

## The Application of Double-J Stents in a University Hospital: Revision of the Indications and Audit

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**Abstract: Purpose:** To revise retrospectively the indications of double-J ureteric stent fixation in patients presenting to our department during one-year period and to check if the objective of this fixation has been fulfilled and if they were associated with notable morbidity. **Materials and Methods:** Our study included 276 patients who underwent JJ ureteral stent fixation. Patient age, gender, side, the medical history, the findings during clinical examination, the lab profile, the imaging studies, The full clinical diagnosis, the operative details, the reason behind fixation of the double-J ureteral stent, any mis events during the double-J ureteral stent fixation and the follow-up data for the patients until the double-J ureteral stents were removed were recorded. **Results:** Median patient age was 45 years (range 6 months to 81 years). Male to female ratio was 67:33. JJ fixation was unilateral in 256 patients and bilateral in 20 patients. 91.2% of stents were placed after endoscopic procedures while 8.8% were placed after open or laparoscopic procedures. The most common complications were lower urinary tract symptoms in the form of irritative voiding symptoms (93/276; 33.7%) and gross haematuria (22/276; 8.0%). Two patients (1/276; 0.4%) had reported UTI, proved by urine culture. Only one case (1/296; 0.3%) complicated with upward stent migration and other case (1/296; 0.3%) had severe encrustation with stone formation. **Conclusions:** In our study, there is an abuse in JJ placement after endoscopic procedures especially ureteroscopy. Indication of JJ placement must be more precise and clarified to avoid abuse and complications.

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**Key words:** Double-J ureteric, Unilateral and Haematuria.

### 1. Introduction

The double J ureteral stents have become one of the most basic and valuable tools in the urological practice. **1** Indwelling ureteral stents provide direct drainage of the upper urinary tract to the bladder without the need for external diversion. **2**The indications for insertion of stents into the urinary tract has expanded significantly during the last decade. Stents now are inserted routinely in patients with ureteral obstruction and for the prevention of complications following open or endoscopic procedures. **3** However, their use is not free of complications and problems. Initially, very few side effects were reported. **4** But later on many publications demonstrated that indwelling ureteral stents can cause lower abdominal pain, dysuria, fever and haematuria. **3, 5** Furthermore, indwelling stents can migrate, break or even be forgotten in the patient. **6,7.**

Gustav Simon described the first case of ureteral stenting during open cystostomy in the 1900s, and Yoaquin Albarann created the first ureteral stent in 1900. **8** In the course of time, ureteral stents were improved to provide good urine drainage from the kidney with as few complications as possible. **9**The first clinical application was reported in 1967 and later in 1970. **10**The common problem with the early stents was their tendency to migrate. **11.** In 1974, the first commercial internal ureteral stent was made and

described by Gibbons. **12**The important problem of stent migration was solved in 1978 when double-J (DJ) stents were described by Finny. **13** The tips of these stents are J-shaped on either side to prevent upward and downward migration and urologists place them endoscopically over the guide wire.

There are numerous types of stents available in the market today. It is essential that those using them be familiar with their properties, design and demerits. There are no universal guidelines regarding their use, handling and effect. Despite tremendous advances in stent biomaterials and design, JJ stents are not free of complications and problems and the search for an ideal JJ stent may remain utopian. **4** JJ stents are usually made from silicon or polyurethane. Ideal stent characteristics are easy insertion, completely internale placement, resistance to migration, easy removing, radio-opacity, biological inertion, and chemical stability, resistance to encrustations, non refluxing, excellent flow characteristics and reasonable price. **1,4.**

### 2. Materials and Methods

The study was conducted in the Urology Department, Al-Hussein and Sayed Galal University Hospitals. In this study, we reviewed retrospectively all our cases of double-J uretral stenting, over a one year period (from August 2015 to July 2016).

Total number of 276 patients who underwent JJ stenting for various urological problems and following open or endoscopic procedures were included in this study. Patients with severe coagulopathies and uremia due to bladder outflow obstruction were excluded from the study. The investigations done before the procedure were Blood Complete examination, Urine routine examination, Serum Creatinine level and Ultrasonography in all the patients while further diagnostic investigations were performed in those patients who underwent definitive open or endoscopic procedures.

The stent was inserted retrogradely by using cystoscope, under mild sedation or local anesthesia in patients with obstructive uropathies while under spinal or general anesthesia in patients who underwent definitive open or endoscopic procedures.

Patients who were not infected received a single prophylactic dose (intravenous) of aminoglycoside or quinolone 2 hours before stent insertion. Infected patients, once stabilized, had the stenting, covered by specific antimicrobial therapy according to urine and/or blood culture. This treatment continued until there was no fever and any evidence of infection disappeared. A Foley's catheter was left in the bladder for 48 hours in all patients for IOP record and any hematuria. In each case the type of stent inserted was that intended to remain in place for either 6 weeks (polyurethane stents) or longer (siliconestents), according to the pathology necessitating stenting. In all cases the stent was a coiled double-pigtail of 5 or 6 F, with side-holes.

All patients were maintained on antibiotic prophylaxis. Complications were noted in immediate post-operative period and on follow up. Patients were followed using plain abdominal X-ray at 1st and 30 days after stenting. Further plain X-rays were taken every 3 months throughout the follow-up, with ultrasonography of the kidneys and urinary tract at each assessment to evaluate any changes in hydronephrosis after stenting. All patients were scheduled to undergo removal or exchange of the stent according to the specific pathology or type of stent. Patients with complications were immediately hospitalized and evaluated using a plain abdominal X-ray to show the stent position and integrity, and ultrasonography to evaluate or exclude hydronephrosis. Minimum follow up period was 1 month and maximum 3 months for these particular patients. The stents were removed endoscopically under topical or spinal anesthesia.

#### **Variables Studied and Statistical Analysis**

Data analysis was carried out using the SPSS software Vr. 22 (IBM, Armonk, NY). Quantitative data were presented as median or mean±standard deviation while qualitative data were presented as

numbers and percentages. For descriptive purpose, pie chart or histogram was used to represent the data. When comparing two groups, test of significance will be done by using Independent sample t-test or Mann-whitney U test for continuous variables, and Chi-square test or Fisher's exact test for categorical variables. Correlations between duration of double-J stent insertion and complications were carried out using spearman rank correlation test. A probability value (p-value) of < 0.05 was considered significant.

#### **3. Results**

Out of these 276 patients, 67% were male and 33% female. Age range was from 3 months to 81 years with mean age of 42.62±16.51years.

The data analysis was performed on 296 cases of double-J ureteral stenting (unilateral in 256 patients and bilateral in 20 patients). In studied patients, the double-J ureteral stents were placed endoscopically in 270 (91.2%) cases and during open surgical procedures in 26 cases (8.8%).

Table 1 shows the indications of endoscopic double-J ureteral stent placement in the studied 270 cases. Most of the endoscopic double-J ureteral stents were fixed after URS for ureteral stones (128 cases) (128/270; 47.4%), pre-SWL for renal or ureteral stones (54/270 cases; 20.0%), after endoscopic management of uretral stricture diseases (43/270 cases; 15.9%) and post-PCNL (31/270 cases; 11.5%).

Table 2 shows the main indication of double-J ureteral stent placement during open surgical procedures in 26 cases. The most common indication was pyeloplasty surgery (12/26 cases; 46.1%).

The most common complications were lower urinary tract symptoms in the form of irritative voiding symptoms (93/276; 33.7%) and gross haematuria (22/276; 8.0%). Two patients (1/276; 0.4%) had reported UTI, proved by urine culture. Only one case (1/296; 0.3%) complicated with upward stent migration and other case (1/296; 0.3%) had severe incrustation with stone formation.

All patients with stent encrustation had a history of urinary stone disease. A week significant correlation was observed between duration of stent insertion and encrustation formation ( $r: .126$ ; P-value: 0.031).

In most of cases (292/296; %) the double-J ureteral stents were removed smoothly, by cystoscope and cold-cup biopsy forceps, without complications. In 3 cases, the ureteroscope was used either for extraction of residual ureteral stone fragments in 2 cases or for removal of migrated double-J stent in one case. In one case, cystoscopic lithotripsy was needed for fragmentation of heavy incrustation on the lower end of the stent.

#### 4. Discussion:

The double-J ureteral stents have become one of the most basic and valuable tools in the urological practice. Indwelling ureteral stents provide direct drainage of the upper urinary tract to the bladder without the need for external diversion. The indication for placement of ureteral stents has expanded significantly during the last decade. Stents are inserted routinely in patients with ureteral obstruction and for the prevention of complications following open or endoscopic procedures. However, their use is not free of complications and problems.**14.**

Indications	Number	%
Pre-SWL of renal or ureteral stones	54	20.0
Post-URS for ureteral stone	128	47.4
Post-endoscopic management of ureteral stricture	43	15.9
Post-PCNL	31	11.5
Pre-gynecologic/obstetric surgeries	8	3.0
Hydro-ureteronephrosis (unexplained etiology)	5	1.8
Pregnancy-related hydro-ureteronephrosis	1	0.4
<b>Total</b>	<b>270</b>	<b>100</b>

	Number	%
Pyeloplasty	12	46.1
Ureterolithotomy	4	15.4
Pyelo/nephrolithotomy	4	15.4
Uretero-vesical implantation	4	15.4
End-to-end ureteroplasty	2	7.7
<b>Total</b>	<b>26</b>	<b>100</b>

In this study, we aimed to identify the indications of double-J ureteral stent fixation and stent-related morbidities at our University Hospitals. The medical records of 276 patients who underwent double-J ureteral stent placement, over a one year period, were reviewed. We found that, the commonest indication for stenting was the adverse events of ureteroscopy/lithotripsy followed by ureteral stenting prior to SWL for either ureteral or renal stones, and double-J stent placement post- endoscopic treatment of ureteral stricture diseases. Irritative voiding symptoms, including dysuria, frequency and urgency, flank pain and hematuria were the most frequent bothersome complications.

In our study sample, the most common indications of double-J ureteral stent placement after URS lithotripsy were the iatrogenic ureteral mucosal laceration during URS (26.6%), followed by the presence of residual stone fragment(s) (25%), either due to in-situ fragmentation, failure of stone extraction or stone migration.

With the introduction of endoscopic ureteric techniques, iatrogenic ureteric injuries during URS lithotripsy are relatively uncommon. However, ureteric injuries are important complication of URS lithotripsy especially occurred in university teaching hospital settings as the surgeons involved have varying degrees of experience.

Anatomical, functional and pathologic changes associated with stents are considered to be cause of increase complications in stented patients. Interference with peristalsis, vesicoureteral reflux, submucosal edema, fibrosis and thickening of ureteral wall, smooth muscle hypertrophy, and mild hydroureteronephrosis, are associated with stent use. These changes not only lead to complications but also delay stone clearance rate.**13.**

In this study, the reported minor complications were irritative LUTS (69.3%), flank pain (23.2%), gross hematuria (8.0%), UTI (0.7%), mild encrustation (1.0%) and upward stent migration (0.3%). The only reported major complications were severe encrustation with stone formation (0.3%). No stent slippage or stent fragmentation was reported in our study sample. In fact, because of the study nature, there were some sort of overlap of complications that resulted from the original pathology and that resulted from the double-J itself.

In comparison to our results, Damiano et al. (2002) reported a frequency of 25% for flank pain, 18.8% for irritative LUTS, 15.2% for bacteriuria, 12.3% for febrile UTI, 9.5% for stent migration and 18.1% for hematuria. Monga et al. (1995) reported 35% of his series had flank pain on the stented side while 6% had irritative LUTS, 32% had culture positive UTI and 10% had febrile UTI. Bierkens et al. (1991) reported a 24% incidence of stent migration in patients whose stent was placed before SWL. Other study reported a frequency of 3.7% for stent migration and 0.3% for stent fragmentation.**14.**

In our study, stent encrustation and stone formation was seen more in those patients where stent indwelling period was more than three months as was also observed by other authors. 2,4,6,19 An ideal, safe, minimal optimal duration for stenting has not been described. No matter what the stenting duration is, all stents will form a bio-film with some degree of bacterial adherence. If left for a sufficiently long time nearly all stent will encrust. However, the safe window period of stenting is probably 6-8 weeks.<sup>6</sup> In our study, stents remained in place for maximum of two months despite those with encrustation who had been lost to follow up. Hence stent monitoring is essential with regular monthly urine cultures, x-ray KUB and a lot of stress should be paid on the counselling of the patients regarding stents complications and their timely removal.

## 5. Conclusion

In our study, there is an abuse in JJ placement after endoscopic procedures especially ureteroscopy. Indication of JJ placement must be more precise and clarified to avoid abuse and complications.

## References

1. Singh I. Indwelling JJ ureteral stents-a current perspective and review of literature. *Indian J of Surg* 2003; 65: 405-12.
2. Nawaz H, Hussain M, Hashmi A, Hussain Z. Experience with indwelling JJ stents. *J Pak Med Assoc* 1993; 43: 147-9.
3. Paz A, Amiel GE, Pick N, Moskovitz B, Nativ O, Potasman I. Febrile complications following insertion of 100 double-J ureteral stents. *J Endourol* 2005; 19: 147-150.
4. Saltzman B. Ureteral stents: indications, variations and complications. *Urol Clin North Am* 1988; 15: 481-91.
5. Pollard SG, Macfarlane R. Symptoms arising from double J ureteral stents. *J Urol* 1988; 139:378.
6. Memon NA, Talpur AA, Memon JM. Indications and complications of indwelling ureteral stenting at NMCH, Nawabshah. *Pak J of Surg* 2007; 23:187-91.
7. Richter S, Ringel A, Shalev, Nissenkorm I. The indwelling ureteric stent: a 'friendly' procedure with unfriendly high morbidity. *Br J Urol Intl* 2009;85: 408-11.
8. Ivica S, Dragan S. Long-term indwelling double-J stents: bulky kidney and urinary bladder calculosis, spontaneous intraperitoneal perforation of the kidney and peritonitis as a result of "forgotten" double-J stent. *Vojnosanit Pregl* 2009; 66: 242-44.
9. Mack T. The double J: then and now. In: Yachia D, editor. *Stenting the urinary system*. Oxford: Isis Medical Media; 1998: p.101-6.
10. Marmar JL. The management of ureteral obstruction with silicon rubber splint catheters. *J Urol* 1970; 104: 386-89.
11. Happerlen TW, Mardis HK, Kammandel H. Self retained internal ureteral stents; A new approach. *J Urol* 1978; 119: 731-4.
12. Gibbons RP, Mason JT, Correa RJ. Experience with indwelling silicone rubber ureteral catheters. *J Urol* 1974; 111: 594-9.
13. Finny RP. Experience with new double J ureteral catheter stent. *J Urol* 1978; 120: 678-81.
14. Mudassar Saeed Pansota, Mumtaz Rasool, Muhammad Shahzad Saleem, Shafqat Ali Tabassum, Akbar Hussain. Indications and complications of double J Ureteral stenting: our experience. *Gomal Journal of Medical Sciences* January-June 2013, Vol. 11, No. 1: 8-12.

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