



# Emergency double-J stent insertion following uncomplicated Ureteroscopy: risk-factor analysis and recommendations

Yousef S. Matani, Mohammed A. Al-ghazo, Rami S. Al-azab, Osamah Bani-hani, Daher K. Rabadi

*Department of General Surgery and Urology (YSM, MAA, RSA, OB) and Department of Anaesthesia (DKR) Jordan University of Science and Technology, Faculty of Medicine, King Abdullah University Hospital, Irbid-Jordan*

## ABSTRACT

**Purpose:** Emergency double-J (DJ) stenting following “uncomplicated” ureteroscopic (UURS) stone treatment is both morbid and costly. Our study aims at identifying those patients who are more likely to require such an extra procedure. Handling of this complication will also be highlighted.

**Materials and Methods:** 319 cases of UURS cases were selected out of 903 patients, who were admitted for URS stone treatment at King Abdullah University Hospital during the period from May, 2003 to December, 2010. Thirty-eight of them (11.9%) had emergency post-URS DJ stenting within 24 hours of discharge. The medical records of all UURS cases were retrospectively reviewed. Comparison in demographic and stone-related variables was made using 2-paired t-test with  $P < 0.05$ . Operative findings of 38 stented patients were outlined.

**Results:** Significant risk factors for emergency stenting were noted in males with larger ( $> 1.5$  cm) and proximal stones (38 stented vs. 281 unstented). Operative risk factors among the 38 patients were: initial procedure time  $> 45$  minutes (42.1%), ureteral wall edema (21.1%), repeated access for stones  $> 1.5$  cm (21.1%), impacted stone (10.5%) and ignored or missed stones/fragments (4.6%).

**Conclusions:** The need for emergency DJ stenting following UURS stone treatment is not uncommon. The routine insertion is impractical and weakly-supported. With risk-factor stratification, selective and individualized DJ stenting policy is recommended.

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## INTRODUCTION

Fragmentation and clearance of ureteric stones can either be achieved by extracorporeal shock wave lithotripsy (ESWL) or ureteroscopy stone treatment (URS). URS stone removal has been found to carry a better overall stone-free rate compared to ESWL. The Current European guidelines recommend primary use of URS in treatment of most ureteric stones (1).

The insertion of double-J (DJ) stent during URS stone extraction is controversial. Since the pioneering report by Hosking et al. (2) and the radical characterization by Moon (3), urologists started to adopt a more selective policy.

Complications of DJ stent insertion include disturbing storage lower urinary tract symptoms, pain, hematuria, infection and poorer qua-

lity of life (4,5). It is, however, thought to reduce post URS obstruction, facilitate clearance of stone fragments and decrease stricture rate (6,7).

The definition of uncomplicated URS (UURS) is both lacking and weakly standardized. Denstedt et al. defined UURS as a procedure with “no evidence of perforation or lack of clinically important edema”. Free flow of contrast into the bladder on retrograde pyelography is exclusive of edema (8). Other studies used an endoscopic, non-validated grading of ureteric edema on a scale of 0 (mild) to 2 (severe) (6,9).

Our study will look at risk-group stratification of patients who might require stenting during their initial “UURS” and address the concept of “prophylactic” DJ stent use.

## MATERIALS AND METHODS

From May 2003 to December 2010, 903 patients had undergone semirigid URS with Holmium laser (365 micron; 0.5-1.4J/5-10 Hz) lithotripsy. All patients were admitted to the urology department at King Abdullah University Hospital and their medical records retrospectively analyzed. All patients had a preoperative consent. Imaging studies included kidney-ureter-bladder (KUB) X-ray and non-enhanced computed tomography (NECT).

Among a total of 903 patients, 319 underwent primary “straightforward” UURS which was defined based on the following selection criteria:

1. All had single and unilateral ureteric stone;
2. Intra-operative perforation was not documented;
3. DJ stent and/or ureteric catheter were not inserted;
4. Ureteric dilatation and/or usage of access catheter were not used;
5. Children and pregnant ladies were excluded;
6. Stone free after the procedure was documented (defined as complete removal and/or residual stone fragments < 3 mm in diameter).

URS was performed, using 8/9.8 semirigid ureteroscope (Richard Wolf, Germany), under general anesthesia in all patients. Urine cultures were

negative. Prophylactic antibiotic was given at induction as a single 1 g IV ceftriaxone. Subsequently, 500mg oral ciprofloxacin tablets were given twice daily for 24 hours.

The stone size and location were determined by KUB and NECT films. They were divided into proximal, middle and distal third ureteral stones. URS stone extraction was achieved by Dormia basket and/or forceps.

Thirty-eight out of 319 UURS had emergency stent insertion within 24 hours of initial URS due to intolerable colic and significant discomfort. Diagnostic URS was performed, prior to stenting, for defining a possible etiology or injury. A height-matched length 6F DJ stent was used. Discharge was made within 24 hours and the stent was removed after 1-2 weeks.

The demographic features, stone-related factors and operative URS findings were analyzed and tabulated. Comparison between those stented and un-stented (38 vs. 281) groups was made using 2-tailed t-test statistics. A  $P < 0.05$  was taken as the level of significance. The analysis was performed with computer software (Statistical Package for the Social Sciences, version 16.0).

## RESULTS

Thirty eight of the 319 UURS (11.9 %) patients had emergency stent insertion. The procedure was complication-free. The mean operative time was 25 minutes. The demographic and stone-related variables of the study group are listed in Table-1. Twenty seven patients were men and 11 women (2.5:1), with a mean age of 38.2 years (range 28-62). The stones included 9 proximal (23.7%), 11 mid-ureter (28.9%), and 18 distal stones (47.4%). Average stone diameter was 10.2 cm (range 7-23 mm).

Significant preoperative risk variables included male sex ( $P = 0.037$ ) and proximal stones ( $P = 0.018$ ). Average ages were comparable (38.2 vs. 39.1 years,  $P = 0.30$ ). Average stone diameter was 1.2 cm and 0.94 cm in the stented and un-stented groups, respectively ( $P = 0.06$ ).

The URS findings are listed in Table-2. Relevant risk factors included: operative time superior to 45 minutes in 16 patients (42.1%), repe-

**Table 1 - Demographics and stone features.**

No. of patients	38
sex(M:F)	2.5:1(27/11)
Mean age in years(Range)	38.2 (28-62)
Stone	
Mean size in mm (range)	10.2(7-23)
Location	
Upper	9(23.7%)
Middle	11(28.9%)
Lower	18(47.4%)

ated access through the ureteral orifice for larger stones (> 1.5 cm) in 8 (21.1%), localized wall edema in 8 (21.1%), handling of impacted stones in 4 (10.5%), ignored small calyceal stone in 1 patient (2.3%) and residual stone fragments < 3mm in 1 patient (2.3%). Control and comparison of these risk factors with the unstented group would have been contributory but clearly unethical.

## DISCUSSION

URS was first reported in 1982 (10) by Perez-Castro in cooperation with Karl Storz. The use of stents during this period was not only strange, but also unfavorable. Eisenberger referred to stents as "Steckerin" (Bavarian for small sticks) (11). DJ stent was first described by Finney et al. in 1978 (12). Criticism to its role, however, appeared in the late 90s (2,3). Nowadays, the urologists remain, sharply, divided on the need for stenting following UURS treatment of lithiasis. Both routine and selective use has been practiced. Selective use, in particular, should depend on a variety of variables related to patients, stones, technology and experience.

Nabi et al. meta-analyzed 9 trials and concluded that stents have significantly higher rate of storage lower urinary symptoms (LUTS), infection, analgesia use, and ureteric stricture. Stenting, on the other hand, did not influence rates of stone clearance. The authors, however, criticized data inconsis-

**Table 2 - URS findings prior to DJ stenting (Risk factors).**

No. of patients	38
Mean operative time(minutes)	25
Risk factors	
Operative time > 45 minutes	16(42.1%)
localized wall edema	8(21.1%)
Repeated access for stones >1.5 cm	8(21.1%)
Impacted stone	4(10.5%)
Ignored small calyceal stone	1(2.3%)
Residual stone fragment < 3 mm	1(2.3%)

tency and lack of standardization. They, therefore, kept the issue of stenting open (5). Similar conclusions were reached by three recent evaluations (13-15). They, basically, advised against routine DJ stenting and were not satisfied by homogeneity and pooling of materials. An excellent review of this dilemma was expressed by Keeley and Timoney (16) who identified the pros and cons of stenting and advised for more meaningful studies.

The use of an alternative and temporary drainage procedure has, recently, been considered. It utilizes short-term insertion of ureteric catheters. This accessory procedure may overcome edema, reduce pain, decrease outpatient visits, avoid secondary endoscopy and limit costs. Djaladat et al. were able to show that pain, storage LUTS and outpatient visits were significantly reduced in the catheter group. Urinary tract infection (UTI) was established in 7 and 4 % in catheter and non-catheter groups respectively. Readmission and stone clearance rates were comparable in a 2-week follow up (17). Reduction in pain and international prostate symptom scores was noted in one-day post-URS catheterization (18).

Baseless avoidance of stenting carries measureable morbidity and cost. DJ stenting is beneficial when obstruction secondary to edema and/or inflammation was anticipated (19). It is, also, effective in reducing pain and promoting drainage in hydronephrosis (20). Cheung et al. highlighted the value of selection in reducing overall stenting rate

without altering stone-free outcome. Their stenting rate was 39% and limited to impacted stones, severe preoperative obstruction and residual poor postoperative drainage (21). Stents were, additionally, found useful in pregnant ladies (22), in upper urinary tract diseases (urolithiasis) (23) and when ureteral access sheath was used (24). Factors that contribute to DJ-associated morbidity include stent design, size, positioning, associated UTI, and duration (25). Recent use of drug eluting stents (26) and alpha blockers (27) were reported to cause less pain and discomfort.

In this analysis, higher risk of emergency stenting was noted among males with larger and more proximal ureteric stones. The impact of stone location and size might be explained by increased manipulation, repeated access and development of wall edema. Increased risk in males is, however, difficult to justify. Comparable Intraoperative risk factors were reported in a similar recent study by Tanriverdi et al. (28). Summary of variables is listed in Table-3. In their analysis, about 2/3 of cases had prolonged procedure, repeated access and ureteral

**Table 3 - Summary of data: current and reference no. 28 studies.**

	Current	Ref. 28
No. of patients (%)	38/319 (11.9)	23/276 (8.3)
Sex(M:F)	2.5:1(27:11)	1.5:1(14:9)
Mean age in years(Range)	38.2 (28-62)	41.5
Stone:		
Mean size in mm (range)	10.2(7-23)	12(9-22)
Location (%)		
Upper	9(23.7)	6(26.1)
Middle	11(28.9)	6(26.1)
Lower	18(47.4)	11(47.8)
Mean operative time(minutes)	25	14
Etiology & Risk factors: (%)		
Operative time (minutes)	> 45 in 16(42.1)	> 60 in 9(39.1)
Localized wall edema	8(21.1)	10(43.5)
Repeated access for stones > 1.5 cm	8(21.1)	6(26.1)
Impacted stone	4(10.5)	4(17.4)
Small calyceal stone	Ignored in 1(2.3)	Unrecognized in 4(17.4)
Left/retained stone fragments	< 3 mm in 1(2.3)	< 4mm in 3(13.1)
Obstructing blood clots	0	4(17.4)
Kinking of ureter	0	2(8.7)
Relatively narrowed segment	0	2(8.7)
UTI	0	1(4.4)
Nonspecific findings	-	9(39.1)

wall edema. Additional causes of postoperative obstruction were linked to residual or missed stones, blood clots, kinking or narrowed segments and UTI.

We do agree with the arguments raised against routine DJ stenting in UURS stone treatment (5,13-15,28,29). Insertion should better be individualized. Relative indications might include prolonged procedure (> 45 minutes), "significant" wall edema, repeated access, impacted stone, larger stones (> 1.5 cm), use of access sheath, ureteric dilatation and pregnancy. Complete removal and clearance of stone(s)/fragments are highly recommended. The use of ureteric catheterization was not tested in our analysis.

## CONCLUSIONS

Insertion of DJ stents during UURS treatment of stones is neither Angel nor Evil. Its role has not yet been decisively outlined. Stent insertion remains "optional" and a consensus is still remote. A risk-based selection may prove to be a better practice. In difficult and lengthy URS procedures with significant stone burden, DJ stenting should be seriously considered.

## CONFLICT OF INTEREST

None declared.

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**Correspondence address:**

Dr. Yousef S. Matani  
Associate professor of Urology  
Department of General Surgery and Urology,  
Faculty of Medicine  
Jordan University of Science and Technology  
Irbid, Jordan  
Um Al-sommaq Post Office, PO Box 2171  
11821 Amman, Jordan  
Telephone: +96 279 557-2751  
E mail: ymatani@gmail.com