

## Case Report

# Surgical management of extramural ectopic ureter by modified colposuspension following ureteroneocystostomy in a young female Siberian Husky dog

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### ABSTRACT

**Objective:** Postoperative complication of extramural ectopic ureters (EEUs) with persistent urinary incontinence (UI) is common in Siberian Huskies. This case report was aimed at reporting the successful correction procedure of EEU in Siberian Huskies by surgical procedure.

**Materials and methods:** A three-month-old and weighing 7.9 kg Siberian Husky dog was presented with history of an acute dermatitis around the genitals, swelling of the genitals and dribbling urination. Abdominal radiographs, ultrasonography, and 3D computed tomography scanning revealed presence of the ectopic ureter with urinary incontinence. Ureteroneocystostomy was applied as the first choice of corrective procedure in this case, and clinical signs were corrected apparently after surgery. Unfortunately, UI with cystitis was developed two months postoperatively. To correct the condition, surgical procedure of colposuspension with ovariectomy and cystopexy was opted.

**Results:** Post-operative progression showed good prognosis and the dog recovered fully. Follow up checkup of the patient after 4 months postoperative and follow up phone call 27 months later did not reveal any abnormalities.

**Conclusion:** This case report recommends surgical procedure of modified colposuspension following ureteroneocystostomy to correct EEUs and its postoperative complication.

### KEYWORDS

Colposuspension; Female; Siberian Husky; Ureteroneocystostomy

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## INTRODUCTION

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Physiologically urine is made continuously in the kidneys and transports to the urinary bladder for storage through two tiny pipeline called ureters which are open at the tip of the trigone of the bladder. The urine then exits to the outside via urethra and penis or vagina. Ectopic ureter (EU) is a pathological state of congenital malformation of the urinary tract where the ureter opens at a different site rather than normal anatomic position at the tip of the trigone of the bladder such as, neck of bladder, urethra, uterus, or vagina in female, and urethra or penis in male ([McLaughlin et al., 2000](#); [Davidson and Westropp, 2014](#)).

The most common clinical sign of EU is urinary incontinence (UI) and it can be complicated with urinary incontinence, renal dysplasia, hydronephrosis, cystic hypoplasia or agenesis, mega-ureter, urethral abnormalities, vestibulovaginal malformations, and urinary tract infections that often ended by euthanasia ([McLaughlin et al., 2000](#); [Reichler et al., 2012](#); [Davidson and Westropp, 2014](#)). EU is more common in females (around 90% of cases), and in 70% of cases is unilateral. EUs are mainly classified into two categories; extramural ectopic ureter (EEU) and intramural ectopic ureter (IEU). EEUs open directly into the urethra, uterus or vagina without any anatomic attachment with urinary bladder. On the other hands, in IEUs a ureter passes through the mucosal and sub-mucosal layers of the bladder to open in the bladder neck, urethra, or vagina ([Ho et al., 2011](#)).

The most susceptible breeds for EUs are the Siberian Husky, Golden Retriever, Labrador Retriever, Newfoundland, and English Bulldog ([Davidson and Westropp, 2014](#)). The rates of postoperative UI have been reported 44% to 67% ([McLaughlin et al., 1991](#)). Postoperative complication with persistent UI is higher in Siberian Huskies than other breeds ([McLaughlin et al., 1991](#); [Davidson and Westropp, 2014](#)). Therefore, the objective of this clinical case report is to reports surgical management of a clinical case extramural ectopic ureter in a Siberian Husky Dog and longterm follow-up study.

## MATERIALS AND METHODS

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The case was handled as per the international guidelines considering ethical standard and animal welfare issues. Three-month-old, Siberian Husky puppy with weighing 7.9 kg was presented to the Royal Animal Medical Center (247, Mangu-Ro, Jungnang-gu, Seoul, Republic of Korea) with UI. Clinical signs observed in this case were dribbling of urine, presence of dermatitis around the

genitals, swelling of the genitals. Left side EEU was diagnosed by contrast radiographs (**Figure 1**), abdominal ultrasonography (**Figure 2**), and finally confirmed by 3D mode computed tomography (CT) scan (**Figure 3**).

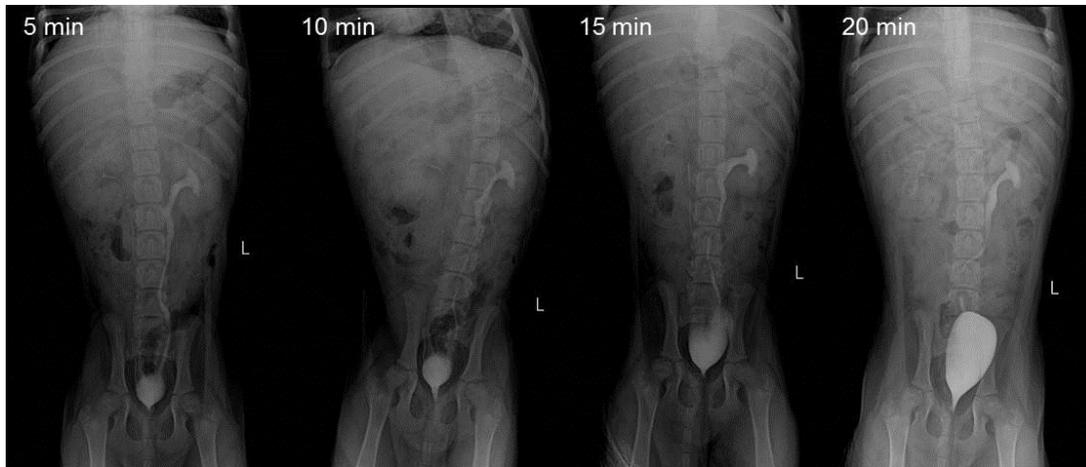
Surgical procedure of ureteroneocystostomy was opted in this case. The patient was anesthetized according to standard protocol. Induction of anesthesia was performed by Provive (propofol, 8 mg/kg body weight, sig., i.v.; Myungmoon Pharm). Volatile anesthetic sevoflurane inhalant (1-5%; Korean Abbot) was used to maintain anesthesia. After shaving the entire affected abdominal area, aseptic preparation, clipping, and draping were performed. A stay suture was placed on the proximal end of the ureter. The distal ureter was ligated and cut between sutures. The bladder mucosa was incised and created a short, oblique, submucosal tunnel in the bladder wall (**Figure 4**). Systemic antibiotics (cephradine, 30 mg/kg bwt, i.v.; enrofloxacin, 10 mg/kg bwt, i.m.; CTC Bio) for 7 days and a pain killer (tramadol, 3 mg/kg bwt, i.v.; Jeil Pharmaceutical, Korea) for 5 days were administered.

The animal was apparently good without clinical sings and discharged from hospital. Two months post-surgery UI was developed. Dilated ureter, thickened bladder wall, and echogenic shadowing in the bladder was observed via ultrasonography (**Figure 5**). The left renal pelvis was dilated mildly and size of left kidney was smaller than right kidney. Bladder wall was severely thickened and echogenic materials floated which made echogenic shadowing. Border between urethra and bladder was uncertain. The part which thought be urethra was observed as shape of prolong bladder. Therefore cystitis was suspected in this case. Urinary sphincter dysfunction was confirmed by maximal urethral closure pressure (MUCP, mean±SD, 71.5±9.2 cm H<sub>2</sub>O;) and leak point pressure (LPP, 95.2±14.5 cm H<sub>2</sub>O) as described previously ([Rawlings et al 2001](#)). Secondary surgical correction was opted where ovarianhystectomy, colposuspension, and cystopexy procedures were performed (**Figure 6**). Colposuspension was performed as described previously ([Holt and Stone, 1997](#)). For medical management Propalin (phenylpropa-nolamine, 1.5 mg/kg bwt, twice a day, p.o.; Vetoquinol) and Amocra (amoxicillin and clavulanic acid, twice a day, 12.5 mg/kg bwt, p.o.; Kuhnil) for 7 days were administrated.

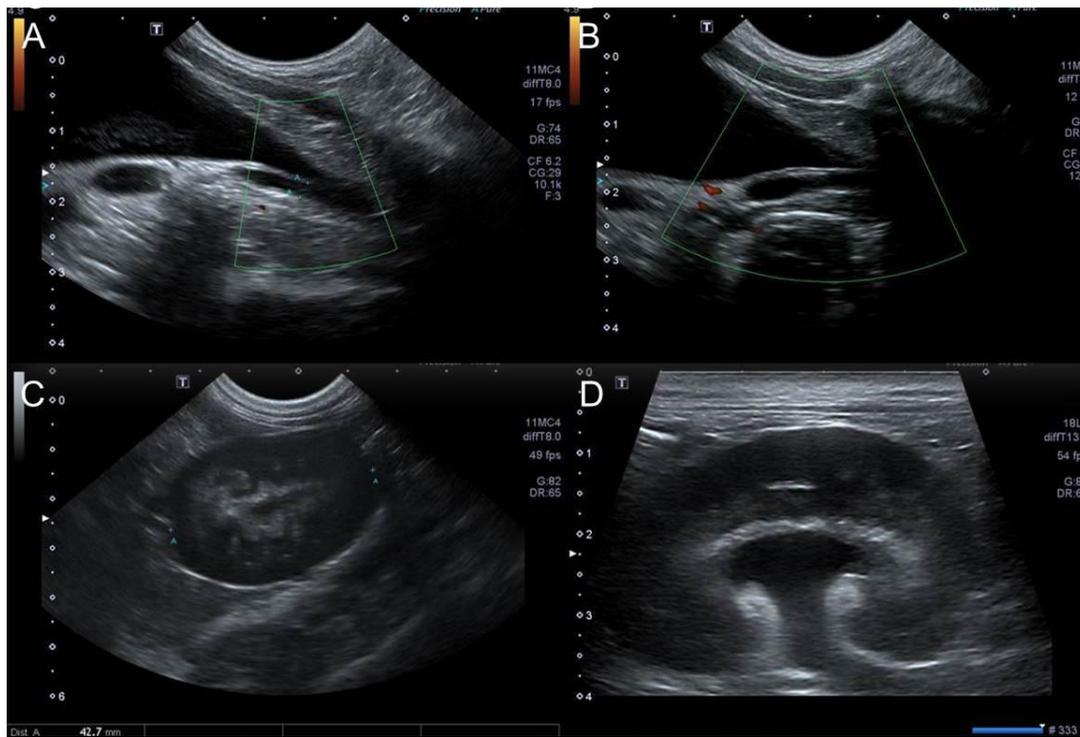
## RESULTS AND DISCUSSION

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Extramural ectopic ureter was diagnosed by abdominal radiographs, ultrasonography, and 3D computed tomography. Ureteroneocystostomy was performed



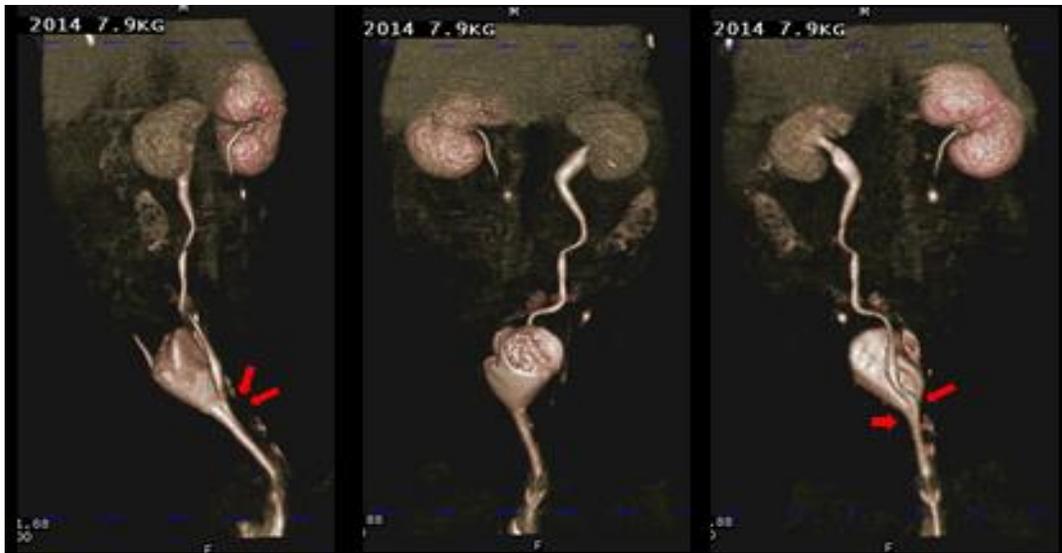
**Figure 1.** Opacification of a contrast medium was present on the left part of urinary system. Performing urography, right-sided urinary system was shown. There are good initial opacification of nephrogram, and persisted until 20 minutes.



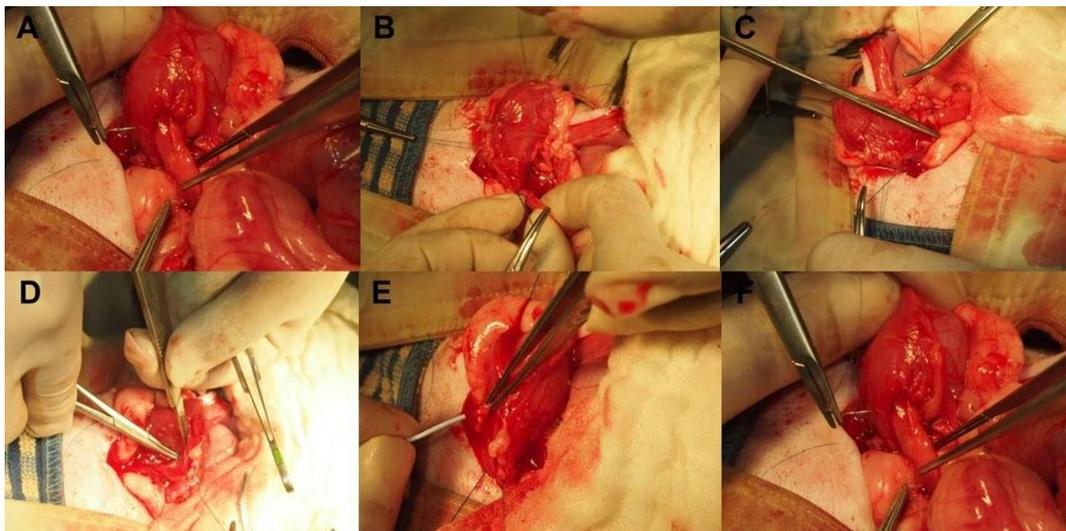
**Figure 2.** Diagnosis of ectopic ureter by abdominal ultra-sonography. Small sized left kidney (A), increased echogenicity in medulla (A), dilation of renal pelvis (B), dilated and tortuous left ureter (C), echogenic sludge (C) and completely bypass with bladder (D).

firstly to correct the condition. Two months postoperatively UI with cystitis was developed in this case. A secondary surgical correction, colposuspension with ovarian-hysterectomy and cystopexy was performed. Immediately after surgery, stranguria was shown first 2 days, however, improved 5 days after surgery (**Figure 7**). After four months MUCP, ( $108.3 \pm 15.4$  cm H<sub>2</sub>O) and LPP, ( $175.1 \pm 14.3$  cm H<sub>2</sub>O) which were like clinically normal. Clinical examination at 4 months postoperatively

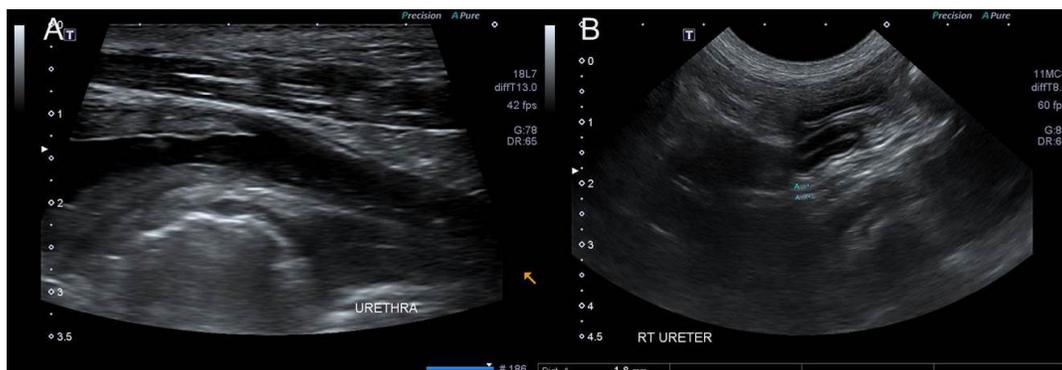
did not reveal any abnormalities. On the phone call follow-up at 27 months no complications reported. It has been reported that high incidence of persistent postoperative UI after surgical correction of EEU is found especially in Siberian huskies ([Ragni and Moore, 2006](#); [Davidson and Westropp, 2014](#)). One of the causes reported that the appropriate position of ureteral termination was not always identified by the as usual imaging technique ([McLaughlin et al., 1991](#)). Various



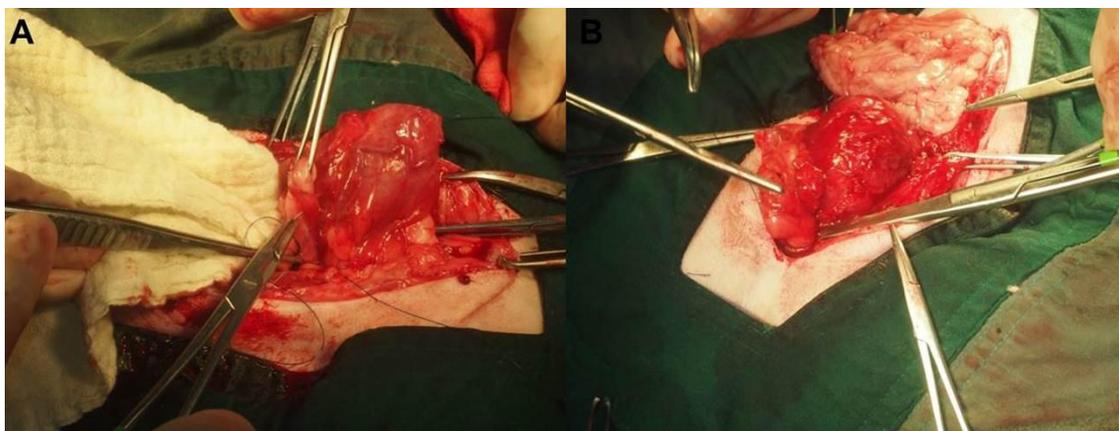
**Figure 3.** Images of computed tomography (CT) as 3D mode. Red arrows indicated the left-sided extra-mural ectopic ureter.



**Figure 4.** Intraoperative images of ureteroneocystostomy. A stay suture on the proximal end of the ureter was performed (A and B) and the ligation of the distal ureter and cutting between sutures. Incising the bladder mucosa and create a short, oblique, submucosal tunnel in the bladder wall (C and D). Inserting the ureter end with pigtailed catheter and suture it to the inner bladder mucosa with absorbable suture (E). Closing the bladder with routine (F).



**Figure 5.** Ultrasonography images after postoperative complication. Dilated ureter (A), echogenic shadowing, and thickened bladder wall (B) were confirmed.



**Figure 6.** Intraoperative images of secondary surgical correction including ovarianhystectomy, colposuspension (A and B), and cystopexy (B).



**Figure 7.** Normal urination was observed 5 days after surgery.

imaging techniques for diagnosis of EUs have been described in previous studies ([McLaughlin et al., 2000](#); [Ho et al., 2011](#); [Davidson and Westropp, 2014](#)). Most commonly used techniques are contrast radiography, fluoroscopic urethragraphy or ureterography, excretory urography, abdominal ultrasonography, cystoscopy, computed tomography (CT) scanning, or a combination of these diagnostic techniques. CT scanning and cystoscopy are reported to be the most useful techniques for diagnosis of EUs. However, contrast-enhanced CT is the most noninvasive useful than other imaging techniques, as the site of ureteral termination can be easily diagnosed ([Ho et al., 2011](#)). In this case, contrast radiography and abdominal ultrasonography were opted and EU was diagnosed. However, 3D constructed micro-CT clearly identified the EEU. Therefore, 3D constructed micro-CT might be most sensitive method to diagnose the EEU.

The common recommended surgical techniques for the correction of EUs are ureterocystostomy, ureteroneocystostomy, colposuspension etc. However, urinary incontinence after surgery is a common complication ([McLaughlin et al., 1991](#)). Firstly, we performed ureteroneocystostomy due to ureter completely by passed the

bladder. Therefore, re-implantation is crucial for normal function of urinary system ([McLaughlin et al., 1991](#)). However, recurrence of UI found in this case following two months postoperative ureteroneo-cystostomy. Urethral sphincter abnormalities are one of the major causes of recurrence of UI after surgery ([McLaughlin et al., 1991](#); [Rawlings et al 2001](#)). Colpo-suspension is applied to treat stress incontinence in female in whom incontinence is correlated with an anatomic mechanism, urethral hypermobility. Sphincter dysfunction is identified in this study by recording low level of MUCP and LPP. The anatomic position of the bladder and urethra play a crucial role for urinary sphincter dysfunction ([Rawlings et al 2001](#)). Therefore, we opted again surgical procedure of colposuspension with ovarianhystectomy and cystopexy. The patient recovered fully after the second surgical procedure. To the best of our knowledge, this is the first veterinary clinical case report of intervention of two surgical techniques in a dog to correct EUs and UI. There are a few reports available about the incidence of postoperative UI of EUs ([Stone and Mason, 1990](#); [McLaughlin et al., 1991](#)). Long term follow-up are crucial to have good prognosis of the case. In this study, we long-term followed-up. Clinical examination at 4 months postoperatively did not reveal any abnormalities

including MUCP and LLP. Telephone follow-up at 27 months no complications reported.

## CONCLUSION

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To avoid the high percentage postoperative complication, modified colposuspension following ureteroneocystostomy could be considered as good surgical techniques to correct EEU's in a dog.

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## CONFLICT OF INTEREST

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The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## AUTHORS' CONTRIBUTION

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All authors contributed equally.

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