Impact of preoperative ureteral stenting on endoscopic findings: A propensity score matching analysis

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Abstract

Introduction and Objective:

The ureteral stent placement before ureteroscopic lithotripsy (URSL) are reported to facilitate ureteroscopic management of urolithiasis. However, there is no report evaluating the ureteroscopic findings after stent placement. In this study, we first examined the effect of the preoperative ureteral stenting on endoscopic findings and surgical outcome of URSL.

Methods:

Among 832 patients who underwent URSL registered in the SMART Study Group from January 2014 to February 2017, 241 cases of single ureteral stones were analyzed. The patients were divided into non-stented patients (n=185) who underwent URSL without preoperative indwelling ureteral stent and stented group (n=56). We evaluated the surgical outcome and endoscopic findings (edema, polyp, stone adhesion, distal ureteric tightness) prospectively based on the SMART classification, which was independently created for this study.

Results:

Owing to differences in patient characteristics, a 1:1 propensity score matching was performed. In the final matched cohort, 96 cases (48 non-stented vs 48 stented) were available for analysis. The average stone size was 8.3±2.9 and 8.3±2.8 mm in the non-stented and the stented group. The mean operation time was not significantly different between the two groups (44.5±16.7 vs 47.6±26.8 minutes). However, stone free rate in the stented group was significantly higher than the non-stented group (83.3 vs 95.7%, p=0.04) Based on our endoscopic findings, the grade of edema (p=0.18) and polyps (P=0.52) at the stone site were not significantly different between two groups, however, the grade of stone adhesion (p=0.04) and distal ureteral tightness (p<0.01) in the stented group were significantly better than in the non-stented group.

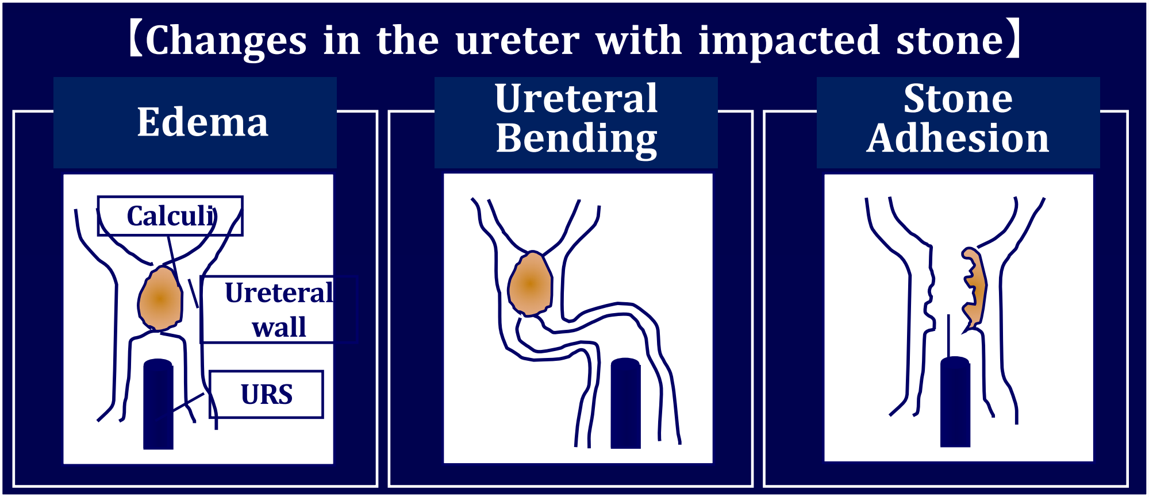
Conclusions:

Preoperative ureteral stent placement is associated with better endoscopic findings of stone adhesion and distal ureteric tightness, and may result in a safe and efficacious procedure for URSL. If severe stone impaction is expected, preoperative stent placement is one of the choices to perform an ideal URS operation.

Background

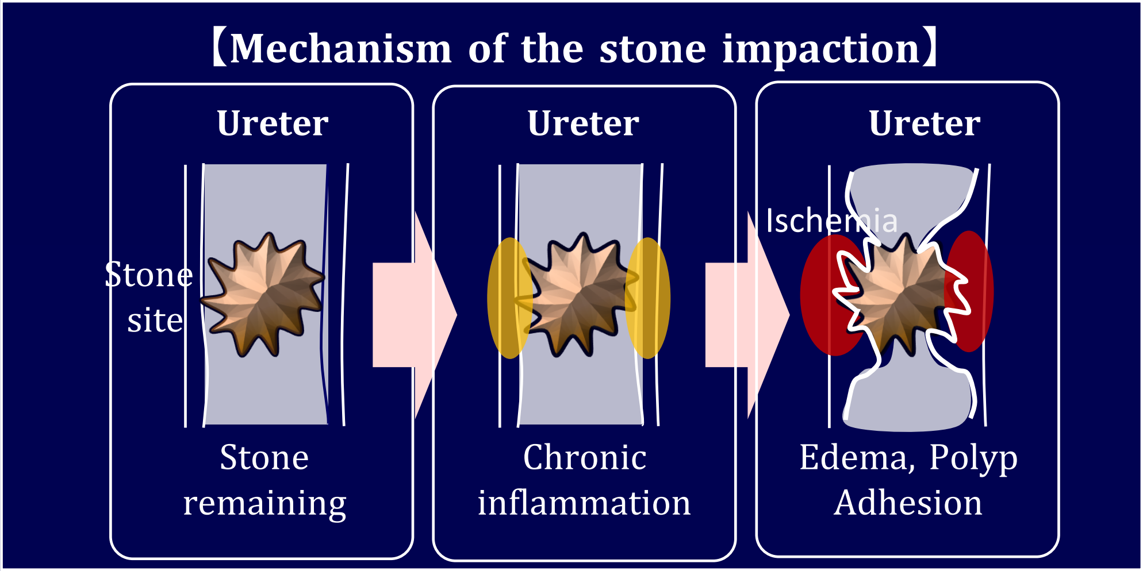
- Impacted stones can exhibit a variety of different pathological changes in the ureter.

【Changes in the ureter with impacted stone】



- Stone impaction is believed to result in the stone remaining and causing chronic inflammation, eventually leading to onset of edema, polyp, and stone adhesion.

【Mechanism of the stone impaction】

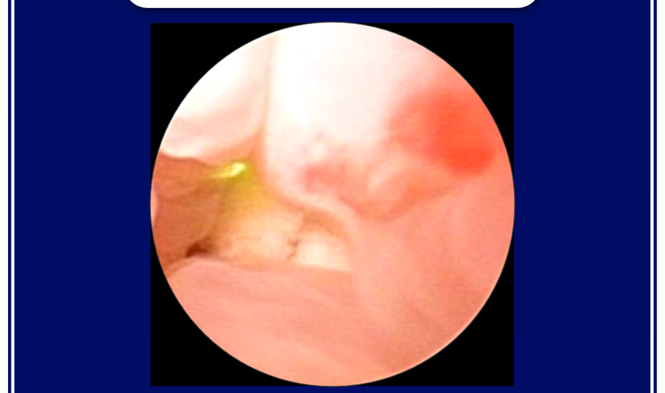


- The ureteral stent placement before URSL are reported to facilitate ureteroscopic management of urolithiasis.

> **There is no report evaluating the ureteroscopic findings after stent placement.**

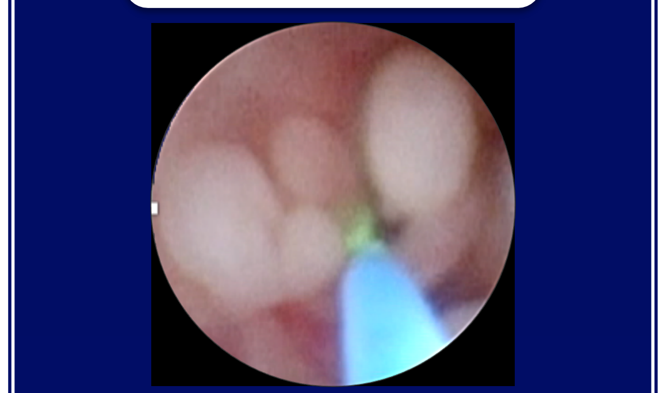
Ureteroscopic findings (UFs; SMART classification)

Edema



G0: normal
G1: Seeing calculi with normal irrigation
G2: Seeing calculi with pressure irrigation

Polyp

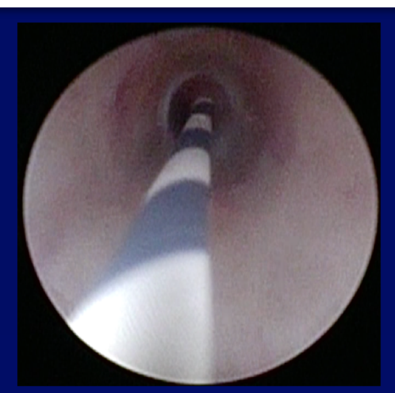


G0: No polyps
G1: Polyps

Adhesion

G0: No adhesion
G1: Easily peel off
G2: Need to peel calculi off by ureteroscopy

Distal ureteral stenosis



G0: Smooth insertion of r-URS
G1: Slight resistance to insert r-URS
G2: Severe resistance or unable to insert r-URS

Objectives

In this study, we first examined the effect of the preoperative ureteral stenting on ureterosocpic findings and surgical outcome of URSL.

Patients and Methods

- **Multicenter study (SMART Study Group in Japan)**

Skilled Endoscopic Management of Renal & Ureteral Stones Study Group

☆ Nagoya City University graduate school
☆ Gyotoku General Hospital
☆ Hara Genitourinary Hospital

- **Study design**

URSL 832 cases (Jan 2014 - Feb 2017)

Excluded criteria
- Staged procedure
- Multiple calculi
- Medical history of URS and URSL
- pre-nephrostomy cases

Single upper tract urinary calculi (U1/U2)
241 cases

Control
185 cases

Pre-stenting
56 cases

Propensity score matching (1:1)

Control (CN)
48 cases

Pre-stenting (DJ)
48 cases

- **Examinations**

Surgical outcomes
- Surgical time
- Stone free rate
- Ureteral injury according to the Traxer classifications
- Postoperative fever

Ureteroscopig findings (SMART classifications)

Results

【Patients' characteristics before matching】

	Control	DJ	p-value
N	185	48	
Age	53.7 ± 13.8	59.5 ± 14.1	<0.01
Sex			0.06
male	142 (76.8)	30 (62.5)	
female	43 (23.2)	18 (37.5)	
BMI	24.6 ± 5.4	23.7 ± 5.3	0.34
History of UTI	4 (2.1)	25 (52.1)	<0.01
Stone size	8.7 ± 3.7	10.2 ± 5.5	0.04
Ston location			0.71
U1	140 (75.7)	38 (79.1)	
U2	45 (24.3)	10 (20.9)	

【Patients' characteristics after matching】

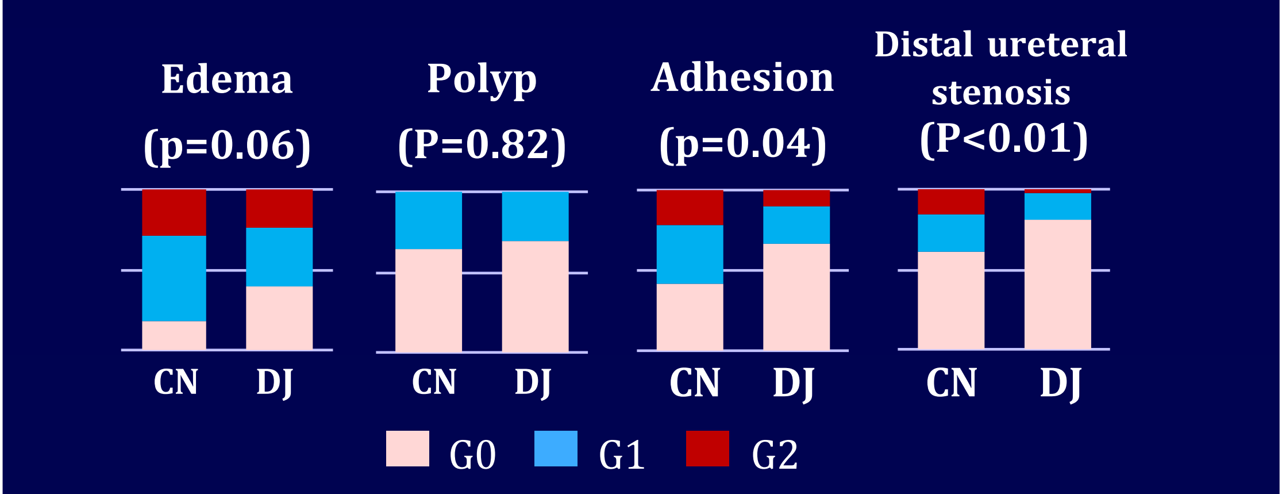
	Control	DJ	p-value
N	48	48	
Age	56.5 ± 14.1	59.5 ± 14.1	0.52
Sex			0.67
male	33 (68.5)	30 (62.5)	
female	15 (21.5)	18 (37.5)	
BMI	23.8 ± 3.5	23.7 ± 5.3	0.88
History of UTI	2 (5.2)	25 (52.1)	<0.01
Stone size	9.7 ± 3.7	10.2 ± 5.5	0.92
Stone location			0.63
U1	35 (72.9)	38 (79.1)	
U2	13 (27.1)	10 (20.9)	

【Surgical outcomes】

	Control	DJ	p-value
N	48	48	
Surgical time	64.4 ± 37.8	60.8 ± 32.9	0.34
Stone free	38 (79.1)	45 (95.7)	0.07
Ureteral injury			0.19
G1(mucosa)	11 (22.9)	5 (10.4)	
G2(muscle)	4 (8.3)	2 (4.1)	
G3(fat)	2 (4.1)	1 (2.1)	
Post-op fever	1 (2.1)	3 (6.3)	0.62

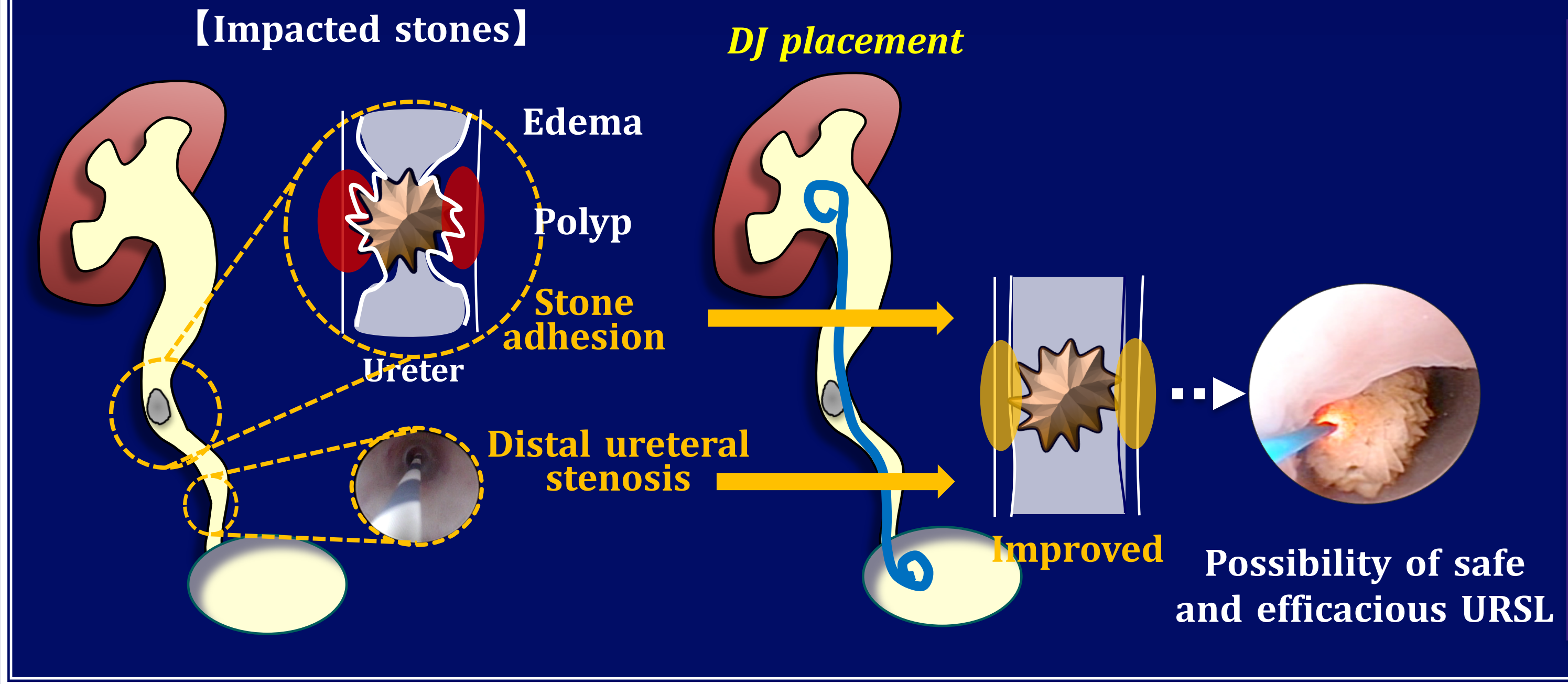
- SFR of DJ group was higher and DJ placement tended to decrease the complications of ureteral injury, but there were no significant differences.

【Effect of the preoperative DJ stenting on ureterosocpic findings】



- Stone adhesion and distal ureteral stenosis significantly improved by the placement of DJ stent.

Conclusions



- **We first reported the possibility of improvement of UFs by the insertion of preoperative DJ stent.**
- **It may result in a safe and efficacious procedure for URSL.**
- **If severe stone impaction is expected, preoperative DJ stent placement is one of the choices to perform an safe URSL.**