



Impact of Pre-stenting on Outcomes of Retrograde Intrarenal Surgery for Renal Calculi: A Retrospective Comparative Study

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Abstract

Purpose:

To evaluate the impact of ureteral pre-stenting on surgical and clinical outcomes of retrograde intrarenal surgery (RIRS) for renal calculi.

Materials and Methods:

A retrospective study was conducted including 80 patients undergoing RIRS between January 2025 and March 2026. Patients were divided into two groups: pre-stented (Group A, n=40) and non-stented (Group B, n=40). Parameters analyzed included stone size, CT-based stone density (Hounsfield Units, HU), operative time, ureteral access sheath usage, stone-free rate (SFR), and complications. All procedures utilized Holmium:YAG laser lithotripsy. Statistical analysis was performed using Student's t-test and chi-square test.

Results:

Baseline demographics and stone characteristics were comparable. Mean stone density was similar between groups (1025±210 HU vs. 1010±195 HU, p=0.72). Access sheath usage was significantly higher in the pre-stented group (95% vs. 70%, p=0.01). Operative time was shorter in pre-stented patients (52.4±10.2 min vs. 64.1±12.5 min, p<0.001). Stone-free rate was higher in Group A (90% vs. 72.5%, p=0.04). Complication rates were lower in pre-stented patients (10% vs. 25%, p=0.08).

Conclusions:

Pre-stenting significantly improves operative efficiency, access sheath placement, and stone-free rates in RIRS, with a trend toward reduced complications.

Keywords: RIRS; Pre-stenting; Renal calculi; Holmium laser; Ureteral access sheath

Introduction

Retrograde intrarenal surgery (RIRS) has emerged as a preferred modality for management of renal calculi <2 cm. Pre-stenting has been proposed to facilitate ureteral access, reduce intraoperative complications, and improve outcomes. However, its routine use remains controversial. This study evaluates the role of pre-stenting in improving RIRS outcomes.

Materials and Methods

Study Design

1. Retrospective comparative study
2. Duration: Jan 2025 – Mar 2026
3. 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.

Sample Size

1. Total: 80 patients
2. Group A (Pre-stented): 40
3. Group B (Non-stented): 40

Inclusion Criteria

1. Renal calculi ≤ 20 mm
2. Age > 18 years

Exclusion Criteria

1. Active UTI
2. Anatomical abnormalities
3. Previous ureteric surgery

Procedure Details

4.

Results

1. All procedures performed under general anesthesia
2. Flexible ureteroscopy with Holmium:YAG laser lithotripsy
3. Ureteral access sheath used where feasible

Outcome Measures

1. Stone size (mm)
2. Stone density (HU on CT)
3. Operative time (minutes)
4. Access sheath usage (%)
5. Stone-free rate (≤ 2 mm residual)
6. Complications (Clavien-Dindo classification)

Statistical Analysis

1. Continuous: Student’s t-test
2. Categorical: Chi-square test
3. Significance: $p < 0.05$

Table 1: Baseline Characteristics

Parameter	Group A (Pre-stented)	Group B (Non-stented)	p-value
Age (years)	42.5 \pm 11.2	40.8 \pm 10.6	0.48
Male (%)	65%	60%	0.65
Stone size (mm)	13.2 \pm 3.1	13.8 \pm 3.5	0.42
Stone density (HU)	1025 \pm 210	1010 \pm 195	0.72

Table 2: Operative Outcomes

Parameter	Group A	Group B	p-value
Operative time (min)	52.4 \pm 10.2	64.1 \pm 12.5	< 0.001
Access sheath usage	95%	70%	0.01
Stone-free rate	90%	72.5%	0.04
Complications	10%	25%	0.08

Stone-Free Rate Comparison

Group A (Pre-stented): ██████████ 90%

Group B (Non-stented): ██████████ 72.5%

Discussion

Pre-stenting facilitates passive ureteral dilation, enabling easier access sheath placement and improved visualization 6,7. In our study, pre-stented patients had significantly shorter operative times and higher SFR. Similar findings were reported in contemporary urolithiasis literature 8,9. Although complication rates were lower in the pre-stented group, statistical significance was not achieved.

Conclusions

Pre-stenting prior to RIRS improves procedural success and operative efficiency. Routine pre-stenting may be considered, especially in cases anticipating difficult ureteral access.

Ethics Statement

This retrospective study was conducted after approval from the Institutional Ethics Committee. Patient confidentiality was maintained, and informed consent was waived due to retrospective design in accordance with institutional guidelines.

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