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Ureteric Injury During Hysterectomy: A Case Report

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Abstract

Ureteral trauma is an uncommon but serious iatrogenic complication of hysterectomy, with risk influenced by surgical indication, patient factors, and intraoperative conditions. A 50-year-old woman presented with oliguria six days after hysterectomy for uterine myoma. She had abdominal distension and mild tenderness, with laboratory findings showing impaired renal function. Ultrasonography revealed bilateral hydroureteronephrosis and intraperitoneal ascites. Emergency exploratory laparotomy identified approximately 1.5 liters of intraperitoneal urine, bilateral ureteral dilatation, and bilateral distal ureteral ligation with urine leakage. Surgical management included intraperitoneal drainage, bilateral ureteroneocystostomy, ureteral stenting, peritoneal lavage, and bladder drainage. Eight days later, the patient developed abdominal wound dehiscence and underwent bilateral ureterocutaneostomy in collaboration with a urology surgeon. At follow-up, the patient showed gradual improvement and was able to resume daily activities under regular outpatient monitoring. Management of ureteral trauma depends on the timing of diagnosis, extent of injury, and associated complications. Early recognition and appropriate surgical intervention are essential to preserve renal function and reduce morbidity. Bilateral ureteral ligation is a rare but severe complication of hysterectomy, often presenting with postoperative anuria or oliguria and requiring urgent urological management. Careful intraoperative identification of the ureters and close monitoring of urine output are critical to prevent and promptly detect ureteral injury.

Introduction

Ureteral trauma accounts for less than 1% of all urological injuries (Phillips et al., 2017). Ureteral and bladder trauma are often overlooked. Ureteral trauma is difficult to diagnose because not all cases present with hematuria. Failure to make a timely diagnosis can lead to

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poor outcomes (Min et al., 2024; Faugno et al., 2025; Hover et al., 2025). Of ureteral injuries from gynecological surgery, approximately 50 percent originate from radical hysterectomy, 40 percent from abdominal hysterectomy, and less than 5 percent from vaginal hysterectomy. All gynecological ureteral injuries occur in the distal third of the ureter (or, in other words, the segment of the ureter closest to the bladder and in the pelvis) (Haas et al., 1998).

A total of 20,489 trauma cases were treated at Dr. Hasan Sadikin General Hospital, with 2.3% being urogenital trauma cases and 40 of these being ureteral trauma cases (0.19%). The majority of ureteral trauma patients were women (90%). Based on the mechanism of trauma, 39 patients had iatrogenic trauma (97.5%) and 1 patient had a gunshot wound (2.5%). Of the iatrogenic ureteral trauma cases, 36 patients (90%) experienced iatrogenic trauma due to gynecological procedures, 5% due to urological procedures, and 2.5% due to gastrointestinal procedures. Management of ureteral trauma consisted of 47.5% ureteroureterostomy and 25% ureteroneocystostomy. Most cases of ureteral trauma were experienced by women, and iatrogenic trauma was the most common. Iatrogenic ureteral trauma caused by gynecological procedures was the most common, such as hysterectomy (Tambah & Adi, 2021; Arcieri et al., 2025; Alwashali & Hatroom, 2025).

Hysterectomy is performed for benign and malignant indications, and the surgical approach may be laparotomy, laparoscopy, or vaginal (Winata & Pramanan, 2025; Billone et al., 2025; Karacan et al., 2025) The most common complications of hysterectomy are intraoperative bleeding, injury to the urinary tract, bowel, or nerves, and postoperative infection or thromboembolism (Habo et al., 2025; Baradwan et al., 2025; Haider et al., 2025). The risk of ureteral injury varies based on the indication for hysterectomy, predisposing risk factors, and postoperative conditions. The pelvic anatomy is a complex structure with close proximity between blood vessels, nerves, intestines, urinary tract organs, and female internal genitalia. The average distance from the ureter to the cervical margin is approximately 2.3 cm. A large uterus, previous pelvic surgery, severe endometriosis, adhesions, massive intraoperative bleeding, and prolonged surgery time are conditions that can increase the risk of ureteral injury during hysterectomy. Early intraoperative diagnosis is the most important prognostic factor for avoiding permanent damage (Irianta & Ridjab, 2018; Ravlo et al., 2022; Cannizzaro et al., 2025).

All surgical procedures, including repair of surgical complications, were reported as suspected medical failures and then evaluated for ureteral injury that occurred during the surgical process. To improve patient safety, we need to identify and learn from surgical complications and medical failures (Sugiyama et al., 2025; Wagner et al., 2025).

Our objective is to evaluate ureteral injuries that occur during hysterectomy to predict risk factors, determine the time of identification, symptoms, and consequences, and the management provided to patients (Ravlo et al., 2022; Orsi et al., 2025; Seminario et al., 2025).

Treatment of ureteral trauma requires extensive surgery. Factors such as time of diagnosis, associated injuries, and degree of injury must be considered when selecting the most optimal technique (Głoćko et al., 2025; Ongaro et al., 2025; Cullivan et al., 2025). Clinical observation and/or placement of a permanent ureteral stent is appropriate for low-grade injuries. Surgical reconstruction may involve primary ureteroureterostomy, transureteral ureteroureterostomy, ureteral reimplantation, or ureterocutaneostomy (He et al., 2021).

Case Report

A 50-year-old woman, P4A1, was referred with oliguria 6 days after hysterectomy due to uterine myoma. Significant findings on examination were abdominal distension with vague tenderness. Progressive abdominal distension was found, which worsened day by day, and was followed by a chest X-ray and abdominal ultrasound. The chest X-ray showed cardiomegaly and right pleural effusion, while the abdominal ultrasound showed extensive ascites, right

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pleural effusion, mild bilateral hydronephrosis, empty bladder, and no visible masses in the pelvic cavity. The patient also experienced difficulty breathing, possibly due to right pleural effusion and pressure on the diaphragm. Significant findings on examination included an 18Fr Foley urethral catheter that did not drain urine or only drained 100 cc from the first day of surgery until the sixth day after surgery, as well as a midline abdominal scar from the surgical incision and abdominal distension with unclear pain location. There was also shallow breathing and tachypnea. A complete blood count showed anemia with two units of blood transfusion administered during surgery. Serial electrolyte, urea, potassium, and creatinine tests showed higher than normal values. The patient underwent emergency exploratory laparotomy by an obstetrician and gynecologist subspecializing in reconstructive urogynecology. Intraoperative findings showed approximately 1.5 liters of fluid suspected to be intraperitoneal urine, ureteral dilatation, bilateral ligation of the distal ureter with urine leakage around the ureteral ligation line, and ureteral necrosis. The patient underwent total intraperitoneal drainage, bilateral ureteroneocystostomy, bilateral ureteral stenting, peritoneal lavage, and urinary catheter placement.

On the 8th day after ureteroneocystostomy, it was found that the abdominal incision site appeared open and there was urine leakage due to extravasation. This condition indicated necrosis of the ureter. This was confirmed by findings during urethral catheterization, where there was no urine in the urine bag, while urine was instead draining through the drain hole, indicating urine accumulation in the abdominal cavity. Subsequently, a burst abdomen complication occurred, and the patient was immediately referred and underwent bilateral ureterocutaneostomy in collaboration with a urological surgeon.

This action was taken after obtaining informed consent from the patient who required a repeat laparotomy after hysterectomy. The consent process is very important and patient-centered. This process must ensure that the patient (or their representative) fully understands the nature, purpose, risks, benefits, and alternatives to the proposed surgery, as well as the possible outcomes if the procedure is not performed (Ogburn, 2014).

Description of the Ureteroneocystostomy Surgical Procedure

The patient was placed in the supine position under general anesthesia. After adequate anesthesia was achieved, aseptic and antiseptic preparation of the surgical field was performed, followed by sterile draping. A midline abdominal incision measuring approximately 15 cm was made and sharply deepened layer by layer until the peritoneal cavity was entered.

Upon exploration of the abdominal cavity, both ureters were found to be ligated. Ureterolysis was performed, revealing distal ureteral tears with bilateral necrosis. Necrotomy of the affected ureteral segments was then carried out. Reconstruction was performed with bilateral ureteroneocystostomy, with an additional right psoas hitch procedure.

The right ureter was identified, and its distal portion was excised. An opening was created in the urinary bladder parallel to the right ureter, and ureteroneocystostomy was performed. The same procedure was subsequently carried out on the left ureter. The fascia of the right psoas minor muscle was then identified, and the right lateral wall of the bladder was suspended to the right psoas minor fascia as part of the psoas hitch technique.

Hemostasis was carefully achieved, and no active bleeding was observed. An intra-abdominal drain was placed. Inspection of the remaining intraperitoneal organs revealed no abnormalities. The abdominal wall was closed in layers using Vicryl 2-0 and 1-0 sutures, and the skin was closed with a subcuticular 3-0 suture. The surgical wound was covered with sterile gauze, and the operation was completed.

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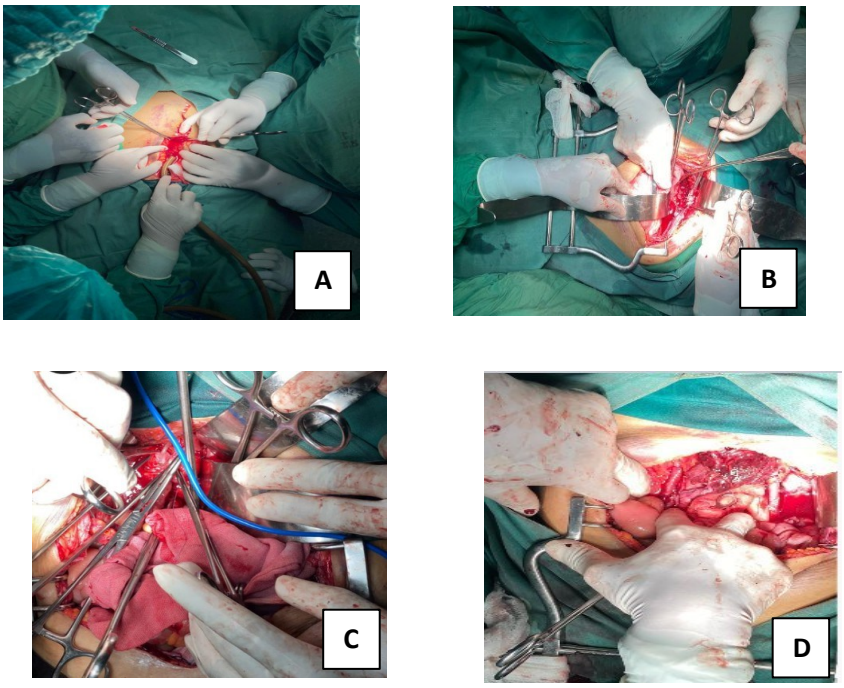

Figure 1. (A) Preoperative, (B) Identification of ligation on the ureter, (C) Ureteral stenting, (D) Postoperative

Description of the Ureterocutaneostomy Procedure

The patient was placed in the supine position under spinal anesthesia. After adequate anesthesia was achieved, disinfection of the surgical field was performed followed by sterile draping. An 18 French Foley catheter with a 15-mm balloon was inserted for urinary drainage.

A Rutherford–Morrison incision was made on the right side and deepened using both sharp and blunt dissection until the right ureter was identified. The ureter was carefully freed from the surrounding peritoneal fat and then mobilized and luxated cranially. The right ureter was clearly identified, and a right ureterocutaneostomy was performed by inserting an 8 French feeding tube into the ureter. Adequate urine output was observed, and the tube was connected to a urine collection bag. The ureter was then secured to the skin using a 4-0 absorbable suture, and hemostasis was achieved.

The procedure was then repeated on the left side. A Rutherford–Morrison incision was made on the left, followed by sharp and blunt dissection until the left ureter was visualized. The ureter was freed from peritoneal fat and mobilized cranially. A left ureterocutaneostomy was performed by inserting an 8 French feeding tube, with confirmation of urine output, and the tube was connected to a urine bag. The ureter was fixed in place using a 4-0 absorbable suture, and bleeding was controlled.

The surgical wounds were thoroughly irrigated until clean, and hemostasis was rechecked and ensured. The wounds were then closed layer by layer, and sterile dressings were applied. The surgical procedure was completed.

Result and Discussion

Postoperative recovery showed bilateral necrosis of the ureter, characterized by complaints of no urine flowing into the urine bag, but rather flowing into the drain tube, and marked by the opening of the surgical wound, causing urine to seep into the open suture wound. Therefore, on the 8th day post-ureteroneocystostomy surgery, the patient must be referred to a type A hospital for ureterocutaneostomy. As of the presentation of this case, the patient has undergone

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outpatient treatment with improving condition and is able to perform daily activities, of course with routine follow-up after the procedure.

Iatrogenic ureteral injury is a well-known complication of gynecological surgery. Total abdominal hysterectomy is the most common cause, accounting for approximately 83% of cases. Bilateral ureteral trauma occurs as a complication of total abdominal hysterectomy. This patient, aged 50 years, with P4A1, is similar to what has been reported previously, which shows that this often occurs in women of reproductive age who undergo total abdominal hysterectomy (Patil et al., 2017; Awonuga et al., 2025; Thakur et al., 2025).

Ureteral injury can be diagnosed intraoperatively or postoperatively, but approximately 70% of ureteral injuries are diagnosed postoperatively (Wang et al., 2025; Ruf et al., 2025). The most common symptoms of ureteral injury are fever and costophrenic pain (flank pain). Patients may experience hematuria, oliguria, anuria, and retroperitoneal urinoma with the risk of abdominal abscess or even the formation of retroperitoneal abscess- . The presence of urinary leakage through the vagina or cervix is an important indicator in the diagnostic procedure. In these patients, anuria is also found, which is a major sign of bilateral ureteral injury (Odeyemi et al., 2024).

Postoperative symptoms in the cases mentioned above are vague and nonspecific. Patients who undergo hysterectomy experience gastrointestinal symptoms, such as difficulty defecating, which makes diagnosis more difficult, as in postoperative ileus.

In patients with ureteral trauma, proximal ureteral trauma is often overlooked in the diagnosis. Unless suspected due to urological symptoms such as hematuria or confirmed by imaging. In addition, the anatomical location of the ureter makes injury less likely to be suspected because it is protected within the retroperitoneum by the pelvic bone, psoas muscle, and vertebrae. The diagnosis of ureteral trauma is even less likely if the mechanism of injury is blunt trauma. The diagnosis of ureteral injury should be considered and evaluation initiated when there is direct injury to the genitourinary tract with penetrating injury or when there are clinical indicators such as hematuria, abdominal/pelvic pain, and genitourinary sensory changes. However, clinical indicators are often unreliable in predicting the presence of ureteral injury (Min et al., 2024; Juneau et al., 2025; De Fazio et al., 2025).

Emergency surgery accounts for the majority of cases. However, even in our elective surgery patients, bilateral ureteral injury may occur when the surgeon attempts to secure hemostasis. Bilateral ureteral injury is rare and mostly presents later with symptoms ranging from fistula to renal failure. Our patients underwent an open approach involving laparotomy exploration, bilateral ureteroneocystostomy, and stent placement. Patients with urinary retention or bilateral ureteral obstruction are at risk of hydronephrosis followed by progressive renal damage, evidenced by impaired renal function with progressive increases in urea and creatinine. Obstruction leads to resolution of hydronephrosis and progressive improvement in renal function. If elevated urea and creatinine persist despite resolution of hydronephrosis, this may indicate that the patient has reached a plateau and will not improve further (Fox et al., 2011).

JJ stent placement was possible in patients who presented early (<2 weeks). Leakage was completely resolved in patients who were eligible for stent placement (100% success in all ten patients). (Patil et al., 2017) In patients who were not eligible for stent placement, ureteral reimplantation was performed due to bilateral ligation and necrosis of the ureter.

If ureteral injury is detected intraoperatively or within the first 72 hours postoperatively, immediate repair is preferable, as this time frame shows the best repair conditions and the best possible outcome. However, unfortunately, most injuries are diagnosed late, often several days or weeks after surgery, because the symptoms found are nonspecific, such as fever, costophrenic pain (flank pain), urinary leakage, or hydronephrosis. In summary, the "very good" or optimal time for diagnosing ureteral trauma after hysterectomy is: intraoperatively or

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within 72 hours postoperatively for immediate repair. In this patient, there was a delay in diagnosis of 6 days postoperatively, resulting in necrosis (Engelsgjerd & LaGrange, 2025).

Ureteral necrosis, especially when avascular, is a serious and rare complication that can cause significant morbidity. If this process is bilateral and progresses to the point where both ureters are connected to the skin surface (ureterocutaneostomy), this indicates extensive damage to the ureter and bladder tissue and loss of normal urinary tract continuity (Fuquan et al., 2020).

The pathophysiology of ureteral necrosis refers to damage to the ureteral tissue, which is often caused by impaired blood supply (ischemia), trauma, infection, radiation, or chemical injury. The ureter is particularly vulnerable to ischemic injury because its blood supply is segmental and fragile. An avascular ureter means that a segment of the ureter has lost its blood supply, leading to tissue death (necrosis). This can be caused by surgical injury, prolonged stent placement, radiation, malignancy, or pressure from adjacent structures (e.g., tumor, abscess). Bilateral involvement is very rare and indicates a systemic or widespread local process, such as bilateral ureteral injury during pelvic surgery, severe infection, or damage from adjacent pathology (e.g., pancreatic pseudocyst) (Fuquan et al., 2020).

Necrosis causes loss of ureter integrity, urine leakage, and risk of serious infection (urosepsis, abscess formation). If left untreated, the necrotic segment may slough off, causing obstruction or fistula formation (Meller et al., 1988).

Ureterocutaneostomy is a surgical procedure in which the ureter is brought to the surface of the skin to divert urine outside the body. It is often used as a last resort when the bladder or lower urinary tract cannot be reconstructed or is not functioning. Bilateral ureterocutaneostomy is performed when both ureters are affected and cannot be reimplanted into the bladder or reconstructed using other techniques.

Cases of bilateral ureteral necrosis have been reported due to severe local inflammation, such as from a pseudocyst of the pancreas, which releases enzymes that digest and destroy the distal ureter. Surgical management depends on the severity of the necrosis. For long segments of necrosis, conventional repair may not be possible.

Options include the use of vascularized tissue flaps (e.g., bladder muscle flap) for reconstruction, if feasible. Ureter replacement with an intestinal segment (ileal ureter), although this is complex and not always feasible in extensive or bilateral disease. Ureterocutaneostomy as a salvage option when reconstruction is not feasible or the patient's condition precludes more complex surgery.

In some cases, a nephrostomy tube may be used for temporary or permanent urine diversion if ureter continuity cannot be restored. Complications that may occur with ureterocutaneostomy include persistent urine leakage, infection, and the formation of a ureterocutaneous fistula ( ), impaired kidney function due to obstruction, infection, or loss of normal urine flow, and the long-term need for urine diversion and related quality of life issues.

Management of ureteral trauma requires extensive surgical techniques. Factors such as time of diagnosis, associated injuries, and degree of injury must be considered when selecting the most optimal technique. Clinical observation and/or placement of a permanent ureteral stent is suitable for low-grade injuries. Surgical reconstruction may consist of primary ureteroureterostomy, transureteral ureteroureterostomy, or ureteral reimplantation (Tambah & Adi, 2021).

Conclusion

Bilateral ureteral ligation is an undesirable ureteral injury during hysterectomy, with the patient presenting anuria, thus requiring urgent urological management. Identification of the ureter

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during hysterectomy and monitoring of urine output are crucial to prevent and identify ureteral injury.

Acknowledgments

This study was conducted in accordance with the ethical principles governing health research involving human subjects. Prior to the implementation of the study and publication of the findings, written informed consent was obtained from the research participant after comprehensive information was provided regarding the objectives, benefits, procedures, and potential implications of the study. All clinical data, diagnostic results, and medical documentation used in this study were handled with strict confidentiality by removing personal identifiers to ensure anonymity. The participant was informed of the right to refuse participation or withdraw consent at any stage without any consequences for the medical care received. The use of medical data did not interfere with the patient's treatment process and was solely intended for scientific and academic purposes in the field of health research.

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