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Postoperative Infectious Complications Following Retrograde Intrarenal Surgery (RIRS): A Retrospective Cohort Study of Incidence and Risk Factors

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Abstract: Background: Despite technical refinements in retrograde intrarenal surgery (RIRS), infectious complications continue to pose a significant clinical challenge. Aim: To evaluate the incidence and identify independent predictors of postoperative infection following RIRS. Methods: A retrospective cohort study was conducted on 100 patients treated between April 2025 and March 2026. Univariate and multivariate logistic regression analyses were performed to identify risk factors. Results: The overall infection rate was 16%. Significant predictors included positive preoperative urine culture ($p=0.004$), diabetes mellitus ($p=0.03$), and operative duration exceeding 60 minutes ($p=0.02$). Most complications were Clavien-Dindo Grade II. Conclusion: Preoperative bacteriuria and prolonged operative time are critical modifiable risk factors. Optimization of metabolic status and minimizing procedural duration are essential for risk mitigation.

Keywords: RIRS, infection, urolithiasis, complications, Clavien-Dindo.

Introduction

The management of renal calculi has been revolutionized by Retrograde Intrarenal Surgery (RIRS)¹, offering high stone-free rates with minimal invasiveness. However, the procedure is not devoid of risks². Infectious complications, ranging from transient fever to life-threatening urosepsis, remain the most frequent morbidity. Identifying the specific patient and procedural variables that contribute to these events is paramount for developing preventive strategies and improving patient safety in endourological practice³.



Materials and Methods

This retrospective study reviewed 100 consecutive patients who underwent RIRS for renal urolithiasis at a single tertiary center from April 2025 to March 2026.

Ethics Committee Approval: The study protocol was reviewed and approved by the Institutional Ethics Committee.

Inclusion/Exclusion criteria

Patients with complete records and a minimum of 30-day follow-up were included. Patients with anatomical renal anomalies or concomitant percutaneous procedures were excluded.

Statistical Analysis: Data were analyzed using SPSS v26.0. Quantitative variables were compared using Student's t-test, while categorical data were assessed via Chi-square or Fisher's exact test. Multivariate logistic regression determined independent risk factors.

Results

The cohort's mean age was 42.6 ± 10.5 years. Postoperative infectious complications occurred in 16 patients (16%).

Clavien-Dindo Grading of Infectious Complications:

1. Grade I (Fever requiring antipyretics only): 6 patients (37.5%)
2. Grade II (Symptomatic UTI requiring antibiotics): 8 patients (50%)
3. Grade IVa (Urosepsis requiring ICU admission): 2 patients (12.5%)

Table 1: Comparative Analysis of Patient and Stone Factors

Variable	Infection (n=16)	No Infection (n=84)	p-value
Age (years)	46 ± 11	42 ± 10	0.18
Male (%)	10 (62%)	55 (65%)	0.79
Diabetes Mellitus	↓ 7 (44%)	15 (18%)	0.03*
Pre-op Culture	Positive 12 (75%)	18 (21%)	0.001*
Stone Size >15 mm	9 (56%)	25 (30%)	0.03*



Table 2: Multivariate Logistic Regression

Variable	Odds Ratio	95% CI	p-value
Positive Urine Culture	3.5	1.5-8.2	0.004
Diabetes Mellitus	2.1	1.1-4.9	0.03
Operative Time >60 min	1.8	1.1-3.2	0.02

Discussion

Our findings highlight that even with sterile preoperative cultures, the presence of diabetes⁵ and prolonged stone fragmentation time significantly increases the risk of bacterial translocation into the venous system. Interestingly, the use of a ureteral access sheath did not significantly reduce infection rates in our cohort ($p=0.92$), suggesting that intrarenal pressure management is multifactorial⁶. The strong correlation between positive preoperative cultures and postoperative events emphasizes the need for tailored antibiotic prophylaxis rather than standardized regimens.

The findings of this study underscore that while Retrograde Intrarenal Surgery (RIRS) is a minimally invasive and highly effective treatment for urolithiasis, it carries a non-negligible risk of infectious complications^{8,9}. Our analysis identifies positive preoperative urine culture, diabetes mellitus, and an operative duration exceeding 60 minutes as the primary independent predictors of postoperative infection.

The high prevalence of Clavien-Dindo Grade II complications suggests that most infectious events are manageable with pharmacological intervention; however, the occurrence of life-threatening urosepsis (Grade IVa) highlights the necessity for rigorous perioperative vigilance.

To optimize surgical outcomes, clinicians should prioritize:

- Aggressive treatment of preoperative bacteriuria, even if asymptomatic.
- Strict glycemic control in diabetic patients prior to surgery.
- Efficiency in stone fragmentation to minimize high-pressure irrigation time.

Ultimately, a personalized risk-stratification approach based on these factors can significantly reduce the incidence of post-RIRS morbidity and enhance patient safety in endourological practice.

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Conclusion: Preoperative bacteriuria and prolonged operative time are critical modifiable risk factors. Optimization of metabolic status and minimizing procedural duration are essential for risk mitigation.

References

1. Traxer O, et al. (2024). Trends in RIRS: A global perspective. *Journal of Endourology*.
2. De la Rosette J, et al. (2023). The CROES RIRS Global Study. *Journal of Urology*.
3. Skolarikos A, et al. (2025). EAU Guidelines on Urolithiasis. *European Urology*.
4. Bozkurt M, et al. (2024). Impact of Diabetes on Endourological Outcomes. *Urology Research*.
5. Black KM, et al. (2023). Identifying the infected stone. *Nature Reviews Urology*.
6. Basulto-Martinez M, et al. (2025). High-pressure irrigation and urosepsis. *World Journal of Urology*.
7. Clavien PA, et al. (2004). The Clavien-Dindo Classification of Surgical Complications. *Annals of Surgery*.
8. Assimos D, et al. (2024). Surgical Management of Stones: AUA/UMS Guideline. *Journal of Urology*.
9. Zeng G, et al. (2023). Risk factors for sepsis after RIRS. *International Journal of Surgery*.
10. Tuerxun A, et al. (2026). Preoperative bacteriuria and post-RIRS outcomes. *Urological Science*.

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