

# INDICATIONS AND COMPLICATIONS OF DOUBLE J URETERAL STENTING: OUR EXPERIENCE

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## ABSTRACT

**Background:** The indications for insertion of stents into the urinary tract have expanded significantly during the last decade. However their use is not free of complications and problems. The present study was designed as part of our internal surgical audit to observe indications and complications of indwelling double J ureteral stenting.

**Material & Methods:** Total number of 100 patients of who underwent JJ stenting for obstructive uropathies and following open or endoscopic procedures were included. 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. Complications were noted in immediate post-operative period and on follow up. Minimum follow up period was 1 month and maximum 3 months.

**Results:** Majority of the patients 40.0% were between 36 to 50 years of age with male to female ratio was 2.6:1. In 80 patients, DJ Stenting was done due to upper obstructive uropathy while in 20 patients, DJ Stent was placed post-operatively. The most common cause of obstructive uropathy was stone disease. Complications like painful trigone irritation, septicemia, haematuria and stent encrustation was seen in 13.0%, 8.0%, 11.0% and 5.0% patients respectively. In our study, overall success rate was 83.0%.

**Conclusion:** Retrograde stenting is an easy and effective procedure for the management of obstructive uropathy and even can be performed under local anesthesia.

**KEY WORDS:** Ureteral stenting, Obstructive uropathy, Complications.

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## INTRODUCTION

The double J ureteral 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 dem-

onstrated 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 Yoaquin 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

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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 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.<sup>1,4</sup>

The present study was designed as part of our internal surgical audit to observe indications and complications of indwelling double J ureteral stenting at the Department of Urology & Renal Transplantation, Bahawal Victoria Hospital, Bahawalpur.

**MATERIALS AND METHODS**

This study was conducted at the Department of Urology & Renal Transplantation, Bahawal Victoria Hospital / Quaid-e-Azam Medical College, Bahawalpur from January 2010 to December 2011. Total number of 100 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 (sili-

cone stents), 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 1<sup>st</sup> 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 anesthesia in 98 cases and by open surgery in 2 cases.

**RESULTS**

Out of these 100 patients, 72% were male and 28% female with male to female ratio of 2.6:1. Age range was from 20 to 80 years with mean age of 43 ± 9.65 years. Age of the patients at presentation is shown in Figure 1. Majority of the patients 40.0% were between 36-50 years of age.

In 80 patients, DJ Stenting was done due to upper obstructive uropathy while in 20 patients, DJ Stent was placed post-operatively (Table 1). The most common cause of obstructive uropathy was stone disease i.e. renal, ureteric or both and 87.5% patients presented with it. While, 12.5% patients were presented with other causes of obstructive uropathy as shown in Table 1.

The post-operative complications are shown in Table 2. Fever and septicemia was occurred in 08 (8.0%) patients. It was managed conservatively

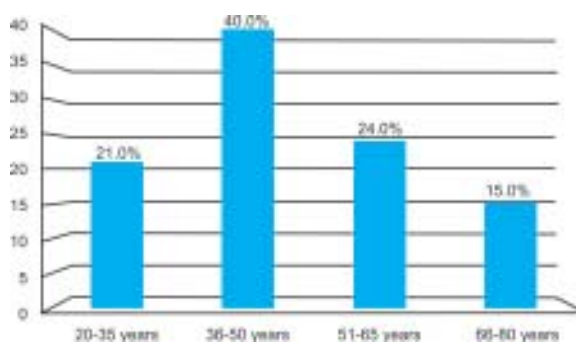


Fig 1: Percentage of patients according to age group (n=100)

**Table 1: Indications of DJ stenting (n=100).**

Indications	No. of patients	Percentage
<b>Obstructive Uropathy</b>	<b>20</b>	<b>80.0</b>
• Stone diseaseo		
Renalo	20	25.0
Ureterico	30	37.5
Renal + Ureteric	10	12.5
• PUJ Obstruction	04	5.0
• Carcinomas	10	12.5
• Pregnancy	06	7.5
<b>Open Surgery</b>	<b>13</b>	<b>13.0</b>
• Pyeloplasty	06	46.15
• Pyelolithotomy	03	23.07
• Ureterolithotomy	01	7.69
• VVF Repair	03	23.07
<b>Endoscopic Procedure</b>	<b>05</b>	<b>5.0</b>
• URS & ICL	05	100
<b>Miscellaneous</b>		
• Post-pyelolithotomy Urinary Fistula	<b>02</b>	<b>2.0</b>

**Table 2: Complications of DJ stenting.**

Complications	No. of patients	Percentage
Fever & Septicemia	08	8.0
Painful Trigone Irritation	13	13.0
Haematuria	11	11.0
Ureteral Perforation	01	1.0
Stent Migration	02	2.0
Stent Encrustation or Stone formation	05	5.0

by injectible antibiotics and anti-pyretics in 05 cases except 03 cases where stents had to be removed. Haematuria was seen in 11 (11.0%) patients who were settled within 24 hours by giving IV fluids while 03 patients required blood transfusion and haemostatic agents. Painful trigone irritation was common and distressing in 13 (13.0%) patients and was settled by anti-cholinergics in 10 patients while in 03 patients it resulted in early DJ Stent removal. Ureteral perforation occurred in only 01 patient in

which immediately DJS was removed. Distal stent migration was seen in 02 patients in whom endoscopic removal was done. Encrustation occurred in five patients who had been lost to follow up and all had been presented either with loin pain or haematuria after more than 3 months. Three cases were managed by ESWL breaking up the encrustation and later on removal of the stent while in 02 patients open surgery was done due to stone formation on the stent. Initially 40/100 (40.0%) patients developed complications and success rate was 60.0% but 23 patients with bleeding, septicemia and trigone irritation were managed conservatively so overall success rate was 83.0%.

## 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>7</sup>

In our study, the commonest indication for stenting was obstructive uropathy followed by prophylactic stenting. Memon NA et al<sup>6</sup> and Richter S et al<sup>7</sup> described obstructive uropathy as the commonest indication in their studies while Nawaz H et al<sup>2</sup> reported prophylactic stenting as the commonest indication followed by obstructive uropathy. The most common cause of obstructive uropathy observed in our study was stone disease either renal or ureteric stones as was also found by Memon NA et al<sup>6</sup> and Richter S et al.<sup>7</sup> Other causes of obstructive uropathy observed in our study were pelviureteric junction obstruction (PUJO), pregnancy and carcinoma of pelvic organs as was also described in many previous studies.<sup>6,7,16</sup>

The age at presentation in our study varied from 20 years to 80 years with mean age of 43 ± 9.65 years. Most of the patients 40.0% were presented between 36-50 years of age. Moreover, in our study 72.0% patients were male and 28.0% were female with ratio of 2.6:1 which is very much comparable to studies of Memon NA et al<sup>6</sup> and Ghaffar A et al<sup>16</sup> who had also found higher incidence of male than female patients.

Double J Stenting can be performed on an outpatient basis on selected patients. Patients who live alone, or who are at high risk of complications, such as those with infection, solitary functioning kid-

ney with renal failure, or uncorrected coagulopathy are best treated in an inpatient setting so they can be appropriately monitored.<sup>17</sup>

Double J stenting was successfully done in 99.0% of patients in our study while Memon NA et al<sup>6</sup> had come across this rate as 94.2%. Those patients, in which ureteric perforation occurred, were considered as unsuccessful cases and in these cases immediate removal of the DJ stent was done.

Complications associated with the use of ureteral stents are basically mechanical in nature and are related to stent material. The most common complication was painful trigone irritation which occurred in 13 (13.0%) patients undergoing DJ stent placement in our study. Shao Y et al<sup>18</sup> and Memon NA et al<sup>6</sup> have come across this rate as 10.0% and 9.0% respectively which is a little lower than our study while Arshad M et al<sup>19</sup> had found higher rate of bladder irritation i.e. 27.27% in his study. This painful trigone irritation was managed by anti-cholinergics in most of the patients while removal of DJ stent was done in those patients who did not respond to anti-cholinergics.

Incidence of post DJ stenting septicemia in our study was 8.0% while Elmalik K et al<sup>20</sup> reported its incidence 5.2% and Arshad M et al<sup>19</sup> 10.2% which is very much comparable to our study. But Richter S et al<sup>7</sup> reported it as 19.0% which is much higher as compared to our study. These patients with septicemia were managed conservatively in the ward by injectible antibiotics and anti-pyretics. Out of these 08 patients, DJS removal has to be done in 03 patients because in these patients fever & septicemia could not be settle after all conservative measures. Post procedural haematuria observed in different studies range from 2-21%<sup>2,4,6,7,15</sup> while in our study it was found in 11.0% patients which was settled by giving IV fluids in 08 patients within 24 hours while 03 patients required blood transfusion and hemostatic agents.

Nawaz H et al<sup>2</sup> reported stent encrustation and stent migration in 10.5% and 3.5% cases respectively. Memon NA et al<sup>6</sup> and Arshad M et al<sup>19</sup> observed stent encrustation in 17.5%, 2.0% and stent migration in 11.7% and 16.3% respectively. While in our study, stent encrustation was seen in 5.0% and stent migration in 2.0% cases which is much lower than previously described studies. 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.<sup>2,4,6,19</sup> 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> 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.

So, in our study initial success rate was 60.0% and overall success rate upto 83.0% which is very much comparable to many previous studies.<sup>2,4,7,20</sup> But Memon NA et al<sup>6</sup> and Damiano R et al<sup>21</sup> have shown a much higher complication rate of DJ stenting i.e. 79.9% and 70.0% respectively.

### CONCLUSION

Retrograde stenting is an easy and effective procedure for the management of obstructive uropathy and even can be performed under local anesthesia. 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 which could otherwise be highly fatal for the patient.

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