Journal of Cardiovascular Disease Research
ISSN: 0975-3583,0976-2833 VOL 16, ISSUE 12, 2025

A RETROSPECTIVE OBSERVATIONAL STUDY ON MANAGEMENT OF IATROGENIC URETERIC INJURIES - A SINGLE INSTITUTIONAL EXPERIENCE

1. Prof. Dr. R. Karunamoorthy, Mch Urology, Professor and Head of the Department
2. Dr. P. Arunkumar, Mch Urology, Assistant Professor
3. Dr. Karthikeyan Mch Urology, Assistant Professor
4. Dr. S. Saraswathi, Mch Urology, Associate professor
5. Dr. S. Vetrichandar, MCh Urology, Associate professor
6. Dr. V. Natarajan, Mch Urology, Assistant Professor

Corresponding Author
Dr. Sukumar

Department of Urology

Govt. Stanley Medical College & Hospital, Chennai

Phone number - 9486202248 E mail - suku89@gmail.com

Abstract

Background: Iatrogenic ureteral injuries are significant complications of pelvic and abdominal surgeries.

Objectives: To evaluate the incidence, patterns, diagnosis, and management of iatrogenic ureteric injuries.

Methods: Retrospective Observational study was conducted between June 2023–June 2025 in the Department of Urology, Government Stanley Medical College, Chennai.Demographic Data, Incidence, Management strategies were analysed.

Results: 27 patients were included in the study. Majority of the Ureteric injuries are due to Ureteroscope in the management of Ureteral calculus. High-grade injuries commonly followed hysterectomy. Most of the Low Grade Ureteric injuries are managed with stenting. Reimplantation done in 3 cases. Boari flap done for 1 case. Ileal Ureter done for 1 case.

Conclusion: Early diagnosis facilitates effective endoscopic management; complex injuries require open/laparoscopic reconstruction.
Keywords: Iatrogenic ureteric injury, ureteroscopy, hysterectomy, ureteric reimplantation, Boari flap, Ileal Ureter.

Introduction

Iatrogenic ureteral injuries represent one of the most significant and preventable complications encountered in pelvic and abdominal surgeries. Delayed diagnosis can lead to sepsis, loss of renal function, need for complex reconstructive procedures, prolonged hospitalization, medicolegal issues, and increased healthcare costs. The close anatomical

proximity of the ureters to the reproductive, gastrointestinal, and vascular structures makes them particularly vulnerable during gynecologic, colorectal, urologic, and endoscopic interventions.

Gynecologic procedures account for the majority of cases, especially hysterectomies and pelvic oncologic surgeries. Risk factors include distorted pelvic anatomy, prior surgeries, inflammation, malignancy, endometriosis, radiation fibrosis, and surgeon inexperience.

Early detection of ureteral injuries is critical. Intraoperative identification allows immediate repair, significantly reducing morbidity. In contrast, injuries detected in the postoperative period often present with nonspecific symptoms such as flank pain, fever, ileus, urinary leakage, or rising creatinine—delaying diagnosis and complicating management.

Understanding the mechanisms, risk factors, preventive strategies, and management principles of iatrogenic ureteral injuries is essential for all pelvic surgeons. This study analyses our institutional experience to review the anatomical considerations, mechanisms of injury, diagnostic approaches, and evidence-based management strategies for iatrogenic ureteral injuries.

Materials and Methods

Study Design: Retrospective Observational Study.

Study Period: June 2023 – June 2025.

Setting: Department of Urology, Govt. Stanley Medical College and Hospital, Chennai.

Participants: 27 patients with confirmed iatrogenic ureteric injuries.

Inclusion Criteria:

- Patients with intraoperative or postoperative detection of ureteric injury.
- Availability of complete clinical and follow-up data.

Exclusion Criteria:

- Traumatic (non-iatrogenic) ureteral injuries.

Diagnostic Evaluation:

- CT urogram

• Cystoscopy

• Retrograde pyelography

Classification systems used:

• Post-Ureteroscopic Lesion Scale (PULS)

• Traxer and Thomas classification

• AAST ureteral injury grading

Procedural Technique

Low-grade ureteroscopic injuries (PULS 1–3) were managed by double-J stent placement. High-grade injuries required:

• Ureteric reimplantation

• Boari flap reconstruction

• Ileal ureter interposition in cases of avulsion

PULS GRADING SYSTEM - Post-Ureteroscopic Lesion Scale (PULS)
PULS 0: No urothelial injury.
PULS 1: Superficial urothelial injury (mucosal laceration).
PULS 2: Urothelial splitting (partial thickness injury).
PULS 3: Periureteral fat is visualized (full thickness injury).
PULS 4: >2cm of devascularization.
PULS 5: Complete transction

TRAXER AND THOMAS CLASSIFICATION OF URETERIC INJURIES
Grade 0-No lesion found or only mucosal petechiae
Grade 1-Ureteral mucosal erosion without smooth muscle injury
Grade 2- Ureteral wall injury involving mucosa and smooth muscle (periureteral fat not seen)
Grade 4- Total ureteral avulsion

Postoperative care included imaging follow-up, stent removal after healing, and monitoring for complications.

Results

A total of 27 patients were included.

Mean age was 45 years; 16 females and 11 males.

16 injuries were detected intraoperatively, while 11 were diagnosed postoperatively.

Etiology:

• Ureteroscopy – majority cases, typically PULS 2–3 injuries

• Gynecologic surgeries – 8 cases (7 TAH, 1 LH), frequently high-grade with ureterovaginal fistulas

Management Distribution:

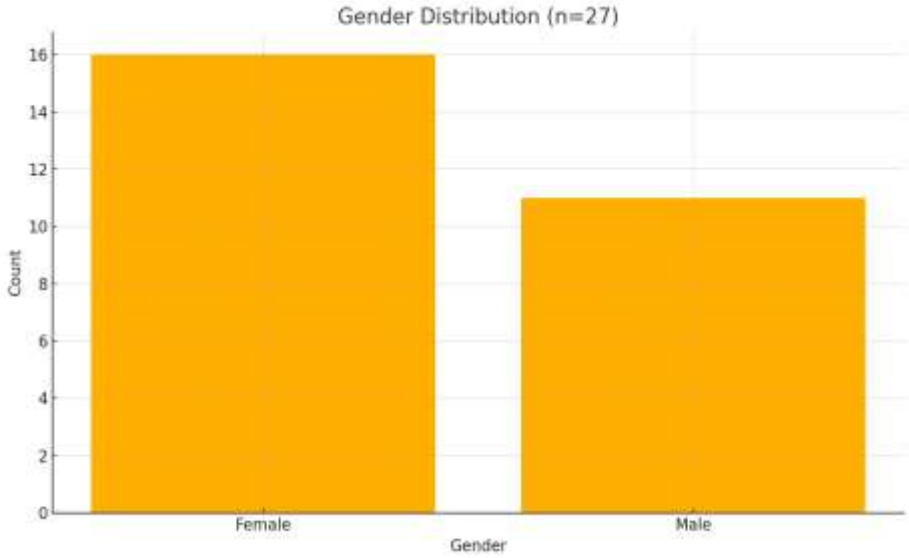
• DJ stenting – majority 22 cases

• Ureteric reimplantation – 3 cases

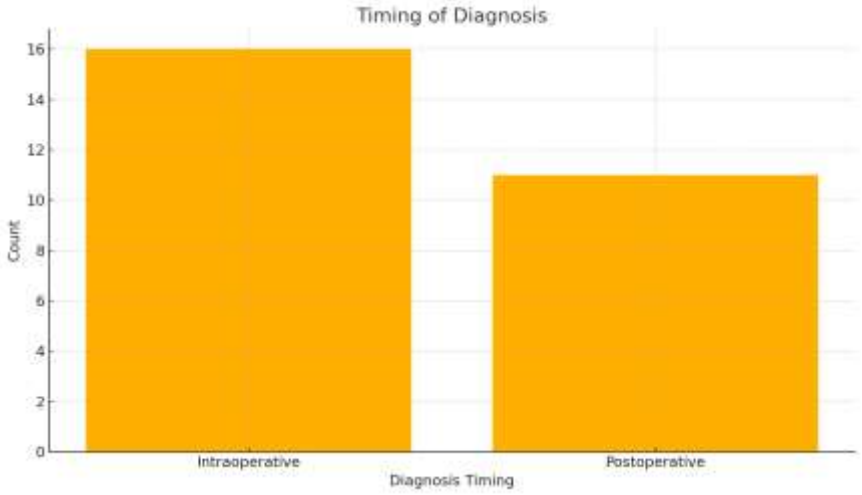
• Boari flap – 1 case

• Ileal ureter – 1 case (avulsion)

Median recovery time: 12 days (range 7–21 days).

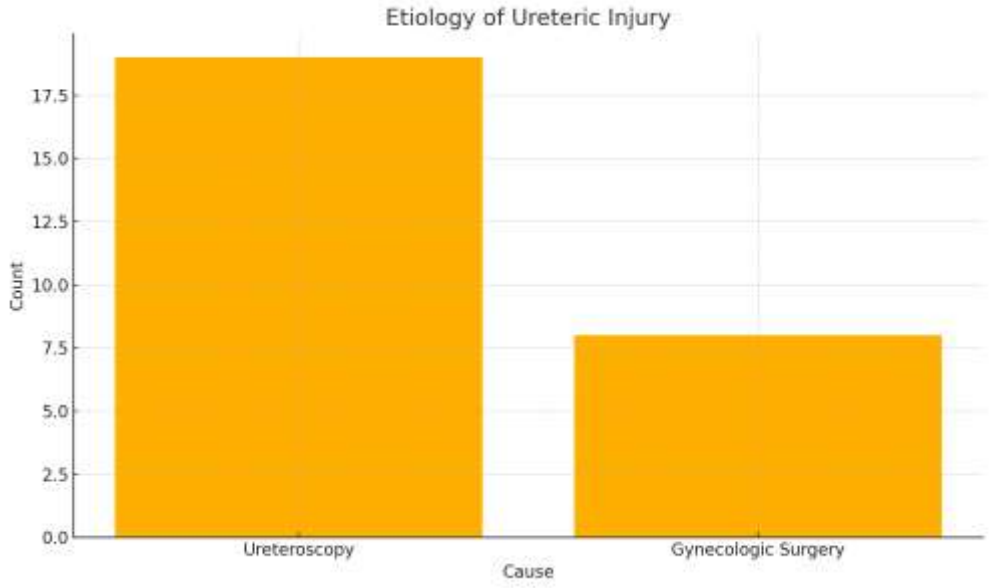


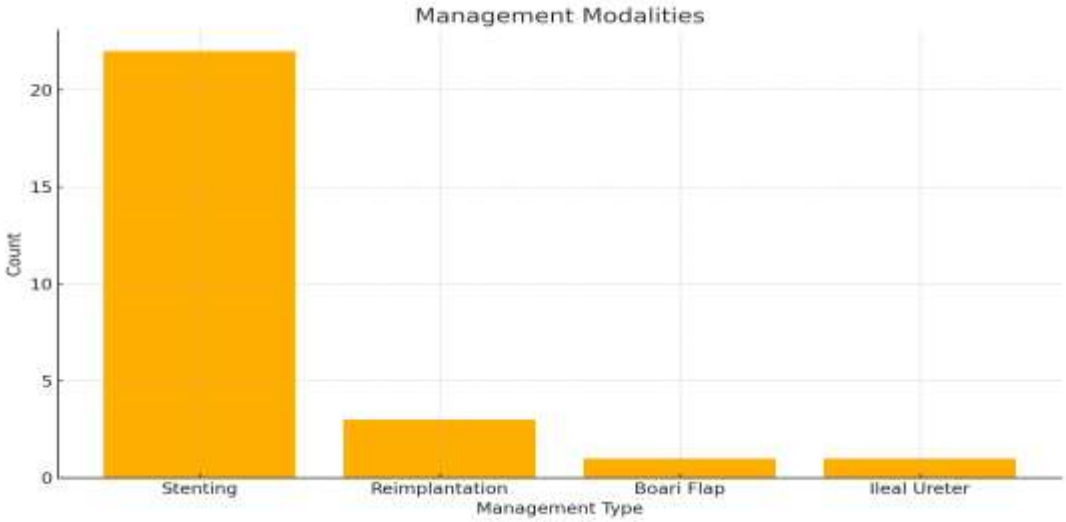
SEX	n
Male	11(40.7%)
Female	16(59.3%)
total	27



DIAGNOSIS TIMING	n
Intraoperative	16(63%)
Postoperative	11(37%)

SPECIALITY	n
Urology	19(70.3%)
Gynaecology	8(29.6%)
Colorectal	nil





Discussion

Iatrogenic ureteral injuries continue to remain a clinically significant concern despite advancements in endoscopic and minimally invasive surgical techniques. In our study, ureteroscopy was the predominant cause of injury, reflecting global patterns where the increasing adoption of ureteral access sheaths and high-pressure irrigation may predispose patients to mucosal tears, perforations, and even avulsion. As endourology has expanded, the complexity of stones treated ureteroscopically has also increased, potentially contributing to a rising trend of higher-grade ureteral trauma.

Gynecologic surgeries—particularly hysterectomy, pelvic organ prolapse repair, and cesarean section—also represented important sources of ureteral injury in our cohort. This aligns with longstanding literature indicating that the ureter is most vulnerable where it is in close anatomical relation to the uterine artery and the lateral vaginal wall. These injuries are especially prone to delayed diagnosis, commonly presenting days to weeks postoperatively with fever, flank pain, urinary leakage, or hydronephrosis on imaging. Such delayed presentations significantly increase the risk of renal function decline and infectious complications, reinforcing the importance of heightened perioperative vigilance in high-risk procedures.

Early intraoperative recognition remains the most critical factor influencing outcomes. Our findings support previous reports that timely identification allows for simpler repairs, often avoiding major reconstructive procedures. Conversely, unrecognized injuries increase

morbidity, necessitating postoperative interventions such as percutaneous nephrostomy, secondary reconstructive surgery, prolonged stenting, or even nephrectomy in non-salvageable kidneys.

Endoscopic stenting served as an effective and minimally invasive modality for a majority of partial-thickness injuries in our study. This is consistent with contemporary evidence indicating that conservative endourologic management, when appropriately selected, yields excellent success rates. However, severe injuries—such as complete transection, ureteric necrosis, and ureteral avulsion—continue to require definitive reconstructive surgery. Options such as ureteroureterostomy, ureteroneocystostomy with psoas hitch or Boari flap, and ileal ureter substitution have been well supported by existing literature, with procedure selection dictated by the site and extent of injury.

Our results further emphasize that early postoperative imaging and clinical suspicion are essential, particularly in patients with complex anatomy, dense pelvic adhesions, malignancy, or prior radiation. Several authors have advocated for the routine use of intraoperative cystoscopy or indocyanine green–based fluorescence imaging during high-risk pelvic procedures to facilitate earlier identification of ureteral compromise.

Global data indicate that gynecologic procedures account for 52–75% of iatrogenic ureteric injuries. Our findings corroborate this trend. Increasing reliance on endoscopic management is documented across studies, with high success rates.

Most ureteral injuries can be managed conservatively with stenting; complex and high-grade injuries benefit from reconstructive options depending on level and extent of injury.

Importantly, outcomes were significantly improved when a multidisciplinary approach was integrated—especially collaboration between gynecology, general surgery, and urology teams. This echoes existing recommendations that shared decision-making and standardized intraoperative protocols can reduce both the incidence and morbidity associated with ureteral injuries.

While our study adds to the existing knowledge, it is not without limitations. The retrospective design and relatively small sample size limit generalizability. Additionally, follow-up duration was variable, which may affect long-term assessment of renal function and stricture recurrence. Future prospective multicenter studies with standardized injury grading and outcome reporting would provide more robust evidence.

Overall, our findings reaffirm that although iatrogenic ureteral injuries are uncommon, they carry considerable morbidity when missed. Prevention through meticulous surgical technique, prompt recognition, and appropriate tailored management remains the cornerstone of achieving optimal outcomes.

Limitations

This was a single-centre study with a limited sample size (n = 27). Follow-up duration was short. A larger study is recommended.

Conclusion

Iatrogenic ureteric injuries, though uncommon, require high clinical suspicion and prompt diagnosis. Endoscopic management is sufficient for the majority of low-grade injuries, whereas complex cases require open or laparoscopic reconstruction. Multidisciplinary collaboration between urology, gynecology, and colorectal surgery is essential to optimize patient outcomes.

References

1. Iatrogenic Ureteral Injury – Overview.Brandes S, Coburn M, Armenakas N, McAninch JW. Iatrogenic ureteral injuries: A guide to management. J Urol. 2004;171(2): 412-417.

2. Ureteroscopy-related Injuries. Traxer O, Thomas A. Prospective evaluation and classification of ureteral wall injuries during ureteroscopy: The Traxer–Thomas classification. Eur Urol. 2013;64(6):993-999.

3. PULS Grading System. Breda A, Territo A, et al. The Post-Ureteroscopic Lesion Scale (PULS): A new classification for ureteroscopic injuries. World J Urol. 2015;33: 1–6.

4. Gynecologic Surgery–related Ureteral Injuries. Gilmour DT, Das S, Flowerdew G. Rates of urinary tract injury from gynecologic surgery. Obstet Gynecol. 2006;107(1):101-108.

5. Incidence & Risk Factors. Karam AK, et al. Risk factors for lower urinary tract injury at the time of hysterectomy. Obstet Gynecol. 2010;116(3): 585-592.

6. Diagnostic Evaluation of Ureteral Injury. Selzman AA, Spirnak JP. Iatrogenic ureteral injuries: A review of diagnosis, management, and outcome. Am Surg. 1996;62: 614-618.

7. Management (Reimplantation, Boari flap, Ileal ureter). Goverde AJ, et al. Reconstructive options for ureteral strictures and injuries. Curr Opin Urol. 2015;25(4): 352–357.

Nicolaisen GS, et al. Boari flap and psoas hitch ureteral reimplantation: Technique and outcomes. J Urol. 1985;133: 266-268.

8. AAST Grading System. Moore EE, et al. Organ injury scaling: Spleen, liver, and kidney. J Trauma. 1989;29: 1664–1666.

9. Systematic Reviews / Meta-analyses. Zitka T, et al. Iatrogenic ureteral injury: A systematic review. Int Urogynecol J. 2019;30: 559–565.