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INCIDENCE AND PREDICTORS OF AUXILIARY PROCEDURES FOLLOWING RETROGRADE INTRARENAL SURGERY: A RETROSPECTIVE COHORT STUDY

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ABSTRACT

Background: Retrograde intrarenal surgery (RIRS) is widely used for renal calculi; however, a subset of patients require auxiliary procedures for complete stone clearance. Identifying predictors of such interventions is essential for preoperative counseling and surgical planning. **Aim**: To determine the incidence and predictors of auxiliary procedures following RIRS. **Methods**: A retrospective cohort study was conducted on 100 patients undergoing RIRS between April 2025 and March 2026 at a tertiary care center. Patients were divided into Group A (no auxiliary procedure) and Group B (required auxiliary procedure). Demographic, clinical, and stone-related variables were analyzed. Statistical tests included Chi-square and independent t-test, with $p < 0.05$ considered significant. **Results**: Out of 100 patients, 15 required auxiliary procedures (15%). Larger stone size, lower pole location, and higher stone density were significantly associated with auxiliary procedures ($p < 0.05$). Mean stone size in Group B was significantly higher (18.4 ± 3.2 mm vs 12.1 ± 2.8 mm). Lower pole stones were more common in Group B (60% vs 28%). **Conclusion**: Auxiliary procedures after RIRS are required in a minority of patients. Larger stone burden, lower pole location, and high stone density are important predictors.

INTRODUCTION

Retrograde intrarenal surgery (RIRS) has become a standard minimally invasive modality for managing renal calculi, particularly stones <20 mm1,2. Despite technological advancements, complete stone clearance may not always be achieved in a single session, necessitating auxiliary procedures such as repeat RIRS, extracorporeal shock wave lithotripsy (ESWL), or percutaneous nephrolithotomy (PCNL)3,4.

Understanding factors that predispose to auxiliary interventions is crucial for optimizing outcomes and improving patient selection. This study aims to evaluate the incidence and determinants of auxiliary procedures following RIRS.

MATERIALS AND METHODS

Study Design : Retrospective observational cohort study

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Study Setting : Department of Urology and Transplantation Surgery, Institute of Kidney Diseases and Research Center and Dr. H L Trivedi Institute of Transplantation Sciences (IKDRC-ITS), Ahmedabad, India.

Study Duration : April 2025 to March 2026

Sample Size : 100 patients undergoing RIRS

Inclusion Criteria

- Patients aged ≥18 years
- Undergoing RIRS for renal calculi
- Complete clinical and radiological records

Exclusion Criteria

- Anatomical renal anomalies
- Previous renal surgery on same side
- Incomplete data or lost to follow-up

Study Groups

- Group A: No auxiliary procedure required (n = 85)
- Group B: Required auxiliary procedure (n = 15)

Data Collection Variables

- Age, gender, BMI

- Comorbidities (diabetes, hypertension)
- Stone size, location, number, density (HU)
- Operative time
- Outcomes: stone clearance, complications, auxiliary procedures

Statistical Analysis

- Continuous variables: mean ± SD
- Categorical variables: frequency (%)
- Tests: Chi-square test, independent t-test
- Significance: $p < 0.05$

RESULTS

Table 1. Baseline Characteristics

Variable	Group A (n=85)	Group B (n=15)	p-value
Age (years)	42.3 ± 11.2	44.1 ± 10.5	0.52
Male (%)	62%	66%	0.78
BMI (kg/m²)	25.1 ± 3.4	26.2 ± 3.8	0.31
Diabetes (%)	18%	26%	0.42

Table 2. Stone Characteristics

Variable	Group A	Group B	p-value
Stone size (mm)	12.1 ± 2.8	18.4 ± 3.2	<0.001
Lower pole (%)	28%	60%	0.01
Multiple stones (%)	22%	40%	0.08
Density (HU)	890 ± 210	1120 ± 250	0.002

Table 3. Operative Outcomes

Variable	Group A	Group B	p-value
Operative time (min)	62 ± 15	78 ± 18	0.01
Complications (%)	10%	20%	0.18
Stone-free rate (%)	92%	40%	<0.001

Key Findings

- Auxiliary procedures required in 15%
- Significant predictors:
  Larger stone size
  - Lower pole stones
  - Higher stone density
  - Longer operative time

DISCUSSION

The present study demonstrates that approximately one in six patients undergoing RIRS requires an auxiliary procedure. This aligns with previously reported rates ranging from 10–25%5.

Stone size emerged as the strongest predictor, with significantly larger stones in the auxiliary group. Lower pole anatomy is known to hinder fragment clearance due to unfavorable gravity-dependent drainage6.Similarly, higher stone density reflects harder calculi, reducing fragmentation efficiency7,8.

These findings highlight the importance of careful patient selection and preoperative planning. Patients with larger, dense, or lower pole stones may benefit from alternative approaches or staged procedures.

CONCLUSION

Auxiliary procedures following RIRS are required in a significant minority of patients. Larger stone size, lower pole location, and high stone density are key predictors. Preoperative identification of these factors can improve surgical planning and patient counseling.

Ethics Committee Clearance

This study was conducted after obtaining approval from the Institutional Ethics Committee. As this was a retrospective analysis of anonymized patient data, the requirement for informed consent was waived.

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