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Original Research Paper

Urology

NEGLECTED DOUBLE-J STENT AND ITS MANAGEMENT DURING COVID ERA IN A TERTIARY CARE CENTRE

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ABSTRACT

Introduction : Double-J stents (DJS) have been widely used in urological practice and offers a suitable mean of drainage for the upper urinary tract. Despite their frequent use, DJ stents are often retained or forgotten for different reasons and leads to serious complications such as migration, fragmentation, encrustation, stone formation, urosepsis, and renal failure. **Methods :** A retrospective observational study of cases with neglected DJ stents over a period of two years from April 2020 to March 2022 is carried out in Guntur General Hospital. All the patients presented to the urology outpatient clinic with polyurethane ureteral stents for more than six weeks, irrespective of the age, gender were included in the study. All patients were evaluated for stent complications by abdominopelvic ultrasound, plain X-ray KUB, non-contrast spiral CT abdomen and pelvis. **Results:** All cases were successfully managed endourologically (including simple cystoscopic removal, CLT, URS, PCNL) except one patient required open pyelolithotomy for Dj stent removal and open nephrectomy was done in other patient with nonfunctioning kidney at a later date. **Conclusion:** A Neglected DJ stent affects patients having low literacy level in particular and its increased incidence noted in recent times, due to loss of follow up particularly in initial days of covid-19. Endourological procedures are quite successful in managing a forgotten DJ stent, provided the treatment options are selected judiciously and meticulously.

KEYWORDS : Neglected DJ stent, CLT, URS, PCNL

INTRODUCTION -

Double-J stents (DJS) have been widely used in urological practice for several reasons. The double J stent offers a suitable mean of drainage for the upper urinary tract. They have been a vital instrument in the urological practice.

DJ stents are usually made from silicone or polyurethane. Forgotten ureteral stents, which generally occurs due to poor compliance of the patient, especially in regions of low socio-cultural development

The indications of double J stent placement comprise, the relief of ureteral obstruction secondary to various etiologies, providing satisfactory postoperative drainage, and prophylatically to avoid ureteral injuries during complex reconstructive surgical procedures, and in many gynaecological operations.

Despite their frequent use, 12% to 14% of DJ stents are retained or forgotten for different reasons. Very serious complications such as migration, fragmentation, encrustation, and stone formation still arise, especially when stents are retained in place for extended periods of time. Furthermore, a forgotten DJ stent is very often complicated event and needs meticulous management and has legal dilemma.

Some very serious complications like urosepsis, renal failure, fistula formation with iliac arteries and even morality have been described due to forgotten DJ stent. The amount of encrustation on a stent is related to the indwelling time in the body. [1]

As reported by El-Faqih et al., stent encrustation rate surges from 9.2% for stent in-situ for less than six weeks to 47.5% at 6 to 12 weeks to 76.3% at more than 12 weeks. [2]

Numerous urological procedures are many times essential to remove the severely encrusted DJ stent safely. The procedure depends on the clinical status and often includes extracorporeal shock wave lithotripsy (ESWL), cystolithotripsy, ureterorenoscopy (URS) and even percutaneous nephrolithotomy (PCNL). Removing a heavily encrusted retained DJ stent may require combined endourologic procedures or open surgery and may represent a challenge for urologists. [3]

The presentation of forgotten stent differs. Damiano et al. detected flank pain in 25.3% of patients, encrustations in 21.6%, irritative bladder symptoms in 18.8%, hematuria in 18.1%, UTI in 12.3%, and stent migration in 9.5% of the patients. [4] *Stent syndrome that consists of flank pain, suprapubic discomfort, irritative voiding symptoms and occasional hematuria is common among study populations.*

In the light of the COVID-19 pandemic, many patients were DJ stented and definitve management deferred for later period in ureteric calculus disease both at our institute and globally. Due to the contagious nature of the disease and several restrictions posed in the form of lockdown, it would be difficult for a patient to regularly follow-up post-placement of stent over the regular paper discharge or OPD card, which themselves might pose as a source of fomite infection.

OBJECTIVES -

To assess –

- *Complications of neglected DJ stents*
- *Risk factors for the occurrence of complications*
- *Management options and outcomes.*

- *Increased incidence in covid era*

METHODS -

This is a retrospective observational study of cases with neglected DJ stent over a period of two years from April 2020 to March 2022 in Guntur General Hospital.

The study details included are Age, gender, literacy, socioeconomic status, indication for stenting, duration of indwelling stent, presenting complaints, type of encrustations, treatments options provided, intraoperative complications, difficulty in follow up owning to covid 19 and their management.

All the patients presented to the urology outpatient clinic with polyurethane ureteral stents for more than six weeks, irrespective of the age, gender were included in the study.

The patients were evaluated preoperatively using a pre-designed sheet including a history of previous stone formation, indications for initial stent placement, duration of the stent in the urinary system, the presenting complaints, the use of urine acidifier along with the duration of the stent.

Preoperative baseline investigations as complete blood count, coagulation profile, kidney and liver function tests, urine analysis and culture were done.

Non-polyurethane ureteral stents and regular stent change patients were excluded from the study.

All patients were evaluated for stent complications by abdominopelvic ultrasound, plain X-ray KUB, non-contrast spiral CT abdomen and pelvis.

Plain X-ray and abdomino-pelvic ultrasound was performed to all patients early postoperatively to ensure that they became stone free.

After one month, all patients were interviewed to confirm the absence of symptoms and exclude new symptoms. Urine analysis and culture, serum creatinine and abdomino-pelvic ultrasound to exclude hydronephrosis and calculus were done after one month.

OBSERVATION AND RESULTS –

A total of 45 patients presented to our outpatient department with neglected DJ stent related complications during the study period. Males were 27 (60%) and females were 18 (40%).

The mean age was 37.2 years ranging from 5 years to 63 years. Majority (40%) of the patients were between 20-34 years of age

Table 1- Age Distribution

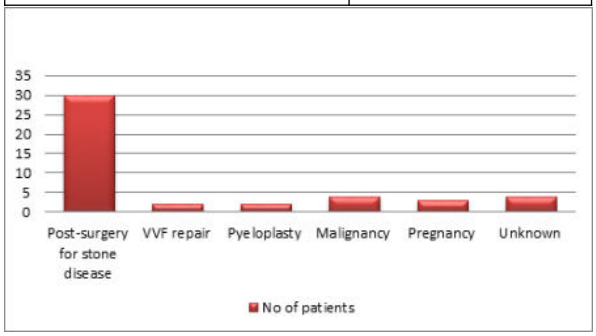
Age Group (years)	No. of patients
5-19	3
20-34	18 (40%)
35-49	15
50-63	9
Total	45

Indications for initial DJ stent placement -

The majority 30 (66.6%) of the stents were placed for stone disease after surgical intervention.

Table 2 - Indications For DJ Stent Placement

Indications	No. of patients
Post-surgery for stone disease	30 (66.6%)
VVF repair	2
Pyeloplasty	2
Malignancy	4
Pregnancy	3
Unknown	4
Total	45



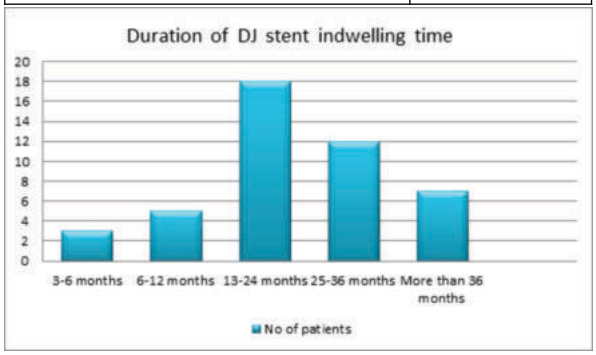
Bar chart 1 - *Indications for DJ stent placement*

Mean range of DJ stent indwelling time -

- *Mean indwelling time - 24.3 months*
- *Range (3 - 48 months)*

Table 3 - Duration Of DJ Stent Indwelling Time NG Time

Duration of DJ stent indwelling time	No of patients
3-6 months	3
6-12 months	5
13-24 months	18 (40%)
25-36 months	12
More than 36 months	7



Bar chart 2 - *Duration of DJ stent indwelling time*

Site of encrustation –

Of the 45 patients with significant encrustation of DJ stents, the most common sites of encrustation were bladder alone in 11 patients (24.4%) and kidney with bladder in 10 patients (22.2%)

Table 4 - Site Of Encrustation –

Site of encrustation	No. of Patients (%)
Bladder	11
Kidney	09
Kidney and ureter	02
Kidney and bladder	10
Ureter and bladder	07
Kidney , ureter and bladder	06
Total cases	45

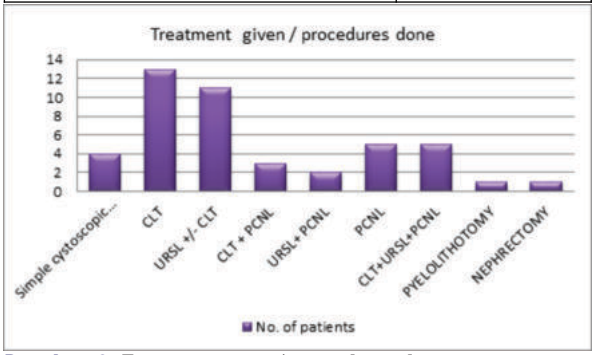
Treatment Given / Procedures Done -

Among 45 patients who had encrustation with retained DJ stent , all cases were successfully managed endourologically (including simple cystoscopic removal , CLT , URS , PCNL) except one patient required open pyelolithotomy for DJ stent removal and open nephrectomy was done in other patient with nonfunctioning kidney at a later date.

Table 5 - Treatment Given / Procedures Done

Treatment/procedure done	No. of patients (%)
Simple cystoscopic removal	4
CLT	13
URSL +/- CLT	11

CLT + PCNL	3
URSL+ PCNL	2
PCNL	5
CLT+URSL+PCNL	5
PYELOLITHOTOMY	1
NEPHRECTOMY	1

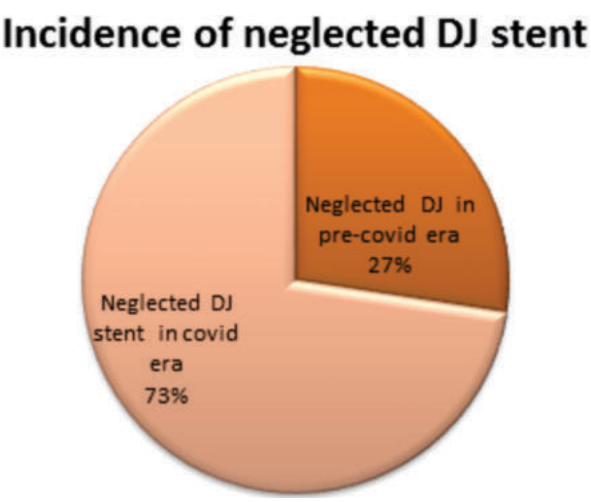


Bar chart 3 *- Treatment given / procedures done*

Neglected DJ stent incidence comparison between covid times and pre-covid times shows 2.6 times increase in its incidence even with maximum possible follow up -

Table 6 - Incidence Of Neglected DJ Stent

Neglected DJ pre-covid 2 years duration (between April 2018 to March 2020 as per institution records data)	17
Neglected DJ covid era 2 years duration (between April 2020 to March 2022) (study period)	45



Pie chart 1 *- Incidence of neglected DJ stent*

DISCUSSION –

Retained DJ stents are observed in urological practice due to poor compliance by the patients or when the patient is inadequately informed by the physician

There is not a precise definition for a retained stent. As per our definition, a DJ stent that cannot be removed at the planned time is a "retained or neglected stent ". However, for standardization purposes, stents that were kept for longer than six weeks were included in this study. In our study we found a significant association between DJ stent indwelling time and stent stone burden, as predicted

Pre-treatment radiological assessment of patients with retained stent is an important issue. As per, our experience, x-ray KUB and USG are inadequate in this regard, and non-contrast CT should be observed in these patients. In twelve patients in our study, X-ray KUB was observed for initial diagnosis and confirmed as almost no encrustation, but CT showed significant stone burden in these patients.

The cause of encrustation is multifactorial. Usual risk factors for stent encrustation are long indwelling time, urinary sepsis, history of stone disease, chronic renal failure, chemotherapy, pregnancy, and metabolic or congenital abnormalities.

Although endourology can provide essential solutions for the management of forgotten indwelling stents, the best treatment remains prevention. In order to avoid encrustation, it has been stated that a time period of between 2 and 4 months is considered ideal for double-J stent removal or replacement. [1] The risk of encrustation and fragmentation depends upon the type of material of the stent. It was found that silicone was least prone to encrustation, followed by polyurethane, silitek, percuflex and hydro gel coated polyurethane .[8]

Stone burden on the proximal end of the stent has been labelled as a main defining factor in the management of encrusted retained DJ stent and associated with multiple surgeries and surgical complications .[9] It should be considered that X-ray KUB may misjudge the proximal stone burden, especially in radiolucent stones. Therefore, surgical planning should be done along with NCCT KUB. The longer the indwelling time of the DJS in the body, the bigger the amount of encrustation in these patients. A PCNL or open surgery was not required in any of the patient with a DJS indwelling time less than 36 months. Open surgery was essential only in one patient with a 5-year duration of the stent indwelling

If encrustation is at the distal end of the stent, an effort can be made to remove it by endoscopic Cystolithotripsy. Larger encrustations may require PCCL (percutaneous cystolithotripsy).

When the stent cannot be removed by pulling gently with grasping forceps, a semi rigid URS is used to fragment encrustations by lithotripsy. If encrustation is present in the proximal part of the stent, a PCNL is done. Except for the nephrectomy case with nonfunctioning kidney and pyelolithotomy, all cases were successfully managed endoscopically, without any complications, and without any open surgery.

In cases of moderate encrustation of proximal segments, flexible URS/ RIRS along with Ho:YAG laser signifies a minimally- invasive alternative treatment if ESWL fails.

The treatment of our choice was PCNL for large stone burden on the upper segment.

An ideal, safe, minimal optimal duration for stenting has not been described. No matter what is the stenting duration, all stents will form a bio-film with some degree of bacterial adherence. If left for a long time nearly all stents will encrust. But it should be noted that the safe window period of stenting is probably 6-8 weeks. [11] Memon et al.[3,4] described and analyzed a unique computerized system that tracked ureteral stents and automatically sent an E-mail to clinical staff if a stent became late for removal.

Migration is an infrequent complication. It can occur either proximally towards the kidney or distally towards the bladder.[12] Silicone stents are more prone for migration as compared to polyurethane. Proximal migration occurs when the stent is too short for the ureter; hence stent of adequate length should be used.[13]

Spontaneous fracture of a forgotten double-J stent is infrequent but can occur, so stent exchange every 6 to 8 weeks is recommended by the manufacturer. The clinical presentation of a fragmented DJ stent may differ with septic, irritative, and hemorrhagic symptoms. [14]

Silicone stents may be more beneficial than polyurethane stents as there is lower risk of calcification and prolonged maintenance of tensile strength which can be up to 20 months. Fragmentation rate of polyurethane stents are four times as common as the silicone stents .[15]

Renal failure remains an important risk factor for morbidity and mortality especially in cases associated with prolonged indwelling times, poor compliance, and pyelonephritis with UTI.

To overcome the issues of forgotten stents, proper counseling of the patients and maintenance of stent registry has been suggested. Such a registry would help in preserving data relating to the lifespan and insertion of ureteric stents. Also, It could be used to send automatic e-mail/ mobile SMS reminders to the patients when the indwelling DJ stents have reached an ' end of life' as defined by the user. It could also help to track all the forgotten or lost stents electronically.

CONCLUSIONS –

Retrograde DJ stenting is an effective and easy modality for the management of obstructive uropathy and can even be performed under local anesthesia.

Short term DJ stenting doesn't pose much threat and complications are minimal. Complications of ureteric stents are various , some of them are urinary tract infection, stent migration, encrustation , breakage, stent blockage, hydronephrosis, hematuria and bladder erosion. Stent encrustation and stone formation are one of the serious complications of retained DJ stents. Noncompliance of some patients together with poor communication between patients and attending urologists constitute important contributing factors to the missing of ureteral stents.

A neglected DJ stent affects patients having low literacy level in particular and its increased incidence noted in recent times, due to loss of follow up particularly in initial days of covid-19. Endourological procedures are quite successful in managing a forgotten DJ stent, provided the treatment options are selected judiciously and meticulously.

Stent Tracker applications in smart phones and patient follow up with phone number play a major part in avoiding complications and decreasing medicolegal issues. (STENT TRACKER application)

If the indwelling time of DJ stent in the body is less than 6 months, simple cystoscopic removal is adequate for most of the patients. If the indwelling time of ureteral stent in body is 13-30 months, transurethral endourologic approaches usually suffice. Percutaneous or open surgeries may be needed only for patients with indwelling time of DJ stent longer than 30 months.

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