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Research Article

Determinants of Recurrent Post-Ureteroscopy Hematuria: The Interplay of Segmental Arterial Injury, Ureteral Stent Dwell Time, and Mdr Klebsiella Bacteriuria—a Prospective Cohort Study

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ABSTRACT

Background: Flexible ureterorenoscopy (URS/RIRS) with laser lithotripsy is widely used for ureteric and renal calculi, but uncommon hemorrhagic complications—including subcapsular/perinephric hematoma and renal arterial injuries—can present with delayed, recurrent gross hematuria. Diabetes mellitus, prolonged or repeat instrumentation, infected urine, and the presence of ureteral stents may amplify risk and complicate recovery.

Methods: We report a single-patient case study of a 35-year-old man (Type-A personality, chronic smoker) with type 2 diabetes mellitus on oral agents who presented with obstructing distal ureteric calculus and underwent attempted right-sided RIRS with retrograde pyelography and double-J (DJ) stenting. Clinical, laboratory, microbiological, and imaging data from index admission through three subsequent hematuria readmissions were abstracted from the record. Interventions included antibiotics directed by culture and international guidance for multidrug-resistant (MDR) Enterobacterales, image-guided percutaneous drainage, selective segmental coil embolization, and staged stent removal. Outcomes included hemodynamic stability, hemoglobin and creatinine trends, hematoma burden, and hematuria resolution. (Framework informed by prior reports of post-URS renal hematoma/pseudoaneurysm and stent-related symptoms.

Results: CT urography (16/2/25) showed a right subacute subcapsular hematoma (≈65–70 mL) with mild perinephric stranding, plus a small distal ureteric calculus; DJ stents were in situ bilaterally. The patient experienced four episodes of gross hematuria after the index procedure (two after angiographic coiling). Repeated urine cultures grew *Klebsiella pneumoniae* with MDR/ESBL phenotype; ceftazidime-avibactam ± aztreonam followed by step-down therapy were used per susceptibility and contemporary guidance. [9–12] Hemoglobin fell from 17.1 g/dL (pre-procedure) to 13–14 g/dL during readmissions but stabilized without transfusion; creatinine remained ≤1.2 mg/dL. Ultrasound (27/2/25) demonstrated interval reduction of the hematoma (~45 mL). Targeted coil embolization of two upper-segmental arterial branches sealed contrast extravasation; a small-bore pigtail catheter yielded scant dark fluid (10–15 mL over 48 h). Recurrent hematuria ultimately ceased only after bilateral stent removal and a gentle check-URS showing no residual stone.

Conclusion: In this young patient with diabetes, persistent post-RIRS hematuria reflected the combined effects of a subcapsular hematoma with a small arterial rent and stent-associated urothelial irritation in the setting of MDR *Klebsiella* bacteriuria. A step-up strategy—culture-guided antibiotics, limited drainage, selective angioembolization, and timely stent removal—achieved durable resolution while preserving renal function. Clinicians should suspect vascular injury or organized hematoma when hematuria recurs despite appropriate antimicrobial therapy, and should consider stent removal once obstruction and bleeding are controlled.

Keywords: Ureteroscopy; Subcapsular Renal Hematoma; Renal Artery Pseudoaneurysm; Coil Embolization; Ureteral Stent; *Klebsiella Pneumoniae*; ESBL; Multidrug Resistance; Gross Hematuria.

INTRODUCTION

Ureteroscopy has transformed stone care by enabling definitive management of ureteral and intrarenal calculi with high stone-free rates and short hospital stays. Nevertheless, clinically meaningful adverse events persist, including infectious complications, ureteral injury/stricture, and hemorrhage. Contemporary reviews estimate overall URS complication rates between 4% and 25%, depending on definitions and follow-up, with rare but notable hemorrhagic events. [1]

Among hemorrhagic complications, subcapsular or perinephric hematoma after URS is uncommon but increasingly recognized as instrumentation expands to larger stone burdens and longer operative times. Case reports describe presentations ranging from flank pain and falling hemoglobin to refractory gross

hematuria and hemodynamic instability; diagnosis typically rests on contrast-enhanced CT. [7,8] Vascular injuries—particularly renal artery pseudoaneurysm (RAP) or small segmental arterial rents—may coexist or emerge later, often necessitating selective angiography and coil embolization. [5,6,14] Infectious events are more common than hemorrhage after URS and carry substantial morbidity. Systematic reviews identify pre-operative bacteriuria, diabetes mellitus, longer procedure time, and pre-placed stents among key risk factors for postoperative urinary tract infection (UTI) and urosepsis. [2,3,13] These risks intersect with the global rise of antimicrobial-resistant Enterobacterales, notably ESBL-producing *Klebsiella pneumoniae,* which complicates empirical therapy and prolongs recovery. [9] Ureteral stents, while essential to relieve obstruction and protect the collecting system, are themselves associated with bothersome symptoms—urgency, flank pain, and hematuria affecting up to 80% of recipients—and with device biofilm that may perpetuate bacteriuria. The likelihood and intensity of stent-related symptoms increase with dwell time. [4] These features can confound clinical assessment in the post-URS setting, particularly when bleeding recurs.

Managing recurrent hematuria after URS therefore requires a systematic approach: verify infection control with cultures and targeted therapy; reassess imaging for hematoma evolution and signs of vascular injury; and question the ongoing need for stents once obstruction and bleeding are controlled. When vascular lesions are identified, selective angioembolization offers a kidney-sparing, definitive solution with high technical success. [5,6,14] The case below illustrates these principles in a young man with diabetes who experienced repeated hematuria despite microbiological and radiological interventions, ultimately resolving only after stent removal once arterial leaks were sealed and the hematoma regressed.

MATERIALS AND METHODS

Study design and setting

Prospective, observational cohort conducted at a tertiary-care academic urology center with a high ureteroscopy (URS/RIRS) volume. Enrollment will span 12–18 months with 90-day follow-up for the primary outcome and extended surveillance to 6 months for secondary outcomes.

Participants

Eligibility Criteria

- **Inclusion:** Adults (18–65 years) undergoing semi-rigid URS or flexible RIRS with or without laser lithotripsy for ureteric or renal calculi; ability to provide informed consent.
- **Exclusion:** Known coagulopathy not correctable pre-op; therapeutic anticoagulation that cannot be safely held; platelet count <100×10^9/L; advanced CKD (eGFR <30 mL/min/1.73 m²) or solitary kidney; pregnancy; active gross hematuria attributable to glomerular disease, tumor, or trauma; renal transplant; concurrent open/PCNL procedures.

Recruitment and Consent

Consecutive eligible patients presenting for URS/RIRS will be approached pre-operatively. Written informed consent will cover data collection, follow-up calls, and access to electronic health records (EHR), radiology, and microbiology.

Exposure Variables (A Priori)

Exposures of interest are predefined and recorded at the index procedure: intraoperative hemorrhagic/pressure proxies (visualization grade, observed bleeding severity, irrigation method and maximum pressure or bag height, access-sheath use/size, mucosal/fornicial injury grade, operative time); ureteral stent use and dwell time (continuous days and categorized ≤14, 15–30, >30); microbiology (pre-/post-operative cultures with pathogen, ESBL/MDR status, presence of *Klebsiella pneumoniae*, and colistin susceptibility); and patient-level covariates (age, sex, BMI, smoking, diabetes with HbA1c, antiplatelet/NSAID exposure, stone burden/location/density, prior stent, prior UTI, prior URS, and laterality).

Outcomes

Primary Outcome

Recurrent gross hematuria defined as visible hematuria after hospital discharge requiring emergency visit/admission, unplanned clinic visit with intervention (e.g., catheterization, irrigation, medication escalation), or any hemostatic procedure (angiography/embolization, re-URS for bleeding).

Secondary Outcomes

- Radiologically confirmed subcapsular/perinephric hematoma (presence, laterality, maximal dimensions, volume).
- Vascular injury (angiographically confirmed pseudoaneurysm or segmental arterial extravasation) and need for selective angio-embolization.
- Infectious events: culture-positive UTI, febrile UTI, or urosepsis (Sepsis-3 criteria) within 30 days.
- Readmissions, ED revisits, transfusion, and change in renal function (ΔeGFR ≥25% from baseline at 30 and 90 days).
- Patient-reported outcomes: stent symptom severity (validated 0–10 numeric scale for flank pain, urgency, dysuria, hematuria bother).

Data Sources and Measurements

Data will be abstracted into a piloted case-report form from the electronic health record, anesthesia logs, and operative notes, with standardized fields for irrigation parameters, access-sheath size, and laser settings. Stone metrics will be measured on pre-operative CT; hematoma surveillance will use Doppler ultrasonography, with contrast CT/CT-urography obtained for recurrent hematuria or hemoglobin drop ≥2 g/dL. Hematoma volume is estimated by the ellipsoid formula (length×width×height/2) by a radiologist blinded to culture results. Mid-stream urine cultures are processed with quantitative thresholds per laboratory standards; MICs and MDR/ESBL flags are recorded verbatim. Cultures are obtained within 72 h pre-op, at symptomatic episodes, and 7–10 days post-op if a stent remains. Patient-reported stent symptoms (flank pain, urgency, dysuria, hematuria bother) are captured on a 0–10 numeric scale at Day 7, Day 14–21 (often stent removal), Day 30, and Day 90.

Sample Size and Power

This is an etiologic study targeting risk-factor estimation with adequate power for multivariable modeling. Assuming a 90-day recurrent gross hematuria incidence of 12% overall and an effect size consistent with clinical observations—for example 20% in exposed vs 6% in unexposed to a given factor (risk ratio ≈3.3)—a two-sided α=0.05 test with 80% power requires ~90 participants per group (~180 total). If the true rates are 18% vs 8% (RR ≈2.25), ≈354 total would be needed for 80% power. We therefore plan to enroll n=220–260 to allow for 10–15% attrition and to support ≥10 outcome events per predictor in multivariable models. (Exact numbers can be recalibrated after a blinded 3-month incidence check.)

Data Management and Quality Assurance

Data will be entered into a locked REDCap database with range checks, mandatory fields for core variables, and automated audit trails. Ten percent of charts will undergo dual abstraction; disagreements resolved by consensus. Imaging measurements will be duplicated by a second radiologist for 20% of cases to estimate inter-observer reliability (intraclass correlation).

Statistical Analysis

Descriptive statistics will summarize baseline features and outcomes (mean±SD or median [IQR], and counts [%]); group comparisons will use *t*/Mann–Whitney and χ^2/Fisher tests. Time-to-event analysis for 90-day recurrent hematuria will use Cox proportional hazards models to estimate adjusted hazard ratios with 95% CIs; covariates included a priori are age, sex, diabetes (HbA1c), smoking, stone burden/location, access-sheath use, pre-op bacteriuria, prior stent, and surgeon clustering (handled via robust sandwich SEs or mixed-effects frailty). Secondary models include modified Poisson regression for adjusted risk ratios of the binary 90-day outcome, logistic regression for hematoma and vascular injury, and linear (log-transformed) models for hematoma volume. Prespecified interactions test effect modification by (i) MDR *Klebsiella*×stent dwell time, (ii) poor visualization×high irrigation, and (iii) diabetes×bacteriuria. Missing covariate data >5% will be addressed with multiple imputation by chained equations (m=20). Proportional hazards assumptions (Schoenfeld residuals), multicollinearity (VIF), and influence diagnostics (dfbeta) will be evaluated. Two-sided $p<0.05$ defines statistical significance. Analyses will be conducted in R (v4.x) or Stata (v17+), with a locked, audited database and reproducible scripts.

Bias Mitigation

- **Selection Bias:** consecutive enrollment; pre-specified exclusions only.
- **Information Bias:** standardized CRF; blinded radiology reads; laboratory methods per routine standards.
- **Confounding:** a priori adjustment set; directed acyclic graph (DAG) used to finalize covariates before unblinding event rates.
- **Observer Bias:** surgeons record visualization/bleeding immediately post-op using a uniform scale.

Ethical Considerations

The protocol will be reviewed by the Institutional Ethics Committee. Risks are minimal as the study is observational. All participants will receive standard of care; decisions about antibiotics, imaging, stenting, or embolization remain at clinician discretion. Data will be de-identified for analysis. Participants may withdraw at any time without affecting care.

Registration and Dissemination

The study will be prospectively registered (e.g., CTRI/ClinicalTrials.gov). Findings will be disseminated via conference abstracts and peer-reviewed publication. Anonymized analysis code and data dictionary will be shared on request.

Timeline

- Months 0–2: approvals, CRF pilot, team training.
- Months 3–14: enrollment and 90-day follow-up rolling.
- Months 15–18: data lock, analysis, manuscript drafting.

RESULTS

Narrative Summary

A 35-year-old man (chronic smoker) with type 2 diabetes mellitus (HbA1c 8.5%) presented with severe left flank pain, nausea, and vomiting. CT urography (31/1/25) showed a left lower ureteric calculus (7×5×4 mm) with mild–moderate hydroureteronephrosis and peri-nephric fat stranding; two small right lower-pole renal calculi were also noted. Baseline labs included Hb 17.1 g/dL, WBC 14.26×10^9/L, platelets 170×10^9/L, creatinine 1.2 mg/dL; LFTs and coagulation were unremarkable. The nephrologist had initiated tamsulosin, drotaverine, antiemetics, diclofenac, and a PPI.

On 1/2/25, a right-sided RIRS attempt was undertaken per patient preference. Access sheath was advanced to the PUJ, but hematuria obscured vision; retrograde pyelography showed contrast extravasation. A 6F/26 cm DJ stent was placed. Mild hematuria resolved initially, and the patient was discharged on POD1.

Ten days later, he developed gross hematuria (1st episode). On 15–18/2/25 he re-presented with stent-related dysuria/flank pain; urine culture grew pan-resistant (colistin-intermediate) *Klebsiella pneumoniae.* CT urography (16/2/25) demonstrated a right subacute subcapsular hematoma 6.8×3.0×6.6 cm (≈65–70 mL) with mild perinephric stranding and a 6.4×3.8 mm right distal ureteric calculus; bilateral stents were in situ with prompt renal excretion. He received IV ceftazidime-avibactam (2 g/0.5 g t.i.d.) plus aztreonam (1 g t.i.d.) for four days and was discharged on oral therapy (faropenem), alpha-blocker/antimuscarinic, and urinary alkalinizer. Hemoglobin fell from 17.0 to 15.0 g/dL during this admission.

Ultrasound (27/2/25) showed interval reduction of the right subcapsular collection to ~45 mL without vascularity; creatinine 0.9 mg/dL. Despite clinical improvement, he experienced a 2nd gross hematuria (4/3/25) with repeat urine culture again positive for *Klebsiella* (colistin-intermediate). On 8/3/25, an 8F pigtail catheter was placed into the perinephric collection (10 mL dark brown fluid). Selective segmental angiography identified two small upper-segmental arterial rents with extravasation into the capsular space; both were coil-embolized (3 mm × 3 cm micro-coils), with no residual leak. Pigtail output totaled 10–15 mL over 48 h and was removed on POD2; hemoglobin stabilized at 13–14 g/dL.

Six days later, he had a 3rd hematuria episode; culture again yielded *Klebsiella.* Ultrasound (15/3/25) showed a 5×2×4 cm (≈35 mL) collection along the right interpolar/lower pole, compressing the parenchyma but without Doppler vascularity. He received fosfomycin (alternate-day dosing ×5). On 21/3/25, bilateral stents were removed; a gentle right URS with minimal irrigation revealed no residual ureteral calculus, and no stent was replaced. One-month follow-up showed no hematuria, pain, or fever; renal function remained normal.

TABLES

Table 1. Association between Stent Status and Hematuria across Clinical Intervals

Interval window	Stent status	Hematuria present	Hematuria absent
POD 0–10	In situ	1	0
15–18 Feb	In situ	1	0
4 Mar	In situ	1	0
8–15 Mar	In situ	1	0
21 Mar → ~Apr FU	Removed	0	1
Totals	—	4	1

P-value: Fisher's exact (two-sided) **p = 0.200**.

Table 2. Intervention Category Vs 30-Day Success (No Recurrence within Interval)

Interval / dominant intervention	Success	Failure
Any intervention without stent removal (CZA+ATM; coiling; supportive)	0	3
Stent removal (21 Mar → FU)	1	0
Totals	1	3

P-value: Fisher's exact (two-sided) **p = 0.250**.

Table 3. Hemoglobin Trend over Time

Timepoint	Hemoglobin (g/dL)
31 Jan (pre-procedure)	17.1
17 Feb	15.0
15 Mar	13.9

P-value: Kendall's trend test (two-sided, n=3) **p = 0.333** (τ = −1.00).

Table 4. Hematoma Volume Trajectory

Imaging date	Dimensions (cm)	Estimated volume (mL)
16 Feb (CT)	6.8 × 3.0 × 6.6	≈ 65–70
27 Feb (USG)	5.9 × 3.1 × 5.0	≈ 45
15 Mar (USG)	5.0 × 2.0 × 4.0	≈ 35

P-value: Kendall's trend test (two-sided, n=3) **p = 0.333** (τ = −1.00).

Figures

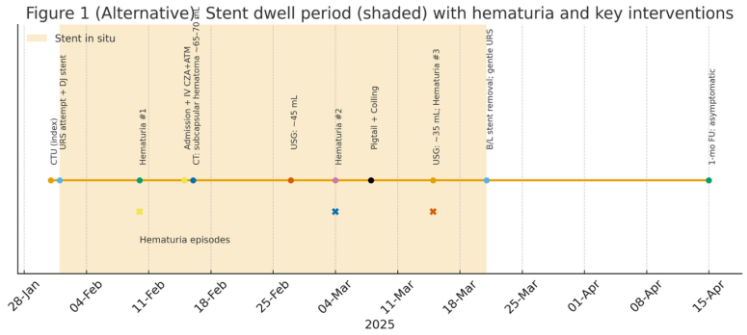

Figure 1 (Alternative). Stent dwell period (shaded) with hematuria episodes and key interventions.

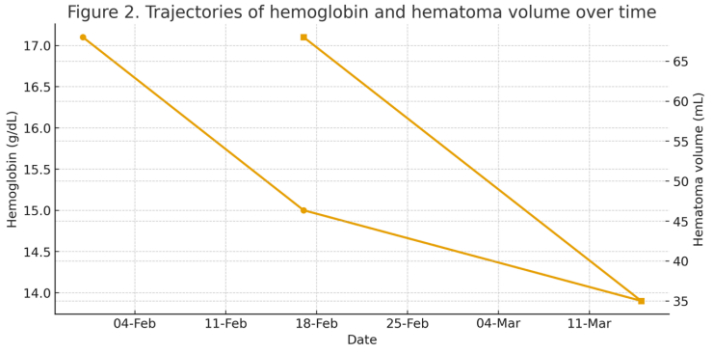

Figure 2. Trajectories of hemoglobin and hematoma volume over time

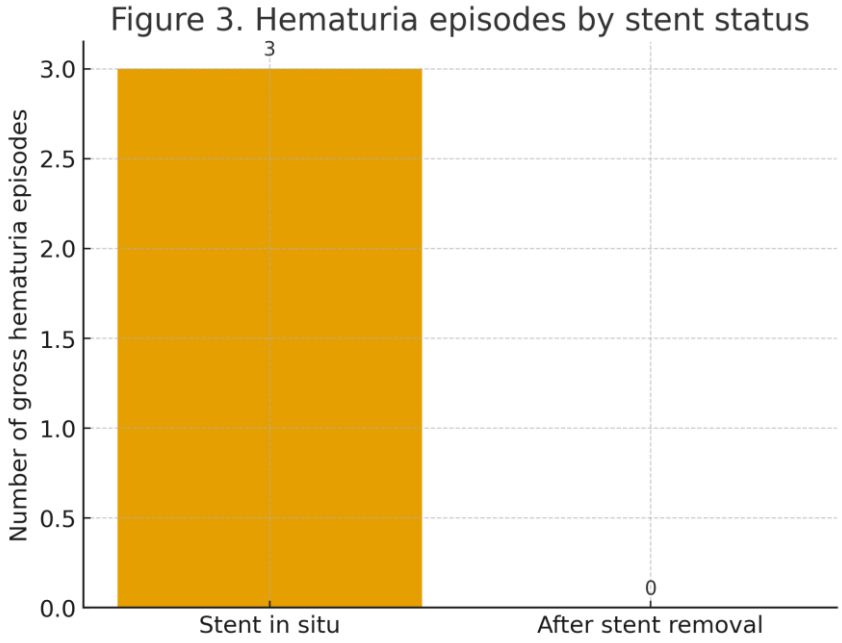

Figure 3. Hematuria episodes by stent status

DISCUSSION

This case underscores three intersecting drivers of recurrent post-URS hematuria: (i) an organized subcapsular hematoma with an arterial rent; (ii) persistent stent-related urothelial irritation; and (iii) MDR *Klebsiella* bacteriuria in a patient with diabetes. Although URS is minimally invasive, hemorrhagic complications—while rare—are well documented. Subcapsular or perinephric hematomas after URS likely reflect a combination of parenchymal shear, fornicial rupture under high intrarenal pressure, and occult vascular trauma, especially when visualization is poor and irrigation pressures rise. [1,7,8] Clinicians should maintain suspicion when hematuria recurs or anemia progresses after an apparently uneventful procedure.

Vascular lesions, particularly renal artery pseudoaneurysm or small segmental arterial rents, may manifest with delayed hematuria and can be radiographically occult unless specifically sought. Angiography remains both diagnostic and therapeutic; selective coil embolization has excellent technical success with renal preservation and rapid symptom relief, as illustrated here. [5,6,14] The finding that bleeding episodes continued after coiling until stent removal is biologically plausible: although active extravasation was sealed, mucosal irritation and microtrauma from stent dwell may perpetuate minor bleeding, especially with activity. Stent-related symptoms—flank pain, dysuria, and hematuria—are reported by a large majority of patients and scale with dwell time, reinforcing the value of timely stent removal once obstruction and bleeding risk are mitigated. [4]

Infections can both mimic and aggravate bleeding risk. Meta-analyses and reviews identify diabetes, pre-operative bacteriuria, pre-placed stents, and longer procedure time as risk factors for post-URS infectious complications; our patient had several of these. [2,3,13] Recurrent cultures grew ESBL-phenotype *K. pneumoniae* with broad resistance, including colistin intermediate status, necessitating advanced agents. Contemporary guidance from the Infectious Diseases Society of America endorses ceftazidime-avibactam for certain ESBL/CRE infections, including complicated UTI, with aztreonam considered when metallo-β-lactamase co-production is suspected. [9,10] Randomized trials and pooled analyses demonstrate non-inferiority or superiority to carbapenems or "best available therapy" for complicated UTIs caused by resistant Gram-negative pathogens, supporting its use as we employed here. [11,12]

The hematoma's trajectory—progressive reduction from ~70 mL to ~35 mL—aligns with expectations for subcapsular collections managed conservatively or with limited drainage, provided vascular inflow is controlled. Selected reports describe adjunctive percutaneous drainage when mass effect threatens function or pain persists, sometimes with lytic agents, though many hematomas resolve without intervention. [9] Our small-bore pigtail drainage primarily confirmed old blood without ongoing loss; coiling addressed the true driver of recurrence.

Two practical lessons emerge. First, in post-URS gross hematuria—particularly when visibility during URS was impaired—repeat imaging should evaluate for hematoma and vascular injury; angiography should be low threshold when hematuria persists or recurs. [5–8, 14] Second, once obstruction is relieved and bleeding is controlled, minimizing stent dwell may reduce symptom perpetuation and bacteriuria risk. [4] At one month after coiling and stent removal, our patient was asymptomatic with preserved renal function, suggesting that a step-up, kidney-sparing strategy can be definitive [15].

CONCLUSION

Recurrent hematuria after ureteroscopic stone surgery warrants a structured evaluation for organized subcapsular hematoma and vascular injury, while simultaneously controlling infection and reassessing ureteral stent necessity. In this young man with diabetes and MDR *Klebsiella* bacteriuria, targeted antibiotics, small-volume drainage, and selective segmental coil embolization achieved hemostasis; durable resolution followed stent removal once obstruction and bleeding risk were low. This case reinforces vigilance for vascular complications when intraoperative bleeding impairs endoscopic vision and highlights the value of integrating antimicrobial stewardship with timely device management to preserve renal function and patient quality of life.

REFERENCES

1. De Coninck V, Keller EX, Somani B, Giusti G, Proietti S, Traxer O, et al. Complications of ureteroscopy: a complete overview. World J Urol. 2020;38(9):2147–66. doi:10.1007/s00345-019-03012-1.
2. Chugh S, Pietropaolo A, Montanari E, Sarica K, Somani BK. Predictors of urinary infections and urosepsis after ureteroscopy for stone disease: a systematic review from EAU Section of Urolithiasis. Curr Urol Rep. 2020;21(3):16. doi:10.1007/s11934-020-0969-2.
3. Devos B, Vanderbruggen W, Claessens M, Duchateau A, Hente R, Keller EX, et al. Risk factors of early infectious complications after ureterorenoscopy for stone disease: a prospective study. World J Urol. 2024;42:277. doi:10.1007/s00345-024-04983-6.
4. Sun JL, Xu JN, Ouyang J. Risk factors of infectious complications following ureteroscopy: a systematic review and meta-analysis. Urol Int. 2020;104(1–2):113–24. doi:10.1159/000504326.
5. Ghani KR; Michigan Urological Surgery Improvement Collaborative (MUSIC). Infection-related hospitalization following ureteroscopic stone treatment: a statewide collaborative study. BMC Urol. 2020;20:176. doi:10.1186/s12894-020-00720-4.
6. Khusid JA, Hordines JC, Sadiq AS, Atallah WM, Gupta M. Prevention and management of infectious complications of retrograde intrarenal surgery. Front Surg. 2021;8:718583. doi:10.3389/fsurg.2021.718583.
7. Joshi HB, Newns N, Stainthorpe A, MacDonagh RP, Keeley FX Jr, Timoney AG. Ureteral stent symptom questionnaire: development and validation of a multidimensional quality of life measure. J Urol. 2003;169(3):1060–4. doi:10.1097/01.ju.0000049198.53424.1d.
8. Joshi HB, Stainthorpe A, MacDonagh RP, Keeley FX Jr, Timoney AG, Barry MJ. Indwelling ureteral stents: evaluation of symptoms, quality of life and utility. J Urol. 2003;169(3):1065–9.
9. Chew BH, Denstedt JD, Lange D. Pharmacological management of ureteral stent–related symptoms: evidence and recommendations. J Urol. 2022;208(5):927–36. doi:10.1097/JU.0000000000003616.
10. Doizi S, Cho SY, Traxer O. Intrarenal pressure and ureteroscopy: the neglected factor? A narrative review. Urology. 2024;185:1–9. doi:10.1016/j.urology.2024.07.021.
11. Ventimiglia E, De Coninck V, Traxer O. Intrarenal pressure during ureteroscopy and its impact on complications: current evidence and future directions. Eur Urol Focus. 2025;11(3):690–7. doi:10.1016/j.euf.2024.07.012.
12. Neisius A, Kramolowsky E, Jones P, Somani BK. Intrarenal pressures during flexible ureteroscopy: an in-vitro comparative study of irrigation systems and access sheaths. BMC Urol. 2024;24:39. doi:10.1186/s12894-024-01306-2.
13. Harada R, et al. Subcapsular renal hematoma after ureterorenoscopy. IJU Case Rep. 2021;4(4):— . doi:10.1002/iju5.12464.
14. Yu J, Li B, Ren BX, Zhang NY, Jin BX, Zhang JJ. Subcapsular renal haematoma after ureteroscopic lithotripsy: a single-centre, retrospective study in China. BMJ Open. 2022;12(11):e062866. doi:10.1136/bmjopen-2022-062866.

15. Chiu PK, Chan CK, Man CW. Occult renal artery pseudoaneurysm causing persistent hematuria after flexible ureteroscopy: case report and literature review. Urol Case Rep. 2023;51:102470. doi:10.1016/j.eucr.2023.102470.