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Delayed diagnosis of bilateral iatrogenic ureteric injury presenting with life-threatening pseudo-acute kidney injury after hysterectomy: a case report

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ABSTRACT

Bilateral ureteric injury after pelvic surgeries, particularly hysterectomy, carries a substantial risk of life-threatening conditions such as severe respiratory distress related to pseudo-acute kidney injury (pseudo-AKI) and sepsis due to peritonitis. A 47 y.o. woman presented with anuria 9 d after hysterectomy. She exhibited severe dyspnea requiring intubation, reduced level of consciousness, tachycardia and abdominal distension. Laboratory results revealed rapid increment of urea and creatinine post operatively requiring serial hemodialysis, leukocytosis, hyperkalemia and metabolic acidosis. Imaging identified bilateral hydronephrosis and ascites. An emergency laparotomy was performed, draining 2.7 L of intraperitoneal urine and revealing bilateral distal ureteral ligation with perforations. Subsequent bilateral ureteroneocystostomy was conducted resulting in significant improvements in clinical status as well as normalization of the renal function within 48 hr postoperatively. Bilateral iatrogenic ureteric injury with concurrent urinary ascites is an uncommon but serious complication of gynaecologic surgeries, particularly hysterectomies. This condition significantly increases the risk of renal failure and other life-threatening complications. Delayed diagnosis, as seen in this case, exacerbates these risks. Immediate surgical laparotomy with subsequent ureteroneocystostomy is critical for renal recovery and resolution of urinary ascites. Although rare, bilateral ureteric injury with urinary ascites necessitates prompt recognition and urgent surgical management to prevent severe renal impairment and other life-threatening outcomes. Careful preoperative planning and intraoperative ureteral visualization are essential in reducing the risk of such injuries.

ABSTRAK

Cedera ureter bilateral pasca operasi panggul, terutama histerektomi, membawa risiko substansial terhadap kondisi yang mengancam jiwa seperti distress pernapasan berat terkait pseudo-AKI dan sepsis akibat peritonitis. Seorang wanita berusia 47 tahun mengalami anuria sembilan hari pasca histerektomi. Ia menunjukkan gejala sesak berat yang memerlukan intubasi, penurunan kesadaran, takikardia, dan distensi abdomen. Hasil laboratorium menunjukkan peningkatan cepat kadar urea dan kreatinin pascaoperasi yang memerlukan hemodialisis serial, leukositosis, hiperkalemia, dan asidosis metabolik. Pencitraan mengidentifikasi adanya hidronefrosis bilateral dan asites. Laparotomi darurat dilakukan, mengeluarkan 2,7 L urin intraperitoneal dan mengungkapkan ligasi ureter distal bilateral dengan perforasi. Prosedur ureteroneosistostomi bilateral kemudian dilakukan, yang menghasilkan perbaikan signifikan pada status klinis serta normalisasi fungsi ginjal dalam waktu 48 jam pascaoperasi. Cedera ureter iatrogenik bilateral dengan asites urin yang menyertai merupakan komplikasi langka namun serius dari operasi ginekologis, khususnya histerektomi. Kondisi ini secara signifikan meningkatkan risiko gagal ginjal dan komplikasi lain yang mengancam jiwa. Diagnosis yang tertunda, seperti dalam kasus ini, memperburuk risiko tersebut. Laparotomi bedah segera dengan ureteroneosistostomi sangat penting untuk pemulihan ginjal dan resolusi asites urin. Meskipun jarang, cedera ureter bilateral dengan asites urinaria memerlukan identifikasi yang cepat dan penanganan bedah yang segera untuk mencegah kerusakan ginjal yang parah dan hasil yang mengancam jiwa lainnya. Perencanaan praoperasi yang cermat dan visualisasi ureter intraoperatif sangat penting dalam mengurangi risiko cedera semacam ini.

Keywords:
bilateral iatrogenic ureteric injury; pseudo-AKI; hysterectomy; ureteroneocystostomy

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INTRODUCTION

Ureteric injury is a significant, yet uncommon, complication of gynaecologic surgery, occurring in 0.2% to 2.5% of cases depending on the type and complexity of the procedure.[1,2] Injuries to the ureter are most frequently reported during hysterectomies, pelvic lymphadenectomies, and surgeries involving extensive adhesiolysis or malignancy.[3] Although the overall rate of ureteral injury is low, bilateral ureteric injury is exceedingly rare, with an estimated incidence of only 0.01% to 0.08%.[2,4] This rarity is attributable to the careful anatomical avoidance of both ureters during surgery; however, when bilateral injury does occur, it poses a significant risk for life-threatening complications, such as acute renal failure. Several risk factors which might increase the likelihood of ureteric injury are anatomical/pathological conditions [presence of pelvic adhesions due to previous surgeries or infection; pelvic malignancies requiring extensive dissection; uterine enlargement (e.g., fibroids or adenomyosis) causing anatomical distortions] and surgical factors [lack of surgeon experience with pelvic anatomy; procedures performed in peripheral medical centres with limited resources; use of electrocautery near the ureter; inadequate intraoperative ureteric visualization].[2] Previous studies have reported some ureteric injury cases in relation with gynecologic surgeries. One case involved a 48 y.o. woman who developed ascites and respiratory distress after a hysterectomy, revealing an undiagnosed ureteric injury requiring emergency repair.[1] A study of 14 cases found Caesarean sections to be the most common cause, with many patients presenting late with anuria.[2] Another review of laparoscopic surgeries reported delayed ureteric injuries, often from thermal damage or adhesions, requiring surgical correction.[3]

The most common initial presentation of ureteric injury is silent, especially when the injury is unilateral. However, bilateral injuries are often associated with more dramatic symptoms such as anuria and rapidly progressive renal failure, necessitating urgent intervention.[4] Other early symptoms can include abdominal pain, haematuria, and fever, which can be easily misinterpreted as other postoperative complications. Delayed recognition often leads to serious sequelae like hydronephrosis, ureterovaginal fistulas, and loss of renal function, as well as significant increases in postoperative morbidity.[3,4] It is imperative that clinicians maintain a high degree of suspicion for ureteric injury, particularly in the early postoperative period, to ensure prompt diagnosis and treatment.

Some possible preventive measures are available preoperatively (CT or MRI urography in complex cases; prophylactic ureteric stenting; and preoperative bowel preparation) and intraoperatively (avoid excessive traction, especially during hysterectomy or lymphadenectomy; staying close to the uterus during dissection, particularly at the uterine artery crossing; minimizing use of electrocautery near the ureter, consider using “cold dissection” using metal or plastic clamps).[1–3]

Management of ureteric injury is primarily surgical, with the optimal outcome achieved when the injury is recognized and corrected intraoperatively. However, delayed diagnosis can lead to severe complications requiring more complex surgical procedure such as ureteroneocystostomy.[1,2] A delay in diagnosis is more common in cases of ureteric stricture or fistula formation, with reported intervals between injury and diagnosis ranging from days to months.[3] In cases of bilateral injury, immediate management is crucial to prevent renal failure, which occurs in

up to 50% of patients with unrecognized bilateral ureteric damage.[2]

Despite advances in perioperative techniques and intraoperative imaging, studies report that approximately 30 to 70% of ureteric injuries are not detected until the postoperative period.[3,4] This delayed recognition is often associated with significant complications, including renal impairment and increased hospitalization times. In cases of delayed diagnosis, the prognosis largely depends on the extent of injury and the timing of corrective surgery. For instance, when treated promptly, most patients recover fully, but delays of weeks to months increase the risk of chronic kidney disease or permanent loss of renal function.[1,2] This case report underscores the rarity and severity of bilateral ureteric injury in gynaecologic surgery, highlighting the importance of early detection and prompt intervention to prevent life-threatening complications.

CASE

A 47 y.o. female patient was referred to our facility with a 9 d history of anuria via urethral catheter, following a total abdominal hysterectomy with bilateral salpingo-oophorectomy (TAH-BSO), performed for symptomatic adenomyosis by an obstetrician-gynaecologist. The details of previously performed surgical techniques and preoperative measures were not documented. However, there was no reported history of prior surgeries or infections in the pelvic or abdominal region. The postoperative care history was unclear until a non-contrast abdominal MSCT was performed, after which the patient was referred for further management. On arrival, the patient was somnolent, tachycardic and experienced severe shortness of breath. Intubation was performed due to severe hypoxemia. Physical examination revealed significant abdominal distention and muscle spasms, suggestive of ascites with suspected peritonitis. Laboratory analysis revealed significant leukocytosis (33,900/μL), hyperkalemia (5.2 mmol/L), and uncompensated metabolic acidosis. A rapid rise in urea and creatinine levels was initially reported postoperatively, suggesting pseudo-AKI, prompting the need for serial hemodialysis at the referring hospital, although the exact value of the urea, creatinine and other laboratory measures were unavailable. Following the latest hemodialysis (post-operative day 9), the current levels are 45 mg/dL and 4.9 mg/dL, respectively.

Ultrasonography (USG) imaging indicated bilateral hydronephrosis. Abdominal CT with cystography performed at the previous hospital demonstrated ascites and bilateral hydronephrosis, without evidence of bladder leakage. The pre-operative imaging data were unavailable.

An emergency exploratory laparotomy was performed by a urologist, revealing 2.7 L of intraperitoneal urine, along with dilated ureters, bilateral distal ureteral ligation by sutures. The ureteral segments surrounding the ligated area were observed to be fragile, non-viable, and showed small perforations with evidence of urinary leakage, likely resulting from prolonged ischemia following the ligation. The intraperitoneal urine was drained, followed by bilateral ureteroneocystostomy (Lich-Gregoir technique) with the placement of double-j stents and an intraperitoneal drain.

Postoperatively, the patient showed significant clinical improvement, with stabilization of vital signs and recovery of consciousness. Renal function began to stabilize within 24 hr post-surgery and returned to normal within the following 48 hr. The patient was extubated on postoperative day two and discharged on day six. The ureteral stents were scheduled for removal within 2-3 mo.

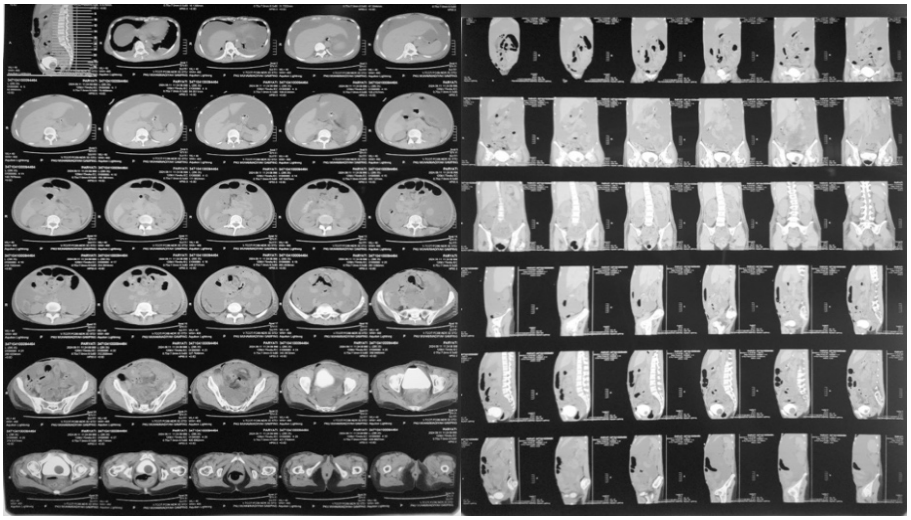

FIGURE 1. Non-contrast abdominal MSCT with cystography phase

FIGURE 2. Identification of the ligated and perforated distal ureter

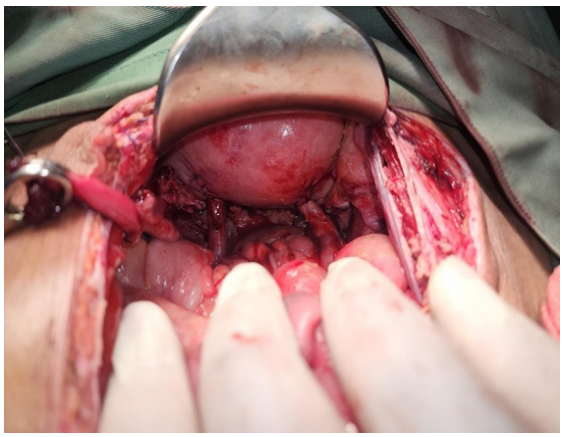

FIGURE 3. Bilateral ureteroneo-cystostomy done with extravesical technique (Lich-Gregoir).

FIGURE 4. Post-operative abdominal X-ray showing well positioned bilateral double-J stents.

TABLE 1. Post ureteroneocystostomy WBC, Ur, Cr and electrolyte

Day	WBC (10^3/μL)	Ur (mmol/L)	Cr (mg/dL)	Na (mmol/L)	K (mmol/L)	Cl (mmol/L)
1	27000	41	3.39	142	4.0	112
3	14800	16	0.59	149	2.2	109

Note. WBC: white blood cell; Ur: urea; Cr: creatinine; Na: natrium; K: kalium; Cl: chlorine.

DISCUSSION

Bilateral ureteric injury is a rare but severe complication of gynaecological surgeries, especially in complex pelvic procedures such as hysterectomy. The most common sites of injury are the lower third of the ureter, where it crosses the uterine artery, and the ureterovesical junction.[5] The occurrence of bilateral injury poses a higher risk of morbidity even mortality due to its potential to cause kidney injury, anuria, peritonitis and even death, thus necessitate urgent surgical interventions.

In this case, a delayed diagnosis of bilateral ureteric injury resulted in life-threatening pseudo-AKI due to continuous absorption of urine in the peritoneal cavity or reverse auto dialysis. It accompanied by severe respiratory distress requiring intubation due to metabolic acidosis and also a notable hyperkalemia, following a total abdominal hysterectomy and bilateral salpingo-oophorectomy. Unfortunately, neither the previous laboratory and imaging data nor the patient's initial clinical information (prior to TAH-BSO) and intraoperative details were available, preventing a comprehensive analysis of the potential risk factors

for the ureteric injury. Post-operative care history was also unclear. Pseudo-AKI was more commonly associated with intraperitoneal bladder rupture. However, in this case, abdominal CT imaging showed no evidence of bladder leakage, suggesting the possibility of other sources of urinary leakage into the peritoneal cavity, which were identified intraoperatively as the perforated non-viable distal ureters. Recent literatures highlighted that bilateral ureteric injuries can often go unrecognized during surgery, particularly when associated with complex operations such as radical hysterectomies. As reported by Chalya *et al.*,[6] bilateral injuries are more likely to occur in the distal ureter, frequently due to suture ligation, and are often associated with delayed diagnosis and severe outcomes such as anuria and hydronephrosis. Bilateral injuries, though rare compared to unilateral ones, represent a particularly challenging clinical scenario. One study in Burkina Faso reported that nine out of 14 cases of ureteral injury involved bilateral ligation, with the average time to diagnosis being 16 d.[2] This delay in recognizing the injury is a critical issue, as early identification and intervention significantly improve outcomes. As demonstrated in our case and consistent with other studies, patients with bilateral ureteric injury, particularly those with delayed diagnosis, frequently present with severe, life-threatening symptoms, often necessitating emergency surgical ureteric re-implantation.[1,6–9] Compared to unilateral injuries, bilateral injuries carry a higher risk of renal complications. In cases where delayed diagnosis occurs, patients are often already in acute renal failure or suffering from complications like peritonitis due to urine leakage, necessitating prompt and aggressive treatment.[10] Endourological interventions, such as double-J stenting, might be an option for minor injuries or early-detected thermal injuries but have shown lower success rates for more complex damage.[11,12] For life-threatening ureteral injuries with long defects, reconstructive procedures are essential. The choice of procedure depends on the location and length of the defect. Reconstructive procedures for life-threatening ureteral injuries depend on the defect's location and length. Ureteroneocystostomy is preferred for distal injuries with intact ureteral function.[13,14] Uretero-ureterostomy is used for middle ureteral defects, directly joining the upper and lower segments.[13] For proximal injuries, psoas hitch and Boari flap techniques are employed to bridge extensive damage, utilizing bladder or other tissues for reconstruction.[14,15] These approaches aim to restore ureteral continuity and ensure proper urinary drainage, though renal auto transplantation is a last resort for severe cases with significant damage.[16] Nephrectomy might be required if the kidney is in a critical state.[12,16] In the present case, immediate laparotomy and bilateral ureteroneocystostomy (Lich-Gregoir technique) were required to resolve the issue and restore renal function and stabilizing the overall condition. The time from referred hospital admission to the emergency laparotomy procedure was approximately 30-60 min, accounting for initial assessments, stabilization, and preoperative preparations. Ureteroneocystostomy was the preferred treatment due to the bilateral distal defects and sufficient ureteral length for reimplantation of both distal ureteral ends into the bladder. The double-J stent will be removed 2-3 mo after the surgery. Important laboratory and imaging data (Ur, Cr, electrolytes and urologic USG) will be evaluated via outpatient visits. Similarly, in a study in Tanzania, bilateral injuries were also associated with higher rates of delayed presentation and subsequent renal complications.[6]

Preventing ureteric injuries during

gynecologic surgery, particularly hysterectomy requires adequate surgical training and awareness (better training in pelvic anatomy and surgical techniques particularly simulation-based training and cadaveric dissection for surgeons in handling complex gynecologic surgeries), effective preoperative planning and imaging [prophylactic stenting in high-risk cases, and use preoperative imaging and intraoperative visualization to reduce injury risk, especially in complex procedures like radical hysterectomies] and excellent intraoperative techniques [meticulous dissection and ureteral identification; avoiding excessive electrocautery near the ureter; fluorescence-guided ureter mapping (e.g., indocyanine green fluorescence) is emerging as a useful tool; use of indigo carmine or methylene blue dye to confirm ureteral integrity intraoperatively and/or with cystoscopy].[13,17–24] Intraoperative ureteral injuries were found more prevalent in minimally invasive radical hysterectomy (MIRH) compared to abdominal radical hysterectomy.[25] This finding underscores the importance of proper training and patient selection to mitigate the higher complication rates associated with MIRH.[25]

Several key measures can be implemented to prevent delayed diagnosis of ureteric injuries in the future. First, rigorous early postoperative monitoring is essential, including prompt recognition of symptoms such as anuria, oliguria, flank pain, ascites, or signs of peritonitis. Postoperative serum creatinine and urea monitoring should be performed, as a rapid rise in creatinine within the first 48 hr post-surgery warrants further evaluation. Additionally, imaging modalities such as USG and CT urography should be utilized in suspected cases of urinary leakage to facilitate early diagnosis. Second, implementing a standardized postoperative protocol may improve outcomes, such as incorporating clinical checklists for the early detection of ureteric injury, conducting routine postoperative USG within 24–48 hr in high-risk cases, and ensuring timely referral and a multidisciplinary approach. Early consultation with a urologist in suspected cases and collaboration among gynecologists, urologists, and radiologists can significantly enhance early detection and improve patient outcomes.

CONCLUSION

Ureteric injuries, though rare, are significant complications in gynecologic surgery, particularly during hysterectomy and complex pelvic procedures. Bilateral ureteric injury, while exceptionally uncommon, poses a high risk of severe renal complications and life-threatening conditions. This case highlights the critical consequences of delayed diagnosis, emphasizing the need for timely recognition and immediate surgical intervention to prevent complications such as pseudo-AKI, peritonitis, and renal failure. The recommended management included emergency laparotomy with drainage intraperitoneal urine and bilateral ureteroneocystostomy, considering the severity and distally located the ureteric injury with adequate length. Key clinical takeaways include early detection through postoperative serum creatinine and urea monitoring within 48 hr and routine USG or CT urography in high-risk cases. Surgical best practices should focus on meticulous dissection with clear ureteral identification, intraoperative patency tests (e.g., methylene blue infusion or cystoscopy), and minimizing electrocautery use near the ureter. Standardized postoperative protocols, including clinical checklists, routine USG, and early multidisciplinary collaboration, can improve early detection, patient outcomes, and reduce the risk of long-term renal complications.

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