



STENT DEFAULTERS: A DATABASE ANALYSIS OF RISK FACTORS.

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ABSTRACT

Introduction: Double J (DJ) ureteric stenting is an integral part of most endo-urological procedures. These ureteral stents are temporary requiring removal or exchange ranging from 3 to 12 months depending on the material of the stent. The long-term effects of forgotten stents are more critical in terms of morbidity.

Patients and Methods: This study was conducted in the Department of Urology. Based on the records of patient's stented from September 2011 to September 2013. A total number of 500 patients who underwent DJ stenting after various Endo-Urological or Open urological procedures were included in this study. Patients who had defaulted more than 2 weeks from the scheduled stent removal date were considered as defaulters.

Results: Of the total 492 patients, 313 were males and 179 were females - of these 26.8% of males (84 patients) defaulted; 24% Females (43 patients) defaulted. The age range was from 8 months to 84 years with the mean age of 41.4 ± 13.85 years.

Conclusion: From the present study we infer that patients with multiple/ complex procedures, patients with procedure related complications and associated comorbidities default stent removal. Hence, identifying these high risk patients and rigorously following them up with postal/telephonic reminders may help us in reducing the adverse events associated with forgotten stents. A stent registry will be of great help.

KEYWORDS : Double J Stent, Complications, Defaulter, Encrustations, Calculus formation.

INTRODUCTION:

Double J (DJ) ureteric stenting is an integral part of most endo-urological procedures. It provides internal drainage of pelvicalyceal system and avoids an external diversion^[1]. The indications of DJ stenting have expanded significantly over the last decade. Despite its widespread use, there are associated complications which may be early and late. These ureteral stents are temporary requiring removal or exchange ranging from 3 to 12 months depending on the material of the stent^[2]. A lot of interest has been generated regarding the short-term complications of indwelling stents such as pain, hematuria, lower urinary tract symptoms, encrustation, urinary incontinence and bacterial colonization^[3,4]. However, the long-term effects of forgotten stents are even more critical in terms of morbidity. The long term complications include stone formation, stent migration, stent fragmentation and obstruction^[5,6]. A number of factors have been implicated for a stent being 'forgotten'. In this study, we attempt to understand the prevalence of defaulters of stent removal among the patients undergoing DJ stenting in a tertiary care Medical college and evaluate the factors associated with and complications due to retained stent.

PATIENTS AND METHODS:

This study was conducted in the Department of Urology. Based on the records of patient's stented from September 2011 to September 2013. A total number of 500 patients who underwent DJ stenting after various Endo-Urological or Open urological procedures were included in this study. Antegrade or Retrograde stenting was done depending on the type of procedure underwent. All patients had been explained about the need for stent removal and the complications of retained stent, and advised stent removal on a given date which was written on the discharge summary in bold letters. Patients who had defaulted more than 2 weeks from the scheduled stent removal date were considered as defaulters. Variables assessed for this study are,

- Age,
- Sex,
- Occupation,
- Educational status,

- Distance from hospital,
- Co-morbidities,
- Procedure underwent,
- Procedure related complications,
- Reason for default,
- Complications of retained stent
- Additional procedures required with stent removal.

All Patients who underwent DJ stenting over the period of September 2011-2013 were included in the study. Patients who lost follow up, dead or cannot be traced were excluded from the study. Of the 520 indwelling stents (in 500 patients), 135 patients (27%) did not follow up on the recommended date for stent removal. Among the 135 patients, 8 patients were excluded from the study (6 patients died due to other comorbidities, 2 patients lost for follow up). A database review of patients with retained stents was done and multiple variables were assessed. Data was analysed using SPSS 19.0 software. Chi square test, Univariate Binary Logistic Regression, Multivariate Binary Logistic Regression were used.

RESULTS:

Of the total 492 patients, 313 were male - of these 26.8% (84 patients) defaulted; 179 were female - of these 24% (43 patients) defaulted. The age range was from 8 months to 84 years with the mean age of 41.4 ± 13.85 years (Figure No. 1). Majority of the patients were from the age group of 15-45 years, and the ratio of defaulters to non-defaulters was more in extremes of ages suggesting bimodal distribution. Most of our patients were daily wage laborers (47%) and house wife (28.5%); About 25.3% of our patients were illiterates, 39.3% have finished their primary school, 24.3% have done high schooling and 11.1% are graduates, there was no statistical significant association between defaulters and non defaulters with education, but we found that long term stent defaulters are from poor socioeconomic status. Majority of patients (67.5%) in our study came from a distance of 30-60 kms, of the defaulters (127 patients) 7.1% were from a distance of 1-30kms, 68.5% were from a distance of 31-60kms, 19.7% come from 61-90kms distance, 1.6% come from 91-120kms distance

and 3.1% come from more than 120 kms distance, we observed that the proportion of defaulters and non-defaulters were almost equal in patients coming from far off place (>90kms), but this was not statistically significant. Approximately 19% of our study population presented with various co-morbidities (Table No: 1); we found that patients with co-morbidities default significantly more than patients without any co-morbidities (p value= 0.003). Most of our patients underwent endo-urological procedure followed by DJ stenting, only few patients underwent open urological procedure (Figure No. 2). From the primary procedure underwent we found that patients undergoing complex endo-urological procedures (PCNL+URL & Complicated DJ stenting) default more than patient undergoing simple procedures (p value 0.002). Approximately 16.5 % of our patients developed complications following endo or open urological procedure; these include bleeding, fever, hematuria, decreased urine output, persistent percutaneous nephrostomy site leak and sepsis. Statistical analysis revealed a significant association between the procedure related complications and stent defaulters (p value= 0.026). The defaulters were enquired about the reason for defaulting; 34.6% of defaulters forgot the need for removal, 29.1% were busy with work, 10.2% were from long distance, 25.3 % of defaulters were quoting other reasons, and one patient (0.8%) told that she was comfortable with the stent. Of the 127 defaulters, 51 patients (40.15%) developed stent related complications (Table No.2) such as Bio-film formation, encrustations and calculus formation (Figure No:3) ; in these 51 patients only 6 (4.7%) patients underwent additional procedure for stent removal, such as Percutaneous Nephrolithotomy, Cystolithotripsy, and Retrograde intrarenal surgery. Multivariate analysis of the variables (age, comorbidities, procedure underwent and complications) are tabulated in Table No. 3.

DISCUSSION:

Double J ureteral stents are in common use in urological practice since its introduction in 1978^[2,3]. Many modifications have been made in stent design, size and composition^[5]. Double J stents are safe, simple and a cost effective way of internal urinary drainage; it not only relieves the obstruction but also does not interfere with subsequent management. Various complications have been described leading to short term and long term morbidity in patients, however the long term complications are often under diagnosed and missed. Numerous risk factors such as long indwelling time, urinary sepsis, recurrent calculus, chemotherapy, pregnancy, chronic renal failure and metabolic or congenital abnormality lead to encrustations, obstruction and breakage of the stent^[4,6]. There are no universal guidelines regarding their use, handling and effect^[6]. The ideal radiological investigation would be Computerized Tomography and/or excretory urography^[9]. These retained stent with complications are managed mostly endoscopically or by extra corporeal shock wave lithotripsy; but a few cases need open exploration. Endoscopic management includes simple cystoscopic stent retrieval, cystolithotripsy, retrograde intrarenal surgery, and percutaneous nephrolithotomy^[6, 10]. The best ways to avoid these complications are to prevent retained stents; various methods have been deployed to prevent the long indwelling or retained stents i.e. stent card register^[7], computerized stent register with automated message and letter generator^[8] etc. In spite of these, many patients default stent removal. Hence, our study was focused on understanding why patients default leading to a forgotten stent.

Of the 127 patients who defaulted for stent removal, we found that patients undergoing multiple/ complex procedures and patients with procedure related complications significantly default stent removal when compared with patients undergoing simple uncomplicated procedures. From our

study we observed that patients from far off place and patients with poor socio-economic status tend to default more, but this was not statistically proven. Patients with co-morbidities have high propensity to default stent removal; this was clearly evident from this present study. Till date no such study has been proposed to evaluate the risk factors for stent defaulters, the present study gives us the broad picture of risk factors of stent defaulters, which helps us in identifying the possible defaulters and thereby avoiding the complications of retained stent in the future. This can be done by properly maintaining stent registry and updating it at frequent intervals.

CONCLUSION:

From our study we infer that patients with multiple/ complex procedures, patients with procedure related complications and associated comorbidities default for stent removal. Hence, identifying these high risk patients and rigorously following them up with postal/telephonic reminders may help us in reducing the adverse events associated with forgotten stents. Maintenance of Stent registry will go a long way in preventing this.

Limitations of our study:

Our study has some limitations. They are single center study and consisting of smaller numbers.

Conflict of Interest: None.

Fig 1: CT and Endoscopic Views of Encrusted Stents with calculus formation.

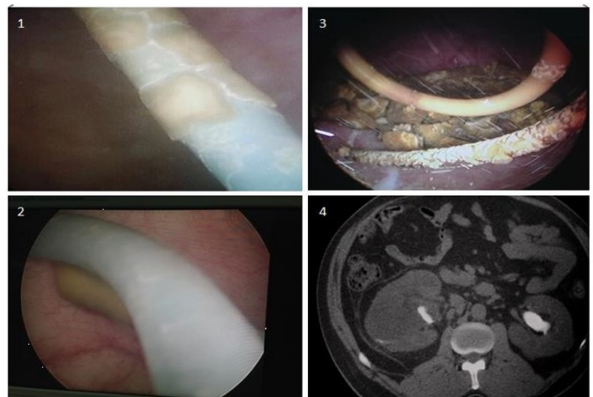


Figure 2: Age distribution in both groups

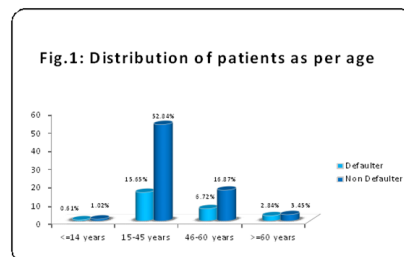


Figure 3: shows the patient distribution in both groups in relationship to the procedures

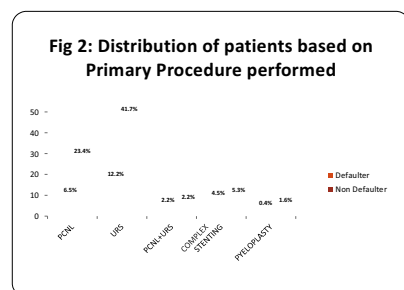


Table 1. Associated Co-morbidities.

Co-morbidities	Defaulters		Non defaulters	
	Count	Column %	Count	Column %
CKD	1	2.70%	2	3.28%
DM	33	89.19%	54	88.52%
HTN	3	8.11%	8	13.11%
Ca breast	2	5.41%	0	0.00%
Hypothyroidism	2	5.41%	0	0.00%
Obesity	0	0.00%	1	1.64%
TB	0	0.00%	2	3.28%

Table 2: Complications of retained stents.

Complications of Retained Stent	No of patients	Percentage
Encrustations	24	47.0%
Bio-film Formation	21	41.2%
Calculus Formation In Lower End	3	5.9%
Calculus In Upper End	2	3.9%
Calculus Formation In Both Ends Of DJ Stent	1	2.0%
Total	51	100.0%

Table 3: Multivariate analysis of Variables

Variables	Groups	Defaulter	Non defaulter	Unadjusted	Adjusted	P value
Age	< 14 years	3	5	REFERENCE	REFERENCE	.277
	15-45 years	77	260	.494 [.115-2.112]	.409 [.081-2.053]	.328
	46-60 years	33	83	.663 [.150-2.932]	.438 [.084-2.292]	.689
	>= 61years	14	17	1.373 [.278-6.775]	.694 [.116-4.147]	
Co-morbidities	Yes	37	61	2.049 [1.279-3.282]	1.532 [.888-2.645]	.125
	No	90	304	REFERENCE	REFERENCE	
Procedure underwent	PCNL	32	115	REFERENCE	REFERENCE	.752
	URS	60	205	1.052 [.647- 1.710]	1.084 [.658-1.784]	.008
	PCNL+URS	11	11	3.594 [1.428-9.045]	3.541 [1.385-9.056]	.019
	COMPLEX STENTING PYELOPLASTY	22	26	3.041 [1.526-6.061]	2.360 [1.151-4.840]	.771
Complications	YES	32	49	2.172 [1.316-3.585]	1.822 [1.075-3.089]	.026
	NO	95	316	REFERENCE	REFERENCE	

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