

# Double J Stenting - Clinical Profile, Indications and Post Operative Complications

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## Abstract

**Introduction:** Ureteric 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 indications for insertion of stents into the urinary tract has expanded significantly during the last decade. However, their use is not free of complications and problems. The present study was designed to observe the clinical profile of patients presenting with obstructive uropathy at a tertiary care centre requiring DJ stents and to study the complications of indwelling DJ stents. **Material and Methods:** Data collection by meticulous history taking and clinical examination, appropriate laboratory and radiological investigations, operative findings, and follow-up of cases. **Results:** Study was conducted with 50 patients. nodule was 23%. Mean age of the subjects was 44.32 year. Overall male predominance was seen in present study with 70% males. Obstructive uropathy forms the major indication for DJ stenting followed by upper urinary tract infections (10%). Associated Complications were noticed in 46% of cases. Most common associated complication of DJ stenting was dysuria (24%) and increased frequency (22%). Urinary tract infection, haematuria, and stent migration was seen in 12%, 8% and 4% cases. **Conclusion:** Double stenting is an easy and effective procedure for the management of obstructive uropathy. However, we recommend that their use must be strictly restricted to selected cases and routine use should be avoided, as they are not free of complications. Moreover, close follow up of stented patients is essential for early detection of complications and a lot of stress should be paid on the counselling of the patients regarding stents complications and their timely removal in order to avoid stent encrustation/migration which could otherwise be highly fatal for the patient.

**Keywords:** Double J, JJ/DJ Stent, Obstructive Uropathy, Ureteric Stents

## 1. Introduction

Ureteric stents have become one of the most basic and valuable tools in the urological practice<sup>1</sup>. Indwelling ureteral stents provide direct drainage of the upper urinary tract to the bladder without the need for external diversion<sup>2</sup>. 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<sup>3</sup>. However, their use is not free of complications and problems. Initially, very few side effects were reported<sup>4</sup>. But

later on many publications demonstrated that indwelling ureteral stents can cause lower abdominal pain, dysuria, fever and haematuria<sup>3,5</sup>. Furthermore, indwelling stents can migrate, break or even be forgotten in the patient<sup>6,7</sup>.

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

In 1974, the first commercial internal ureteral stent was made and described by Gibbons<sup>12</sup>. The important problem of stent migration was solved in 1978 when double-J (DJ) stents were described by Finny<sup>13</sup>. 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<sup>4</sup>. JJ stents are usually made from silicon or polyurethane. Ideal stent characteristics are easy insertion, completely internal placement, resistance to migration, easy removing, radio-opacity, biological insertion, and chemical stability, resistance to encrustations, non-refluxing, excellent flow characteristics and reasonable price<sup>1,4</sup>.

The present study was designed to observe the clinical profile of patients presenting with obstructive uropathy at a tertiary care center requiring DJ stents and to study the complications of indwelling DJ stents.

## 2. Aim and Objectives

- 1) To study the clinical profile of patients presenting with obstructive uropathy.
- 2) To study the indication and complications of indwelling DJ stents

## 3. Material and Methodology

### 3.1 Study Area

Department of General Surgery at Dr. Vasantrao Pawar Medical College, Hospital and Research Centre, Nashik, Maharashtra, India.

### 3.2 Study Population

All the patients undergoing double J stenting for various indications at our hospital.

### 3.3 Study Design

A Prospective, observational, Clinical study

### 3.4 Study Duration

August 2016 to December 2018

### 3.5 Inclusion Criteria

All patients who were presented with urological conditions requiring Double-J Stenting:

- Ureteric Calculi
- Post PCNL
- Carcinomas
- Stricture Urethra

### 3.6 Exclusion Criteria

1. Patients in whom Double-J Stent could not be inserted due to tight stricture or impacted ureteric calculus.
2. Patients in whom DJ Stenting is contraindicated.

### 3.7 Methodology

Records of patients who underwent stenting from 2016 August to 2018 December was collected and included in the study after the patients have been informed about the nature and objective of the study. Written and informed consent was obtained from them prior to recruiting them into the study. Patients would be recruited by personal interview and detailed history was taken.

The stent was inserted in a retrograde manner by using a cystoscope; under spinal or local anesthesia. The stent was left in place for a varying period based on the indication for stenting. We used a polyurethane stent at our institute. All patients were followed up initially after a period of one week. The second follow up and third follow up (if required) was based on the symptoms (if any) at the previous follow up. The date of the second and third follow up as well as date of removal of the stent varied based on the symptoms at the previous follow up. Removal of the stent was done under local anesthesia with mild sedation in most cases while some may require spinal or general anesthesia. A plain abdominal X-Ray KUB and Abdominal and Pelvic Sonographic examination was performed during the follow up to check for any infection and location of the stent. During follow up, the patients were asked questions pertaining to complications of stenting.

### 3.8 Statistical Analysis

The quantitative data was represented as their mean  $\pm$  SD. Categorical and nominal data was expressed in percentage. All analysis was carried out by using SPSS software version 21.

## 4. Results

**Table 1.** Distribution of cases as per Age group

Age group (years)	N	%
< 20*	1	2.0%
21-30	3	6.0%
31-40	11	22.0%
41-50	17	34.0%
51-60	13	26.0%
> 60	5	10.0%
<b>Total</b>	<b>50</b>	<b>100.0%</b>
<b>Mean age - 44.32 +/- 9.16 years</b>		
* 1 year old child		

Mean age of the subjects was 44.32 year with 70% cases were above 40 years of age group (Table 1).

**Table 2.** Distribution of cases as per Gender

Gender	N	%
<b>Males</b>	<b>35</b>	<b>70.0%</b>
<b>Females</b>	<b>15</b>	<b>30.0%</b>
<b>Total</b>	<b>50</b>	<b>100.0%</b>

Overall male predominance was seen in present study with 70% males and 30% females (Table 2).

**Table 3.** Distribution of cases as per Indications of Stenting

Indications	N	%
<b>Obstructive Uropathy</b>	<b>41</b>	<b>82.0%</b>
<b>Infection</b>	<b>5</b>	<b>10.0%</b>
<b>Congenital</b>	<b>1</b>	<b>2.0%</b>
<b>Others</b>	<b>3</b>	<b>6.0%</b>
<b>Total</b>	<b>50</b>	<b>100.0%</b>

Obstructive uropathy i.e. either renal or ureteric calculus forms the major indication for DJ stenting followed by upper urinary tract infections (10%) (Table 3).

**Table 4.** Distribution of cases as per specific indications

Specific Indications	N	%
<b>Renal calculus</b>	<b>28</b>	<b>56.0%</b>
<b>Ureteric Calculus</b>	<b>13</b>	<b>26.0%</b>
<b>Pyonephrosis</b>	<b>3</b>	<b>6.0%</b>
<b>Emphysematous Pyelonephritis</b>	<b>2</b>	<b>4.0%</b>
<b>Anderson Hynes Pyeloplasty</b>	<b>1</b>	<b>2.0%</b>
<b>Post Radical Hysterectomy + B/ISalpingo-oophorectomy</b>	<b>1</b>	<b>2.0%</b>
<b>Ruptured bladder post-hysterectomy</b>	<b>1</b>	<b>2.0%</b>
<b>Nephrocutaneous fistula due to UV reflux</b>	<b>1</b>	<b>2.0%</b>
<b>Total</b>	<b>50</b>	<b>100.0%</b>

Most common indication for DJ stenting was renal (56%) and ureteric calculus (26%). Other indications include: Pyonephrosis (6%), Emphysematous Pyelonephritis (4%), Anderson Hynes Pyeloplasty (2%), post-pelvic surgery (4%) and Nephrocutaneous fistula (2%) (Table 4).

**Table 5.** Distribution of cases as per specific complications

Complications	N	%
<b>Increased frequency</b>	<b>11</b>	<b>22.0%</b>
<b>Dysuria</b>	<b>12</b>	<b>24.0%</b>
<b>Haematuria</b>	<b>4</b>	<b>8.0%</b>
<b>UTI</b>	<b>6</b>	<b>12.0%</b>
<b>Stent Migration</b>	<b>2</b>	<b>4.0%</b>

Associated complications were noted in 46% cases.

Most common associated complication of DJ stenting was dysuria (24%) and increased frequency (22%). Urinary tract infection, haematuria, and stent migration was seen in 12%, 8% and 4% cases (Table 5).

## 5. Discussion

Ureteral stent placement is an important adjunct to many urologic procedures such as extracorporeal shock wave lithotripsy and ureteroscopy<sup>14</sup>. Ureteral stents may also be useful for managing conditions such as hydronephrosis due to stone disease, pregnancy and due to a malignant neoplasm<sup>15</sup>. The indications for stent insertion have

increased during the last few years and currently ureteric stents are inserted as an almost routine procedure in patients with ureteric obstruction. Thus, the complications of stents are also more frequent than before<sup>6</sup>.

The aim of the present study was to thus evaluate the clinical profile of patients presenting with obstructive uropathy and to study the complications of indwelling DJ stents. A total of 50 patients who were presented with urological conditions requiring Double-J Stenting were included in the study and were followed up to note the associated complications.

## 5.1 Demography

Mean age of the subjects was 44.32 year with 70% cases were above 40 years of age group. Overall male predominance was seen in present study with 70% males and 30% females.

Marhoom *et al.*<sup>16</sup> studied 220 patients requiring JJ stenting. Out of total 220 patients, 133 were males and 87 were females with mean age 39.5 years.

Shah *et al.*<sup>17</sup> in their study observed that out of total of 146 patients requiring ureteral stenting, 66.43% (n=97) were males and 33.56% (n=49) were females. The age ranged from 7–97 years, with the mean age of 46.31 years.

Chahal *et al.*<sup>18</sup> studied 90 patients with various indications for DJ stenting. Out of total 90 patients 59 were male and 31 were female, mean age of patients was 42.64 years.

Ray *et al.*<sup>19</sup> in their study observed that, out of 19 patients studied, 12(63.16%) were male and 7 (36.84%) were female. The mean age was  $39.78 \pm 13.69$  years.

The age at presentation in the study by Pensota *et al.*<sup>20</sup> varied from 20 years to 80 years with mean age of  $43 \pm 9.65$  years. Most of the patients 40.0% were presented between 36–50 years of age with 72.0% male and 28.0% were female.

Our findings are also in concordance with studies by studies of Ali *et al.*<sup>21</sup>, Memon *et al.*<sup>6</sup> and Ghaffar *et al.*<sup>22</sup> who had also found higher incidence in males.

## 5.2 Indications for Ureteric Stenting

Obstructive uropathy with either renal (56%) or ureteric calculus (26%) forms the major indication for DJ stenting.

In the study by Pensota *et al.*<sup>20</sup>, the commonest indication for stenting was obstructive uropathy (80%) followed by prophylactic stenting (20%). Chahal *et al.*<sup>18</sup>, Memon *et al.*<sup>6</sup> and Richter *et al.*<sup>7</sup> also described

obstructive uropathy as the commonest indication in their studies. The most common cause of obstructive uropathy observed in these studies was stone disease either renal or ureteric stones.

Other indications observed in present study includes: Upper urinary tract infections (10%) (i.e., Pyonephrosis (6%) and Emphysematous Pyelonephritis (4%) to drain the infected urine), Anderson Hynes Pyeloplasty (2%), postpelvic surgery as a prophylactic measure (4%) and Nephro-cutaneous fistula in a case of uretero-vesical reflux to drain the hydronephrotic proximal collecting system (2%).

Similar findings were also described in other previous studies<sup>6,7,20,22</sup>. Other indications for stenting (apart from obstructive uropathy (79.2%)), observed by Memon *et al.*<sup>6</sup> was: urinary tract leakage (7.5%), urinary tract surgery (6.7%) and other endoscopy procedure (6.7%). Pensota *et al.*<sup>20</sup> observed 20% stenting cases to be related to urological surgeries. Chahal *et al.*<sup>18</sup> observed other indications as hydronephrosis (27.8%), bifid ureter (2.2%) and ureteric stricture (1.1%) respectively.

## 5.3 Complications

Double J stenting was successfully done in all the cases in present study. The occurrence of ureteric perforation was considered as unsuccessful cases.

Successful stenting was observed in 99.0% of patients in the study by Pensota *et al.*<sup>20</sup> while Memon *et al.*<sup>6</sup> had come across this rate as 94.2%.

Complications associated with the use of ureteral stents are basically mechanical in nature and are related to stent material. Associated complications were observed in 46% cases in present study. Most common complications encountered were dysuria (24%) and increased frequency (22%) while urinary tract infection and haematuria was seen in 12% and 8% cases.

Chahal *et al.*<sup>18</sup> in a similar study observed complication rate as 75.5%, which is higher than in present study. Frequency and dysuria were the most common complications observed, occurring in 36.6% and 35.5% of patients respectively.

Ali *et al.*<sup>21</sup> in their study observed that most common complications in cases with JJ stents 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.

Arshad *et al.*<sup>23</sup> in their study observed increase frequency as the most common associated complication

found in 27.27% of the cases. The symptoms of dysuria and frequency was managed by anticholinergics in all the patients and removal of DJ stent was not required in any of them.

The most serious complication associated with ureteral stenting is stent encrustation and stent migration. In present study, stent migration was noted in 4% cases while no cases of encrustation was reported.

Chahal *et al.*<sup>18</sup> in a similar study observed 7 cases (7.8%) complicated with upward stent migration and 3 cases (3.3%) of severe encrustation.

Nawaz *et al.*<sup>24</sup> reported stent encrustation and stent migration in 10.5% and 3.5% cases respectively.

Memon *et al.*<sup>6</sup> and Arshad *et al.*<sup>23</sup> observed stent encrustation in 17.5%, 2.0% and stent migration in 11.7% and 16.3% respectively.

Pensota *et al.*<sup>20</sup> observed stent encrustation in 5.0% and stent migration in 2.0% cases. Lower rates of stent encrustation and migration in present study as compared to few of the previously described studies can be attributed to lesser stent indwelling period in our patients.

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 stents will encrust. However, the safe window period of stenting is probably 6–8 weeks<sup>6</sup>. Hence use of stents must be strictly restricted to selected cases and routine use should be avoided. Also, 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.

## 6. Summary and Conclusion

A hospital based Prospective, observational, Clinical study was conducted at Department of General Surgery in a Tertiary Care Hospital. The aim of the study was to evaluate the clinical profile of patients presenting with obstructive uropathy and to study the complications of indwelling DJ stents. A total of 50 patients who were presented with urological conditions requiring Double-J Stenting were included in the study. All patients were followed up initially after a period of one week. The second follow up and third follow up (if required) was

based on the symptoms (if any) at the previous follow up. Following observations were made:

Mean age of the subjects was 44.32 year with 70% cases were above 40 years of age group. Overall male predominance was seen in present study with 70% males and 30% females. Most common indication for DJ stenting was renal (56%) and ureteric calculus (26%). Other indications include: Pyonephrosis (6%), Emphysematous Pyelonephritis (4%), Anderson Hynes Pyeloplasty (2%), post-pelvic surgery (4%) and Nephrocutaneous fistula (2%). Associated complications were noted in 46% cases. Most common associated complication of DJ stenting was dysuria (24%) and increased frequency (22%). urinary tract infection, haematuria, and stent migration was seen in 12%, 8% and 4% cases.

Double stenting is an easy and effective procedure for the management of obstructive uropathy. However, we recommend that their use must be strictly restricted to selected cases and routine use should be avoided, as they are not free of complications. Moreover, close follow up of stented patients is essential for early detection of complications and a lot of stress should be paid on the counselling of the patients regarding stents complications and their timely removal in order to avoid stent encrustation/ migration which could otherwise be highly fatal for the patient.

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