

EVALUATION OF SIGN AND SYMPTOMS RELATED TO INDWELLING URETERAL STENTS

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ABSTRACT

Objective: To study factors that influence signs and symptoms related to stented ureter. **Material & methods:** This was a prospective-cross sectional study, from March 2014 to August 2014, to know factors that influence signs and symptoms of patients with ureteral stent. All patients were inserted ureteral stent participated in this study. Exclusion criteria were patients with malignancy, patients who had history of DJ stent placement previously, patients with bilateral DJ stents and patients with urinary tract infection. All patients completed IPSS questionnaire before inserted stents. After 1 month, when removal DJ stents performed, all patients completed IPSS, USSQ and VAS. All data was analyzed with Chi-square/fisher exact test, Pearson/Spearman correlation and Mann Whitney. **Results:** Forty patients consisted of 23 man (57.5%) and 17 women (42.5%) completed this study. The mean age was 44.92 years old and length of stented ureter was 38.22 days. There was significance correlation between IPSS of DJ stent pre-insertion and post insertion ($p < 0.001$; $r = 0.628$). Of the patients reported dysuria (62.5%), frequency (55%), nocturia (52.5%), incomplete emptying (47.5%), hematuria (35%) and urgency (15%). On bivariate analysis, there was significance correlation between DJ stent position and frequency ($p < 0.001$), nocturia ($p < 0.001$), urgency ($p = 0.002$), incomplete emptying ($p = 0.049$), dysuria ($p = 0.030$), hematuria ($p = 0.026$) and pain ($p < 0.001$). **Conclusion:** Previous urinary symptoms and DJ stent position were factors that influenced sign and symptoms related to ureteral stent insertion.

Key words: Stent, ureter, sign and symptom.

ABSTRAK

Tujuan: Mempelajari faktor yang mempengaruhi tanda dan gejala yang berhubungan dengan stent ureter. **Bahan & cara:** Penelitian ini adalah penelitian prospektif cross sectional, dari bulan Maret sampai Agustus 2014, untuk mengetahui faktor yang mempengaruhi tanda dan gejala pasien dengan stent ureter. Semua pasien yang berpartisipasi dalam penelitian ini dipasang stent ureter. Kriteria eksklusi adalah pasien dengan keganasan, pasien yang sebelumnya memiliki riwayat pelepasan DJ stent, pasien dengan DJ stent bilateral dan pasien dengan infeksi saluran kemih. Semua pasien melengkapi pertanyaan IPSS sebelum dipasang stent. Setelah 1 bulan, saat pelepasan DJ stent dilakukan, semua pasien melengkapi IPSS, USSQ dan VAS. Semua data dianalisa dengan tes Chi-square/fisher, korelasi Pearson/Spearman dan Mann Whitney. **Hasil:** Sebanyak 40 pasien, terdiri dari 23 pasien (57.5%) dan 17 pasien (42.5%) berpartisipasi dalam penelitian ini. Rerata usia adalah 44.92 tahun dan lama stent ureter adalah 38.22 hari. Terdapat korelasi yang signifikan antara IPSS pre-insersi DJ stent dan post-insersi ($p < 0.001$; $r = 0.628$). Pasien yang dilaporkan dysuria (62.5%), frekuensi (55%), nokturia (52.5%), pengosongan yg tidak tuntas (47.5%), hematuria (35%) and urgency (15%). Pada analisa bivariate, terdapat korelasi yang signifikan antara posisi DJ stent dan frekuensi ($p < 0.001$), nokturia ($p < 0.001$), urgensi ($p = 0.002$), pengosongan yang tidak tuntas ($p = 0.049$), dysuria ($p = 0.030$), hematuria ($p = 0.026$) dan nyeri ($p < 0.001$). **Simpulan:** Gejala urinari sebelumnya dan posisi DJ stent adalah faktor yang mempengaruhi tanda dan gejala yang berhubungan dengan dengan insersi stent ureter.

Kata kunci: Stent, ureter, tanda dan gejala.

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INTRODUCTION

Temporary drainage upper urinary tract can be done with internal ureteral stent. Over the past 2 decades, ureter stenting is the method most often

used for upper urinary tract drainage. Since it was first introduced by Zimkind et al in 1967, double J stent (DJ stent) is widely used in urological surgery procedures. Ureteric stent is an effective and easy way to upper urinary tract drainage.^{1,2}

DJ catheter or stent is a tube that is placed in the lumen of the ureter either antegrade or retrograde with the aim to maintain the patency of the ureter. DJ stent has a very large role when needed drainage of urine. DJ stent mounting indications that should be done is in the case of obstructive pyelonephritis and renal colic pain that can not be tolerated patients. Whereas, indications of installation of DJ stent as an safety is the endoscopic procedure when encountered edema of the ureter, ureteral perforation, Steinstrasse, history of renal failure and single kidney or a kidney transplant. Relative indication of mounting a DJ stent is a stone with a size of more than 2 cm were performed extracorporeal shockwave lithotripsy procedure (ESWL), pregnancy, impacted stones, history of urinary tract infection or sepsis, passive dilatation of the ureter/ureteric estuary, endoscopic procedures are long (more than 45 min) and patients endoscopic surgical procedure is planned for the next (second look ureteroscopy).^{1,3,4}

Installation of DJ stent can provide the complaints of discomfort in patients. This discomfort varies from person to person and are idiosyncratic, but it can occur in 80% of patients. Some literature mentions the symptoms that occur in patients with DJ stent is urinary disorders that are irritating, such as a frequency (50-60%), urgency (57-60%), dysuria (40%), bladder emptying perfect (76%), pain flank region (19-32%), pain suprapubic region (30%), incontinence and hematuria (25%).¹ Morbidity another on mounting a DJ stent is fever and bacteriuria (31%), low back pain (15.5%), fragmentation (10%), migration (8%) and forgotten (4.5%).⁵

OBJECTIVE

To study factors that influence signs and symptoms related to stented ureter.

MATERIAL & METHOD

This study was a prospective cross-sectional study to determine the factors that influence voiding symptoms in patients who mounted a DJ stent performed in Sardjito General Hospital and Suhardi Hardjolukito Airforce Hospital Yogyakarta, in March to August 2014. Inclusion criteria for this study were willing to follow the study, Age 20 to 65 years, yet never plugged DJs previous stent and underwent surgery procedures of mounting DJ stent

either planned from the beginning and follow-up of certain operating procedures. While patients who refuse to participate in the study, patients were fitted DJ in cases of malignancy, previously had undergone stent installation procedure DJ stent, DJ bilateral stent and urinary tract infection were excluded

Patients undergoing urology procedures installation of DJ stent were included in this study. Previously recorded demographic data and clinical such as age, sex, height, weight, body mass index, IPSS, DJ stent length, stent DJs size, location and positioning DJ stent after stent fitted. After 1 month, the patient is scheduled to be released DJ stent. Recorded data IPSS, voiding USSQ components and VAS.

This research using Kolmogorov-smirnov test to assess the normality of data. To assess the relationship between the dependent variable with the independent variables used bivariate analysis using Pearson Chi-square method, or Fischer's Exact test if not eligible. Also used Spearman correlation analysis and Mann Whitney. The software used was SPSS Statistics 17 for Windows.

RESULTS

From the 40 patients included in this study, clinical and demographic data obtained in table 1. The mean age of patients in this study was 45.05 years with the youngest 20 years old and the oldest 64 years. There were 6 people (15%) were aged between 20-34 years, 18 people (45%) were aged 35-49 years and 16 (40%) were aged 50-64 years. Of the 40 patients who participated in this study there were 23 males (57.5%) and 17 females (42.5%). The average height in this study was 1.59 m and 63.50 kg body weight. Average installation time DJ stent was 38.22 days. DJ fastest stents removed within 14 days and a maximum of 114 days. Pain quality checks performed by the Visual Analogue Scale (VAS) with a mean VAS 1.62, minimum 0, median 1 and maximum 5.

There were 32 people (80%) give complaints such as urinary symptoms in the questionnaire USSQ. Distribution of urinary symptoms on the questionnaire USSQ can be seen in table 2. In component U1, there are 18 people (45%) did not experience symptoms of frequency, thirteen (32.5%) urinate every 3 hours, six people (15%) urinate every 2 hours, three people (7.5%) to urinate every hour and no one had to urinate more quickly than 1 hour. U2 components, there were 19 people

Table 1. Patient characteristics.

	Min	Max	Median	Average	Standard deviation
Age (year)	20	64	43.00	45.05	11.81
Height (meter)	1.48	1.70	1.60	1.59	0.06
Weight (kg)	46	86	63.50	64.17	10.08
Body mass index (kg/m ²)	19.15	35.11	24.66	25.09	3.44
Installation time of DJ stent (day)	14	112	34	38.22	16.73
VAS	0	5	1	1.62	1.33

Table 2. USSQ distribution to patient.

Parameters	Scores							Total
	1	2	3	4	5	6	7	
U1	18 (45%)	13 (32.5%)	6 (15%)	3 (7.5%)	0 (0%)			40 (100%)
U2	19 (47.5%)	12 (30%)	4 (10%)	5 (12.5%)	0 (0%)			40 (100%)
U3	30 (75%)	4 (10%)	2 (5%)	4 (10%)	0 (0%)			40 (100%)
U4	34 (85%)	6 (15.0%)	0 (0%)	0 (0%)	0 (0%)			40 (100%)
U5	40 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)			40 (100%)
U6	21 (52.5%)	12 (30%)	2 (5%)	4 (10%)	1 (2.5%)			40 (100%)
U7	15 (37.5%)	19 (47.5%)	4 (10%)	2 (5%)	0 (0%)			40 (100%)
U8	26 (65%)	13 (32.5%)	1 (2.5%)	0 (0%)	0 (0%)			40 (100%)
U9	26 (65%)	14 (35%)	0 (0%)	0 (0%)	0 (0%)			40 (100%)
U10	16 (40%)	16 (40%)	3 (7.5%)	2 (5%)	3 (7.5%)			40 (100%)
U11	8 (20%)	8 (20%)	12 (30%)	2 (5%)	6 (15%)	3 (7.5%)	1 (2.5%)	40 (100%)

Table 3. IPSS characteristics and QoL patient before and after installation of DJ stent.

	Min	Max	Median	Average	Standard deviation
IPSS before installation of DJ stent					
Obstructive	0	19	0	1.20	3.11
Irritative	0	10	1	1.97	2.06
Total	0	29	2	3.20	4.76
QoL	1	5	2	2.50	0.98
IPSS after installation of DJ stent					
Obstructive	0	19	0.5	1.42	3.11
Irritative	0	15	2	3.40	3.57
Total	0	33	2	4.80	6.02
QoL	1	6	2	2.75	1.29

(47.5%) did not complain of symptoms of nocturia, twelve (30%) awoke one time to urinate overnight, four people (10%) had nocturia 2 times, five people (12.5%) experienced nocturia 3 times and none had nocturia 4 times or more in patients who mounted a DJ stent.

In component U3, thirty people (75%) have no symptoms of urgency due to the installation of DJ

stent. While the remaining, four (10%) rarely experienced urgency, two (5%) experienced occasional urgency and 4 people (10%) were almost always experiencing urgency. In component U4, thirty-four people (85%) did not experience symptoms of urge incontinence and 6 people (15%) had urge incontinence with uncommon frequency. None of the patients were incontinent without

feeling the urge to urinate.

Patients who did not experience symptoms urination with incomplete emptying (U6) 21 people (52.5%), twelve people (30%) experienced urination incomplete emptying with rare frequency, two people (5%) experienced symptoms urination incomplete emptying with sometimes frequency, four people (10%) experienced symptoms urination incomplete emptying with almost always frequency and 1 (2.5%) always have experienced symptoms urination incomplet emptying due to the installation of DJ stent.

Fifteen patients (37.5%) did not experience symptoms of dysuria (U7) due to the installation of DJ stent, nineteen (47.5%) experience symptoms of dysuria were rarely, four (10%) sometimes experience dysuria and 2 people (5%) were almost always experienced dysuria.

U8 Component describing complaints of hematuria in patients who mounted a DJ stent. Fourteen (35%) had hematuria and all with mild blood-stained urine. Component U10 ask the patient whether voiding symptoms due to ureteric stenting effect on the patient. Sixteen (40%) stated that the urinary symptoms due to the installation of DJ stent had no effect in their life, sixteen (40%) had mild effect, three (7.5%) have moderate effect, two (5%) have quite influential and two (5%) were very influential.

The result to U11 component, which describes the quality of life when patients experience urinary symptoms due to ureteric stent. Eight people (20 and will be removed, the patient is given back IPSS questionnaire to be filled.

This study show increasing IPSS score

components irritating, obstructive, total and QoL between before installation DJ stent and after installation DJ stent. With Spearman correlation analysis, there was a significant correlation between the IPSS total prior to the installation of DJ stent and total IPSS after the installation of DJ stent ($p < 0.001$; $r = 0.628$), there was a significant correlation between the IPSS obstructive components prior to installation of DJ stent and components obstructive IPSS after the installation of DJ stent ($p < 0.001$; $r = 0.820$), there was a significant correlation between the IPSS irritative components prior to installation of DJ stent and IPSS irritative components after the installation of the DJ stent ($p < 0.001$; $r = 0.630$). There was no relationship between QoL before DJ

Table 4. VAS characteristics in patients who mounted a DJ stent.

Variable	VAS (mean)	p*
Position of DJ stent		< 0.001
Good	1.03	
Not good	3.18	
Size of DJ stent		0.700
4.7F	1.60	
5F	1.70	
Leght of DJ stent		0.700
28 cm	1.60	
26 cm	1.70	
Location of DJ stent		0.061
Right	1.18	
Left	1.91	

*Mann Whitney test

Table 5. Characteristic variable and bivariate analysis againts urinary symptoms.

Variable	Total n=40	Frequency		P	Nocturia		P	Urgency		P	Incomplete emptying		P	Disuria		P	Hematuria		P
		Yes	No		Yes	No		Yes	No		Yes	No		Yes	No		Yes	No	
Gender																			
Male	23	14	9	*0.385	13	10	*0.554	8	15	**0.145	12	11	*0.491	17	6	*0.083	10	13	*0.191
Female	17	8	9		8	9		2	15		7	10		8	9		4	13	
Position DJ stent				**0.000			*0.000			**0.002			*0.049			**0.030			**0.026
Good	29	11	18		10	19		3	26		11	18		15	14		7	22	
Not Good	11	11	0		11	0		7	4		8	3		10	1		7	4	
Size DJ stent				**0.140			**0.148			**0.689			**0.721			**0.715			**1.00
4,8F	30	19	3		18	12		7	23		15	15		18	12		11	19	
5F	10	11	7		3	7		3	7		4	6		7	3		3	7	
Location				*0.069			*0.121			**0.482			*0.093			*0.182			*0.279
Right	16	6	10		6	10		5	11		5	11		8	8		4	12	
Left	24	16	8		15	9		5	19		14	10		17	7		10	14	
Leght DJ stent				**0.140			**0.148			**0.689			**0.721			**0.715			**1.00
28 cm	30	19	3		18	12		7	23		15	15		18	12		11	19	
26 cm	10	11	7		3	7		3	7		4	6		7	3		3	7	

*Chi square test

**Fisher exact test

There was a significant correlation between the position of DJ stent with the pain experienced by patients ($p < 0.001$). DJ stent size, length and location of DJ stent does not affect the quality and quantity of pain experienced by the patient. In table 5 it can be seen some of the factors that analyzed, cause the symptoms of urinary or not in the installation of DJ stent. DJ stent position associated with the onset frequency ($p < 0.001$), nocturia ($p < 0.001$), urgency ($p = 0.002$), incomplete emptying (0.049), dysuria (0.030) and hematuria (0.026). Gender, DJ stent size, location of DJ stents, DJ stent length does not have a significant association with micturition complaints experienced by the patient.

DISCUSSION

Installation of DJ stent procedure is often performed in urological surgery. Patients who mounted ureteric stent has several side effects and complaints are quite disturbing. These complaints can affect several aspects of daily life, such as anxiety, sleep disorders, sexual function, loss of working time, and quality of life. The mean age of patients in this study was 44.92 years. In this study the majority of cases are urinary tract stones (85%). According to Pearle, the incidence of urinary tract stones are rare in the age less than 20 years and reach peak incidence in the decade 4 to 6. In this study the proportion of men (57.5%) more than women (42.5%). Urinary tract stone disease is more common in the male sex than women.⁶

In this study, there were 32 people (80%) had urinary complaints such as frequency, nocturia, urgency, urination incomplete emptying, dysuria and hematuria. It was not much different from the results of research Joshi et al, which mentions 78% of respondents complained of urinary symptoms such as irritative symptoms, hematuria, and incontinence. In another study, Joshi et al mention, most (80%) patients complained of one or more symptoms of urinary disorders caused by the installation of DJ stent.^{7,8}

IPSS is one instrument that is commonly used to determine urinary disorders/LUTS (Lower Urinary Tract Symptoms). In this study, there were increases in value when the total IPSS scores before DJ stent fitted and after DJ stent fitted with $p < 0.001$. Research Joshi et al also noted that the presence of DJ stents will increase the IPSS score. The difference was in Joshi et al study, IPSS values measured when the DJ stent was inserted and the IPSS score after DJ

stent removed. Joshi et al study also mentions that the IPSS components change when plugged in and not plugged DJs stent was irritating components, specifically frequency, nocturia and urgency. This was in line with our research that there was a significant difference between irritative components before installation DJ stent and after installation DJ stent ($p < 0.001$). In this study also mentioned there is a difference between the IPSS obstructive component before the DJ stent fitted and after the DJ stent fitted ($p < 0.001$). Obstructive component changes when the DJ stent was installed according to Joshi et al study was incomplete emptying.⁸

Distribution of urinary symptoms that often appear on the questionnaire USSQ are dysuria (62.5%), frequency (55%), nocturia (52.5%), urination incomplete emptying (47.5%), hematuria (35%), and urgency (15%). Patients who complain of pain in this study was 77.5%. This was similar to the research that says Joshi et al found 80% of patients experiencing pain associated with the installation of DJ stent.⁸ Pain and urinary symptoms that occur may be caused by spasm of the distal ureter and bladder due to an irritation of a foreign body. Smooth muscle spasm of the distal ureter and local irritation at the trigone that was rich in nerve fibers, receptor $\alpha 1$ -D and give symptoms similar to benign prostate enlargement. Pain arising in this study classified as mild to moderate pain (minimum 1, maximum 5) so it was expected not to interfere with the patient. Pain associated with the DJ stent may occur in some places and are spread, usually occurs around the area of the external genitalia and groin. Pain in the kidney area when not in micturition condition, indicating the presence of reflux.⁷

DJ stent size, in this study 4,7F and 5F, no effect on voiding symptoms and pain in patients with DJ stents installed. This was consistent with research Damiano et al which compares the size of the stent 4,8F and 6F. In Damiano et al research, DJ stent size also did not affect the incidence of urinary symptoms in patient.⁹ DJ stent length, in this study 28 cm and 26 cm, had no effect on voiding symptoms and pain. This was consistent with Lee et al study, which compared pain in patients who mounted a DJ stent with a length of 22 cm, 24 cm and 26 cm. In this study does not provide a significant difference on the pain caused by the installation of DJ stent with a length of 22 cm, 24 cm and 26 cm.¹⁰

In this study can be shown that the position of DJ stents and previous IPSS scores, affect the onset of symptoms urination and pain when plugged

DJs stent. DJ stent position looks good from the distal end of the stent DJ located on the ipsilateral side, do not cross the midline. This was according to Lee et al study which states that the installation of DJ stent with the correct position was more important than medical therapy in reducing the symptoms caused by the installation of DJ stent.¹¹

CONCLUSION

The conclusion that can be drawn from the results of the data analysis and discussion in this study are installation of DJ stent side effects urination and pain complaints, an increase in IPSS scores before DJ stent fitted and after DJ stent fitted, DJ stent a good position (do not cross the midline) have the symptoms and pain that is lighter than unfavorable position.

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