine flow was seen, and the urethral catheter was removed 48 hours post-operatively. The dog was observed to void normally with occasionally dribbling. Evaluations, such as a urinalysis, were performed to evaluate the infection. At 2-82 months of post-operation, the dog has reported urinary

incontinence improvement compared to before the operation.

## DISCUSSION

The diagnosis of the congenital ectopic ureter is based on radiographic and ultrasonography findings [8]. Contrast radiography has been diagnosed with the ectopic ureter, and ultrasonography images have also been used to confirm this study's diagnosis. Hydronephrosis and distended ureter are commonly seen in the ectopic ureter. This might cause by chronic pyelonephritis, urine outflow obstruction or primary lack of ureteral peristalsis. [10] After diagnosis, a surgical treatment protocol was designed to repair the defect and to prevent further complications. The surgical repair is a proper therapeutic approach for ectopic ureter in this present study. In general, ectopic ureter therapy requires a surgical correction, which should be performed as early as possible in young animals [11]. In this study, the surgical treatment was performed when a dog is a 9-month old that might cause the marked persistent urinary incontinence lead to the intermittent urinary tract infection. Further administration of a drug such as phenylpropanolamine is use to increase urethral sphincter tone and necessary to help the infection. In conclusion, this procedure was safe and provided a good prognosis and could prevent the recurrent of urinary tract infection. This study suggested that surgical repair could be used as a potential treatment of congenital ectopic ureter in dogs.

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**Conflict of interest:** The authors declare that there is no conflict of interest.

## Author's Contribution

All the authors contributed for the manuscript. Manaporn Kosornsri, Warattha Boontuboon and Ratikorn Bootcha prepared and interpreted the results and Soontaree Petchdee drafted, critical revised and approved a manuscript.

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