

# A trial placement of a prophylactic ureteral catheter during the excision of a huge pelvic mass with incidental cystotomy

Hussein Warda

*Department of Obstetrics and Gynecology, Hurley Medical Center, Flint, Michigan, United States*

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## Correspondence

Hussein Warda  
Hurley Medical Center  
2 Hurley Plaza, Suite 101  
48503 Flint, United States  
phone: +1 816 808 8181  
hwarda@yahoo.com

Ureteral injuries are one of the major complications following gynecologic surgeries. They are serious, troublesome, often associated with significant morbidity, and are one of the most common causes for legal action against gynecologic surgeons. The reported rates of injury depend on the vigilance of diagnosis, type of surgery and other risk factors. We present a case of a 48 year old obese Caucasian female with no significant past medical history who came in with back pain and progressive abdominal swelling for the past three months and was found to have a very large pelvic mass. After preoperative evaluation, including: medical history, physical exam, and imaging studies showing a heterogenous mass 24.6 x 33.0 x 43.1, we predicted that the risk of urinary tract injuries was very high. We used preoperative prophylactic bilateral ureteral catheters to prevent injury. A surgical oncologist was consulted and an exploratory laparotomy was performed with removal of the large multi-lobulated pelvic mass + total abdominal hysterectomy, bilateral salpingo-oophorectomy, and appendectomy all performed at the same time. Patient had an incidental cystotomy during the procedure, which was repaired intra-operatively. The ureters remained intact with no injuries. The importance of thorough preoperative identification, evaluation and anticipation of ureteral injuries will be discussed in detail.

**Key Words:** ureter ◊ catheter ◊ injury ◊ prophylactic

## INTRODUCTION

The reproductive and urinary tracts in women are closely related anatomically and embryologically [1]. Knowledge of this anatomy plays an important role in the prevention of urinary tract injury during gynecological surgery. The overall rate of urinary tract injury associated with pelvic surgery in women is approximately 1% [2]. Bladder injury is more common than ureteral injury [1]. However, the exact incidence of these injuries is unknown. The pelvic ureters are retroperitoneal structures that run from the renal pelvis to the bladder and can be injured during pelvic surgery at any point along their distal course. The most common sites of injury are as the ureter passes just inferior to the internal cervical os

under the uterine arteries [3, 4], and the next most commonly injured area is at the pelvic brim, in the area of the infundibulo-pelvic ligament. The reported rates of urinary tract injuries depend on the vigilance of diagnosis, the type of surgery and patient factors. In our case we describe a case of excision of a huge pelvic mass with incidental bladder injury and prophylactic use of ureteric catheters to avoid injury.

## CASE REPORT

The patient is a 48-year-old, obese, Caucasian female with no significant past medical history who came in with back pain and progressive abdominal swelling for the past three months. She was seen in the emergency department as her back pain became

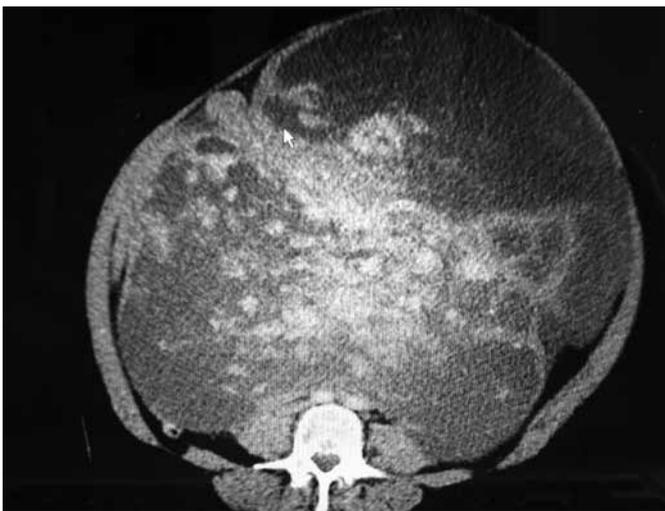
significantly worse in the last three days. She denied any nausea, vomiting, recent change in bowel movements, chest pain, or shortness of breath. She was not sure about a recent change in weight. Her LMP was three weeks ago and she has a history of irregular menstrual bleed. She denied any vaginal discharge or fever. She had bilateral leg swelling that she stated was chronic in nature. Physical examination showed a pleasant female with no apparent distress; she was alert, oriented, and cooperative. Vital signs were stable. Abdomen was grossly distended, generalized tenderness with visible veins. Patient had back tenderness, which was more on her right side. Extremities showed non-pitting edema of the legs bilaterally, reported by patient to be chronic, with adequate peripheral pulses. Patient had no pertinent past medical history. She has no pertinent past surgical history. Her family history was positive for mother having ovarian cancer and maternal aunt with breast cancer. Blood work done showed hemoglobin 15.5 g/dl, white blood count of 12.2 K/UL, platelet count of 298 K/UL, values of liver function tests and tumor markers CA-125, CA 19.9, alpha fetoprotein, lactate dehydrogenase, and inhibins A and B were all normal. Abdominal and pelvic CT scan with contrast was done. It showed mild, right lower lobe atelectatic changes seen. A very large 24.6 x 33.0 x 43.1 cm sized heterogenous mass with both solid and cystic areas within it (predominately cystic) was seen to be involving the entire pelvis and most of the portion of the abdominal cavity (situated intraperitoneally) while pushing all abdominal organs superiorly. The exit origin of the tumor was difficult to determine because of its size, however, the possibility of uterine origin is likely with such a large

mass without evidence of any ascites. Both kidneys were normal. The urinary bladder was not well seen. No comment was given in regards to the ureters. (Figure 1). A pelvic ultrasound was then performed to try to differentiate the origin of the mass. The transvaginal ultrasound report also stated that the exact origin of this mass was uncertain. The mass measured 45 x 55 cm. The uterus and ovaries were not separately visualized from the mass.

A surgical oncologist was consulted and an exploratory laparotomy with excision of pelvic mass was ordered. Intraoperatively, a urologist was consulted for the bilateral placement of ureteral catheters. The urologist inserted a French #21 scope into the blad-



**Figure 2.** Showing large abdominal/pelvic mass distorting the whole pelvic anatomy and making identification of ureters very difficult.



**Figure 1.** Showing large pelvic and abdominal heterogenous mass 24.6 x 33.0 x 43.1 with both solid and cystic areas.



**Figure 3.** Showing inability to access the retroperitoneal space without careful dissection.

der that showed a normal bladder mucosa as it entered the bladder. The bladder examination showed a highly elevated base of the bladder secondary to the retroperitoneal mass. We were able to see the right ureteral orifice and able to insert a right ureteral catheter all the way to about 25 cm. However, we were not able to insert the catheter into the left side because we were not able to see the orifice. During exploration with the oncologist we had to explore the bladder because the huge mass was occupying the whole abdomen and the retroperitoneal space. (Figures 2, 3). After gradual dissection (Figure 4) we were able to find the right ureter with the aid of the ureteric catheter. With a lot of difficulty we were able to find the left ureter. It was kinked and pushed up into the mid pelvic area and attached to the pelvic mass. We were able to separate the ureter away from the mass and able to trace it down to the bladder area. The bladder was highly elevated secondary to the pelvic mass. Finally we were able to separate the bladder and remove the large multi-lobulated pelvic mass + total abdominal hysterectomy, bilateral salpingo-oophorectomy, and appendectomy performed at the same time (Figure 5). We instilled indigo blue into the bladder; found there was an incision on the bladder dome area and we were able to find the edge of the defect. The mucosa was then sutured with 3-0 chromic and the muscle was closed with 3-0 Vicryl. The seromuscular area was closed with 3-0 Vicryl in an interrupted fashion. We repeated a cystoscopy again and were able to find the left ureteral orifice and insert a catheter into the left side. A Foley catheter size French #18 was placed and secured. Ureteral catheters were kept for two days and the Foley catheter was kept for two weeks. The mass came

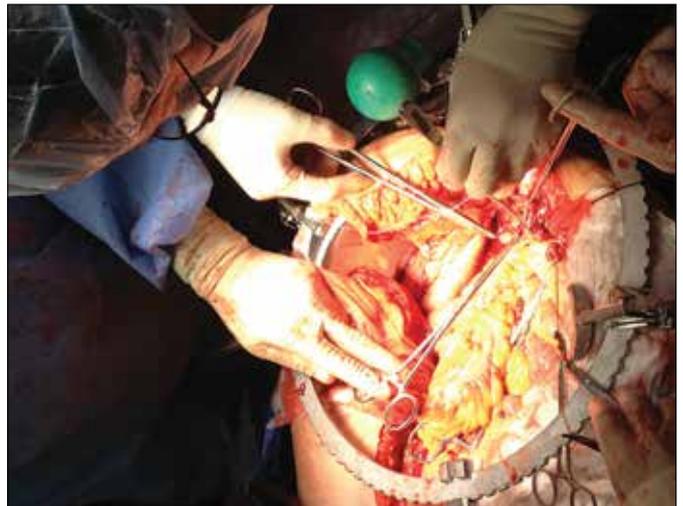
back to be a 9 kg plexiform leiomyoma (49 x 48 cm) with edema, hyaline, and cystic degeneration. The patient had an uneventful postoperative course and was sent home on the fourth postoperative day.

## DISCUSSION

Prevention of ureteral injury is a fundamental principal of pelvic surgery. The reported rates of injury depend on the vigilance of diagnosis and type of surgery among other risk factors. Risk factors for urinary tract injury in pelvic surgery are based upon characteristics of the patient and/or procedure [1, 2, 3]. Patient risk factors that impact urinary tract complications are conditions that distort pelvic anatomy – obscure tissue planes make visualization of urinary tract structures difficult or make the urinary tract more vulnerable to injury [3, 4, 5]. These include, but are not limited to, prior pelvic surgery, endometriosis, history of pelvic irradiation, obesity, and large pelvic mass. As for procedural factors, urinary tract injury occurs almost exclusively in major gynecologic surgery that involves surgical dissection in proximity to the ureters or bladder. Procedural risk factors involve the indication and type of procedure, including, but not limited to, surgery for malignancy, advanced pelvic reconstructive surgery, and laparoscopic hysterectomy [1, 2, 3, 5, 6, 7, 8–13]. Potential mechanisms of intraoperative ureteral injury include: 1. crushed with a clamp, 2. kinked or ligated with a suture or staple, 3. lacerated or transected during sharp or blunt dissection or while using an energy source, 4. devascularization or denervation [3]. Potential consequences of ureteral injuries include: ureteral obstruction (re-



**Figure 4.** Careful dissection of mass from surrounding structures.



**Figure 5.** Appearance of pelvis after removal of mass, total abdominal hysterectomy, bilateral salpingo-oophorectomy, and appendectomy.

sulting in hydronephrosis and possible irreversible injury, which, if bilateral, can lead to renal failure), genitourinary fistula, and urinoma [14, 15, 16].

There are three levels for prevention: primary (avoiding urinary tract injury), secondary (intraoperative recognition and repair of injury), and tertiary (postoperative diagnosis and treatment of urinary tract injury) [17].

In my discussion, I emphasize the importance of primary prevention of ureteral injuries. The most important method for primary prevention is good knowledge regarding the surgical anatomy of the pelvis and meticulous surgical technique. Intraoperative identification of the bladder and ureters are crucial steps in any major gynecological surgery.

Preoperative evaluation including medical history, physical exam, and imaging studies will predict the risk of urinary tract injuries. As discussed before, patients with risk factors have higher likelihood of ureteral and bladder injuries. The goal of the surgeon is to anticipate difficulties in surgery and to be one step ahead in preventing possible complications.

One of the methods that have been studied for use in difficult cases has involved ureteral catheters. Even though universal use of prophylactic ureteral catheters is not recommended [18, 19, 20], ureteral catheters are helpful for high-risk patients. The catheters are placed in the operating room under cystoscopic guidance prior to the initial incision. Since the most common mechanism of ureteral injury is accidental ligation or transection. Identification of the ureter at each step in a procedure avoids injury [21]. The ureteral catheters allow the surgeon to easily palpate

the ureters prior to clamping, ligating pedicles, or dissecting through tissue close to the ureter. Another advantage of the catheter is that extensive ureterolysis with high risk of denervation and/or devascularization is not needed to identify the ureters.

In our case there were multiple patient and procedural risk factors including obesity, large pelvic mass distorting the anatomy of the pelvis, and the possibility of malignancy. Even though placement of ureteral catheters was very difficult in our case, requiring two attempts, we believe that placement of the right catheter before and the left catheter after the removal of the mass prevented potential injury during surgery, avoided postoperative obstruction from ureteral edema, and decreased the likelihood of postoperative kinking of the ureters during the healing process.

## CONCLUSIONS

Urinary tract complications including ureteral and bladder injuries are major preventable complications in most gynecological surgeries. Adequate knowledge regarding urologic anatomy, adequate surgical techniques and prevention methods are basic weapons in the armamentarium of a gynecological surgeon. Prophylactic ureteral stenting during gynecologic surgery has been highly debated and is still a controversial issue. The aim of my case report is to emphasize that each patient should be thoroughly assessed preoperatively and as in our case; high-risk patients might require extra methods to prevent urinary tract injuries.

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