
High pressure vaginography to diagnose vaginal ureteral ectopia in patients with continuous urinary incontinence

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Introduction: Continuous urinary incontinence in female patients can be a diagnostic dilemma if traditional imaging fails to identify a source. Vaginography has been used to diagnose vaginal ectopic ureters in the past with mixed results.

Materials and methods: Institutional review board approval was obtained for a retrospective review. Five teenage females with continuous incontinence and prior negative imaging work ups underwent high pressure vaginography.

Their findings and treatment outcomes are reviewed.

Results: A vaginal ectopic ureter was diagnosed in each of the five patients at a mean age 15.8 years. Each had undergone prior magnetic resonance urography that was non-diagnostic. Four of the five were managed surgically with resolution of their incontinence. One was lost to follow up.

Conclusion: High pressure vaginogram should be considered during the work up of female patients with continuous urinary incontinence, especially when other imaging modalities fail to identify an etiology.

Key Words: ureteral duplication, ureteral ectopia, vaginogram, urinary incontinence

Introduction

Ectopic ureters can be identified using conventional imaging techniques, physical examination and endoscopy.¹ Ureteral ectopia is more common in females and can result in continuous urinary incontinence secondary to insertion distal to the external urinary sphincter.² Ureteral ectopia into the vagina is rare, accounting for only 25% of cases of continuous incontinence in female pediatric patients.^{3,4}

In 1954, Katzen reported the novel use of a vaginogram to detect an ectopic ureter to the vagina

in a duplex system.⁵ Since this publication, the use of vaginography has been reported in 13 additional cases involving duplex systems.⁶⁻¹² The diagnostic utility of a low pressure vaginogram in these reports has been questioned, however, secondary to a low sensitivity for diagnosing ectopic vaginal ureters. Herein we review our experience using high pressure vaginograms to diagnose ectopic ureters in females with continuous urinary incontinence and prior negative work ups and demonstrate improved efficacy of high pressure compared to low pressure vaginograms.

Materials and methods

Local institutional review board approval was obtained prior to reviewing the medical records of female patients referred to our office with urinary incontinence that underwent vaginography. Health Insurance

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TABLE 1. Overview of prior negative imaging work up, vaginography findings and treatment outcomes

Patient age (years)	Previous radiologic evaluation	High pressure vaginogram findings	Treatment
16	MRU, urodynamics, RP, renal scintigraphy, RBUS	Right inverted-Y duplication	Laparoscopic ectopic segment excision
14	MRU, urodynamics, renal scintigraphy, RBUS	Right inverted-Y duplication	Laparoscopic ectopic segment excision
17	MRU, renal scintigraphy, RBUS	Right inverted-Y duplication	N/A
16	MRU, abdominal CT, urodynamics, RBUS	Left ectopic upper pole, poorly functioning renal segment	Left upper pole partial nephrectomy
16	MRU, RBUS	Right ectopic upper pole, poorly functioning renal segment	Right upper pole partial nephrectomy

CT = computed tomography; MRU = magnetic resonance urogram; RBUS = renal-bladder ultrasound; RP = retrograde pyelogram

Portability and Accountability Act compliance and patient privacy were maintained with proper data gathering and protection.

Between July 2002-April 2009, vaginography was performed in five consecutive female patients referred for continuous urinary incontinence. All patients had extensive prior non-diagnostic work ups, including a negative magnetic resonance urogram (MRU) in each patient, Table 1. The senior author performed the vaginography in each case under general anesthesia. This was accomplished using a 20-French Foley catheter placed into vagina. The Foley balloon was filled with 20 mL-30 mL of sterile water and pulled snugly to seal the vaginal opening after which 50% dilute contrast was instilled. The vaginogram was initially performed under gravity filling. Subsequently, a high pressure study was performed using a piston syringe with manual contrast injection until leakage occurred around the vaginal seal. Volumes ranged from 150 mL-300 mL depending on the size of the vaginal vault. Periodic intraoperative fluoroscopic imaging was performed during both portions of the study in the AP and oblique planes.

Results

The five patients had a mean age of 15.8 years (range 14-17). Four were Caucasian and one was African-American. All were referred from outside institutions and initial imaging work up, including MRU, was conducted prior to referral. Low pressure vaginogram

did not reveal an ectopic ureter in any patient, Figure 1. Subsequent high pressure vaginogram, however, did reveal ectopic ureters in all five patients, Figure 2. Three patients were found to have an inverted-Y ureteral duplication with ectopia to the right vaginal fornix. The other two patients were diagnosed with an upper pole vaginally ectopic ureter of a duplex system.

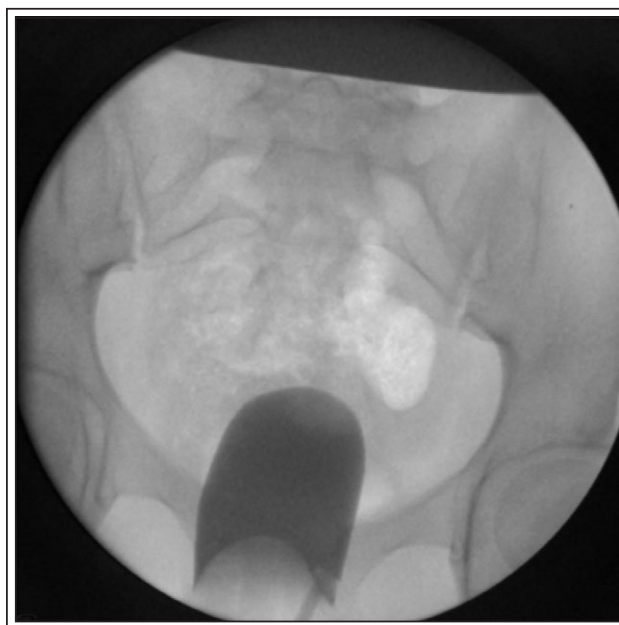


Figure 1. Low pressure vaginogram failing to show the vaginally ectopic ureter.



Figure 2. High pressure vaginogram in the same patient showing an ectopic ureteral insertion into the right vaginal fornix.

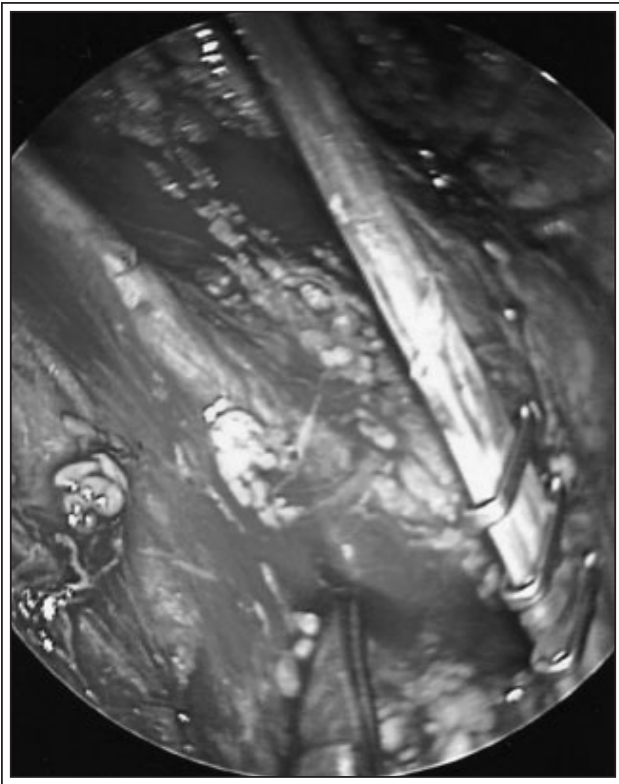


Figure 3. Intraoperative image showing clips on the distal segment of the ectopic ureter prior to transection in a patient with an inverted-Y duplication.

Two of the three inverted-Y ureteral duplications were treated laparoscopically with ectopic segment excision, Figure 3. One patient relocated and was lost to follow up. The two patients who had ectopia in a duplex system underwent partial nephrectomy after renal scintigraphy demonstrated a poorly functioning upper pole. All four patients who underwent surgery had complete resolution of urinary incontinence. The two patients who underwent laparoscopic excision of the inverted-Y segment were discharged home the day of surgery and the two who underwent an upper pole partial nephrectomy were discharged on postoperative day 1 with no complications in either group. Pathologic findings confirmed mesonephric duct origin in all the ectopic ureteral segments.

Discussion

Herein we report our experience successfully diagnosing vaginally ectopic ureters utilizing high pressure vaginograms in five female patients with continuous urinary incontinence. The use of a vaginogram to diagnose ureteral ectopia first appeared in the literature as a case report in 1954 in which it was used in determining the laterality of renal dysfunction and subsequent removal.⁵ The next publication was in 1995 in the French literature, whereby a case of ureteral ectopia to the vagina was diagnosed by vaginography.⁶ The diagnostic utility of vaginography, however, has been questioned. In a cohort with ectopic dysplastic upper-pole moieties vaginography was only able to definitively diagnose ectopia in one out of seven patients.⁷ In a more recent Vietnamese series, vaginograms diagnosed six ectopic ureters draining dysplastic upper pole moieties, albeit with sensitivity of only 33%.¹¹

Recently, MRU has been promoted as an optimal imaging modality for urinary tract anomalies and likely represents the current gold standard.¹³⁻¹⁵ However, in this small series, each patient had undergone prior MRU that failed to identify the ectopic ureter. Additionally, many of them had already undergone renal scintigraphy, renal and bladder ultrasound, voiding cystourethrogram, computed tomography and urodynamics. Low pressure vaginography with contrast filling under gravity also failed to diagnose the ectopia. Performing vaginograms under high pressure led to a diagnosis in each of the patients and subsequent surgical repair cured their incontinence and improved their quality of life. While not possible to directly compare the diagnostic utility of vaginography in this series, we have shown that high pressure vaginography can be useful in the work up of

female patients with continuous urinary incontinence, especially when other imaging modalities fail to identify an etiology.

There are limitations to this study. It is retrospective in design and therefore is subject to those inherent biases. All initial imaging work up was done prior to referral our center and therefore we could not control the quality of those studies obtained. Our local radiology staff, however, reviewed all prior imaging before to proceeding with high pressure vaginography. Finally, the small sample size precludes us from making any inference on the ability of MRU or low pressure vaginogram to diagnose ectopic ureters in poorly draining segments. These limitations notwithstanding, we feel that high pressure vaginography is a useful diagnostic modality in this select group of patients. □

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