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# DOUBLE J INDWELLING URETERIC STENTS: INDICATIONS AND COMPLICATIONS

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## Abstract

Ureteric stents have been used since many years in urologic practice. Many complications encountered during its use. This study carried out in the Department of urology at Basrah General Hospital from 2003 to 2007. During this period 213 patients required D-J stents insertion were fallowed up. Complications encountered include loin pain in 21.6%, irritative symptoms in 30.5%, febrile UTI in 10.8%, bacteriuria in 27.7%, upward migration in 3.3%, slipping in 4.2%. We conclude that indwelling ureteric stents carried a significant risk of complications and accurate timing of removal or changing is mandatory.

## Introduction

Double-J ureteral stents are widely used to provide adequate drainage of the obstructed upper urinary tract or to promote healing of ureteral lesions by preventing urinary extravasation[1]. It is now a fundamental part of urological practice, since its introduction in 1978, many improvements have been made in stent composition and design but complications are often encountered and could result in significant morbidity[2]. Typically ureteral stents are placed to prevent or relieve ureteral obstruction due to an intrinsic or extrinsic etiology, including obstructing ureteral calculi, ureteral stricture, congenital anomalies such as ureteropelvic junction obstruction, retroperitoneal tumor or fibrosis, or that developing after open or endoscopic ureteral surgery. Stents are also commonly placed before open surgical or laparoscopic procedures to help identify the ureters and prevent inadvertent ureteral injury[3]. An increasing number of double-J stents, including pure polyurethane, softened polyurethane, polyurethane-derived polymers, silicone and hydrogel-coated stents, are available. Knowledge of the biocompatibility of these stents, including their effects on both the uroepithelium and the urine, should help to determine their safety, particularly for long-term use[1] With such widespread use complications have been noted, common side effects include pyelonephritis, dysuria, loin pain, hematuria, and urinary frequency and urgency. Bacteriuria is frequent, and patients often require courses of antibiotics. More serious complications are stent migration, occlusion, fragmentation, encrustation and stone formation[1]. These are well described and can lead to increased morbidity, renal impairment and repeated procedures for removal[4].

## Patients and Methods

The study includes (213) patients; (146) males; (67) females. The age range was from 3-65 year. These patients were admitted to the urologic ward at Basra General Hospital in the period from January 2003 to January

2007 with various indications for ureteric stenting.

The patients were informed about the double J stent, its function and possible complications.

All patients were established to have sterile urine before application of the stents and antibiotics prophylaxis were given immediately before the insertion of the stents and continue for five days after.

The stents used were polyurethane type from the products of (Rusch France) with the size range from Ch3-Ch7.

Follow up of the patient with monthly visit or according to the complaint of the patients. The total period of fallow up approximately 10 weeks/patient. Questioner, urine analysis, urine culture and sensitivity fluoroscopy and or plain radiography were performed to all patients every visit.

The stents were removed when it is complete its function or changed when it is farther needed. We divided our patients according to duration of placement of stent into 3 groups (1,2&3) and according to indication of placement into 2 groups (group A Stone forming group & group B non stone forming).

## Results

This prospective study includes 213 patients. They were 146 (68.5%) males and 67 (31.5%) females with ages range from 3y to 74 y (average 37 y).

At our institution, the initial indications for stent placement were nephroureteral lithiasis (group A) which include 161 cases (75.6%) and this further subdivided into preparation for ESWL in 42 cases (19.7%), after ureteroscopic manipulation in 33 (15.5%), and obstructing ureteral calculus in 86 (40.4%).While group B represents non lithiasis cases which include 52 patients(24.4%) in this group the stent was used for trauma in 6 (2.8%), extrinsic ureteral compression in 8 (3.8%), ureteric reimplantation in 15 (7%) and pyeloplasty (treatment of ureteropelvic junction obstruction in 23 (10.8%) Table I.

According to the duration of placement, we divided our patients into 3 groups: group 1 the duration was <3 months that include 133 (62.4%), group 2 the duration was >3 months and <6 months include 62 (29.1%) and >6 months duration in group 3 which include 18 (8.5%).

The complications were in a total of 213, 46 patients (21.6%) had loin pain while irritative urinary symptoms in the presence of sterile urine were found in 30.5% (65 patients) treated conservatively while DJ was removed in 7 patients who can't tolerate symptoms.

Fifty nine patients (27.7%) had culture positive urinary tract infections and 23 patients (10.8%) had febrile urinary tract infections which were treated by antibiotics according to culture and sensitivity. Upward stent migration was identified in 7 patients (3.3%) and treated by withdrawing of the stent by ureteroscopic forceps traction. Nine patients (4.2%) had stent slipped down to the bladder treated by reinsertion if indicated.

In our series of 50 patients (23.5%) had encrustation of the stents, 33 patients (10.7%) had minor encrustation and we faced no problem in its withdrawal by gentle traction under fluoroscopic monitor although 3 patients in non calculus group had stent duration (group 3) >6 months (average 8 months).

Seventeen patients (10.4%) had severe encrustation and stone formation, according to the duration 2 of them in group 1, 5 in group 2 and 10 in group 3, all of 17 patients were in calculus group. Of the 17 severely encrusted stents, 2 were fragmented.

The encrustation was localized to the upper end in 9 and both lower and upper end in 4 and the lower end in 2 while in 2 cases the stent encrustation had

extended throughout the length of the stent. The encrustations were dense and radio-opaque in all.

Ureteroscopy with forceps was done in 3 patients and intracoporeal lithotripsy in 7 patients, percutaneous nephroscopy in 2, ESWL in 8, cystoscopic lithotripsy in 6, open surgery in 2 and simple nephrectomy in one. Eight patients required more than 1 procedure to render them stent-free.

Complete clearance was achieved in 12, and 2 had clinically significant residual stones fragments (6 mm), 2 were lost to follow up, and 1 died of complications of severe renal azotemia and sepsis.

## Discussion

The indwelling ureteral stent is now a fundamental part of urological practice[2]. Ureteric stents have been used in urologic practice for over 25 years and in many cases have become almost routine[5]. Many complications are often encountered and could result in significant morbidity although many improvements have been made in stent composition and design[2].

In this study, we found that the complications of DJ catheter can be divided into minor and major .The minor complication were loin pain, irritative symptoms, UTI, upward migration and slipping while the major complications we faced were severe encrustation, stone formation and fragmentation that may cause a significant morbidity.

Damiano et al[6] reported 25% incidence of flank pain, irritative symptoms 18.8%, bacteriuria 15.2%, febrial UTI 12.3%, stent migration in 9.5% and hematuria in 18.1% while Monga et al[2] reported 35% of his series had flank pain on the stented side while 6% had irritative urinary symptoms, 32% had culture positive urinary tract infections and 10% had febrile urinary tract infections. These are comparable to our results. Bierkens et al reported a 24% incidence of stent migration in patients whose stent was placed before ESWL[7]. These are higher than our results[8] Other study reported 3.7% incidence of stent migration and 0.3% incidence of stent fragmentation[8].

In this study we detected 21.6% incidence of loin pain which was minor in severity and treated successfully by non-steriodal analgesia.

Irritative urinary symptoms in the presence of sterile urine were found in 30.5% (65 patients) treated by reassurance and 5mg oxybutanine three times daily while 7 patients can't tolerate the symptoms and the DJ stents were removed, this may be due to severe trigonal irritation.

We reported positive urine culture in 59 patients (27.7%), while 23 patients (10.8%) had febrile UTI which were treated by antibiotics according to culture and sensitivity, these results are comparable to the above studies.

Upward migration was detected in 3.3% (7 patients) and treated by withdrawing of the stent by ureteroscopic forceps traction. Excessive coiling of the upper end of the stent was the cause for this complication. Accurate length and optimum placement of stents should minimize migration[2].

The other complication is downward slipping that was recorded in 9 patients (4.2%) treated by reinsertion if indicated. This may be due to incorrect placement of upper end of the stent.

Hematuria was reported in several patients after DJ insertion but we were unable to decide its cause whether the stent itself or the original pathology or traumatic manipulation.

A severely encrusted ureteral stent is a difficult management problem for endourologists. Encrustation and the associated stone burden often involve the bladder, ureter and kidney, necessitating a multimodal endoscopic approach that may be performed at

single or multiple sessions[3]. Encrustation of ureteral stents is often associated with alkaline urine and urinary infection, with oxalate and calcium phosphate deposits predominating[2]. It has been well recognized that stent indwelling times are strongly related to the incidence of stent encrustation[3,4].

El-Faqih et al reviewed 299 polyurethane stents and reported encrustation incidences of 9.2% for catheters retrieved before 6 weeks, 47.5% for those retrieved after 6 to 12 weeks and 76.3% for those retrieved after 12 weeks[8] while we reported encrustation incidence of 12.8 % for stent removed before 3 months, 29% for stent retrieved before 6 months and 83.3% for stent detached after 6 months.

Encrustation may occur in the absence of underlying urolithiasis, suggesting a slow progressive phenomenon induced by urease, urinary tract infection, stasis, dehydration, and long indwelling times[6,4]. Andriole et al[9] reported a 10% incidence of stent obstruction secondary to encrustation in a series of 87 patients in whom the indication for stent placement was predominantly non-calculous disease and this is comparable to our results although non of them had sever encrustation[6].

Stents placed in patients with known urinary calculous disease may be at a higher risk for encrustation. All our patients with severe encrustation and stuck stent were found to have calculus disease, 2 patients had calcified stents within 12 weeks. Spirnak and Resnick reported a series of 5 patients with calculous disease in whom ureteral stents calcified as early as 3 weeks after insertion[2].

We found that both duration of placement and presence of underlying urolithiasis are risk factors in stent encrustation although the later is more valuable.

Encrustation may be due to multifactorial causes. The probable risk factors include poor compliance, long indwelling times, sepsis, pyelonephritis, chronic renal failure, recurrent or residual stones, lithogenic history, metabolic abnormalities, congenital renal anomalies, and patients on chemotherapy with hyperuricosuria. Repeated stenting should be avoided in those with significant risk factors[10].

Several measures are recommended to prevent complications associated with stent placement. Timely cystoscopic removal or exchange of the ureteral catheter should minimize stent calcification and fragmentation (manufacturers recommend changing every 6 months)[2].

The exact interval for changing or removing an indwelling ureteral stent to avoid significant encrustation is difficult to determine due to multiple and unclear etiologies of stent encrustation. The optimum interval is between 2-4 months. It should be sooner in patients with a history of urolithiasis and pregnancy[3,6,10].

Prophylactic antibiotics may decrease infection and stone encrustation[2,10]. Prevention of the forgotten stent complication could include patient education to remind them of the presence of an internal foreign body that could lead to problems if left indwelling for a prolonged interval[2].

It is of vital importance that a computerized warning and stent retrieval software system, similar to that advocated by McCahy and Ramsden[9] be installed in all urology clinics to alert the urologist when a stent must be removed[2,10].

**Table I : Indication of DJ stent placement**

| | Indication of placement | Number | % |
|---|---|---|---|
| Stone forming group 161 (75.6%) | preparation for ESWL | 42 | 19.7 |
| | after ureteroscope | 33 | 15.5 |
| | obstructing ureteral calculus | 86 | 40.4 |
| Non stone forming group 52 (24.4%) | Trauma | 6 | 2.8 |
| | extrinsic ureteral compression | 8 | 3.8 |
| | uretric reimplantation | 15 | 7 |
| | Peyloplasty | 23 | 10.8 |
| | Total | 213 | 100 |

**Table II: Complications of stent in relation to duration**

| complication | Group 1 133 pt (%) | Group 2 62 pt (%) | Group3 18 pt (%) | Total 213 pt (%) |
|---|---|---|---|---|
| Loin pain | 28 | 16 | 2 | 46(21.6 %) |
| Irritative symptoms | 22 | 25 | 18 | 65(30.5%) |
| Febrile UTI | 17 | 2 | 4 | 23 (10.8%) |
| +ve urin culture | 23 | 21 | 15 | 59 (27.7%) |
| Upward migration | 7 | -------- | ------- | 7 (3.3%) |
| Slipping | 7 | 2 | ------ | 9 (4.2%) |
| Fragmentation | ------ | --------- | 2 | 2 (0.9%) |
| Encrustation | 12 (9%) | 21 (33.9%) | 17 (94.4%) | 50 (23.5%) |
| Foreign body phobia | 3 | 6 | ------- | 9 (4.2%) |

**Table III: Duration of stent placement in relation to severe encrustation.**

| Group | < 3 months | 3-6 months | > 6 months | total |
|---|---|---|---|---|
| Stone forming Percentage of Encrustation | 101 14.9 % (15 stent) | 45 35.6 % (16 stent) | 15 86.7% (13 stent) | 166 27.3% (44 stent) |
| Non stone forming Percentage of Encrustation | 32 6.3 % (2 stent) | 17 11.8 % (2 stent) | 3 66.6 % (2 stent) | 52 11.5% (6 stent) |
| Total Percentage of Encrustation | 133 12.8 % (17 stent) | 62 29 % (18 stent) | 18 83.3 % (15 stent) | 213 23.5 % (50 stent) |

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