



ORIGINAL RESEARCH PAPER

Urology

COMPARATIVE ANALYSIS OF EFFICACY OF DIFFERENT CALIBRE OF DJ STENT IN RELATION TO URINARY TRACT SYMPTOMS.

KEY WORDS: DJ stent, endourology, USSQ score

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ABSTRACT

INTRODUCTION: ureteral stents (DJ) stents are integral part of endourology but they are not free from side effect.¹ These symptoms are largely due to bladder irritation caused by stent.² We report our experience on the evaluation of symptoms related to indwelling DJ stents and their impact on various urinary symptoms, based on different stent calibre, using a validated stent symptom specific questionnaire³.

METHODS: A total of 150 patients divided in three groups (50 each) were evaluated using 4Fr, 5Fr and 6Fr DJ stent at 7th day post op, at 21st day and at 28th day(7 days after DJ removal) using USSQ score.

RESULTS: At 7th day we found urinary, pain, general and accessory symptoms were significantly lower in 4 Fr group. However no significant difference was seen between 5 and 6 Fr group. At 21st day tolerance developed in almost all domains with significant difference only in pain and general symptoms, both being higher in 6Fr group. 7 days after removal of DJ stent symptom score continue to fall in all the groups. Where urinary and accessory symptoms were least in 4 Fr group there was greatest fall of pain scores in 6 Fr group, probably because of maximum relief in larger calibre group.

CONCLUSION: Ours is the 1st study to compare three different stent sizes including 4 Fr calibre with USSQ scores not widely different but were statistically significant, so we recommend use of smaller calibre stent wherever possible.

INTRODUCTION:

Ever since the development of DJ(double J) stent, ureteral stent are of fundamental importance to any urologic practice. Though ureteral stents (DJ stents) are integral part of endourology they are not free from side effect.¹ Haematuria, urgency, frequency, dysuria, and both bladder and flank pain are the most prevalent symptoms related to indwelling ureteral stents. These symptoms are largely due to bladder irritation caused by stent.² The hypothesis that less or softer material in the bladder would result in fewer symptoms has influenced stent design toward variable diameter, dual durometer, and softer stents.^{3,10} We report our experience on the evaluation of symptoms related to indwelling DJ stents and their impact on various urinary symptoms, based on different stent calibre, using a validated urinary stent symptom specific questionnaire(USSQ)⁴.

MATERIALS AND METHODS:

The study was conducted in the Department of Urology in which adult patients with diagnosis of ureteric or renal calculus who underwent surgery (PCNL/URSL/RIRS) and required ureteric stent in post op period were included in the study. A total of 150 patients of renal and ureteric calculi having requirement of ureteric stent in post op period were enrolled depending upon the sample size of previous studies and were randomized by adaptive minimization into three groups with 50 patients in each group. Group A – 4/26 Fr stent, Group B- 5/26 Fr stent, Group C- 6/26 Fr stent

Patients were enrolled in these groups and urinary symptoms were evaluated using a standardized questionnaire on post-op day 7, 21 and 7 days after stent removal.

Patients with age less than 18 years, patients with residual calculi, bleeding diathesis, patient's unwillingness, orthopedic or spinal deformity that restricts proper positioning, neurogenic bladder, history of chronic use of selective alpha-1 blocker, urinary tract infection, pregnancy or lactating females were excluded from the study.

Stent from the same company i.e. INDOVASIVE (Biorad Medisys Pvt Ltd) with stent diameter 4, 5 and 6 Fr and 26 cm length were

used in all groups. Fluoroscopic confirmation for loop of stent was done at the end of procedure and also an X-ray KUB was done at 21 days before removal of DJ stent to again confirm if there was any migration of stent.

STATISTICAL ANALYSIS:

USS QUESTIONNAIR was recorded at 7, 21 and 28 days for all 6 domains and the final scores for each domain were compared with ANNOVA and KRUSKALL WALLIS test with SPSS 22 software. All reported P values are two-sided, and statistical significance was set at 0.05.

RESULTS:

No patient was lost to follow-up. All groups were compared in respect to age, sex and stone location. Patient's demographic characteristics are detailed in table 1 and figure 1 and 2.

Table 1. showing demographic characteristics of patients.

Variables	4/26 Fr	5/26 Fr	6/26 Fr
Age (mean ± SD)	42.68±16.72	39.96±15.25	39.98±12.27
Gender			
MALE	33 (66%)	39 (78%)	31 (62%)
FEMALE	17 (34%)	11 (22%)	19 (38%)
LOCATION OF STONE			
RENAL	36(72%)	33(66%)	37(74%)
URETRIC	14(28%)	17(34%)	13(26%)

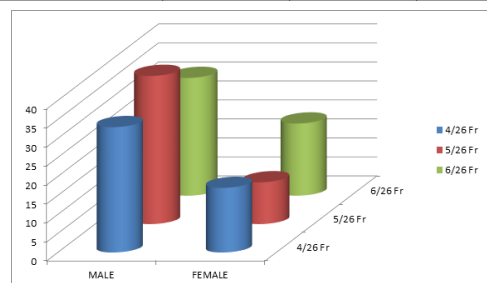


Figure 1 showing sex distribution in various groups

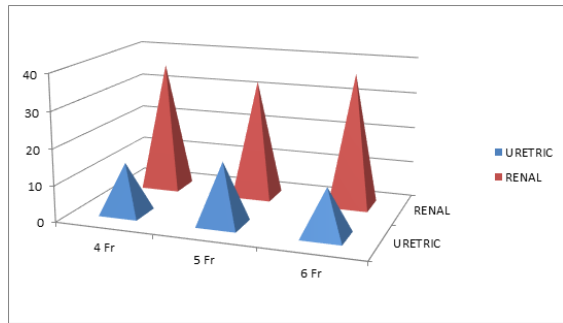


Figure 2 showing location of stone in various groups.

Among various stents symptoms assessed on USSR questionnaire urinary, pain, general and accessory symptoms were significant at 7 days post stent placement with p value <.01 in all groups by Annova test. On inter-group symptom analysis by Kruskal–Wallis test, urinary symptoms were significant in group A w.r.t group B and C but not among group B and C respectively. Similarly pain symptoms were significantly lower in group A and B w.r.t. group C but not among themselves. General and accessory symptoms were significantly lower in group A w.r.t group B and C, whereas no difference was seen among these two groups. None of the patient were working or sexually active in 4 Fr group whereas only one and two patients were working and sexually active in group B and C which was not significant. Description of stent symptoms at 7 days are shown in table 2 and figure 3.

Table 2 showing comparison of stent symptom at 7 days.

STENT SIZE	URINARY SYMPT OMS	PAIN SYMPT OMS	GENERAL SYMPT OMS	WORK SYMPT OMS	SEXUAL SYMPT OMS	ACCESSORY SYMPT OMS
4 Fr	20.6±2.56 ^b	14.34±2.79 ^a	10.68±2.02 ^a	0 ^a	0 ^a	6.04±1.09 ^b
5 Fr	22.12±2.72 ^a	14.66±3.37 ^a	11.96±1.87 ^b	0.14±0.98 ^a	0.08±0.57 ^a	7.44±1.09 ^a
6 Fr	22.62±3.18 ^a	17.84±3.05 ^b	12.7±2.31 ^b	0.26±1.29 ^a	0.08±0.56 ^a	6.88±1.12 ^a
ANNOVA	6.89	19.75	12.13	0.96	0.5	10.38
P VALUE	<0.01*	<0.01*	<0.01*	0.38	0.6	<0.01*

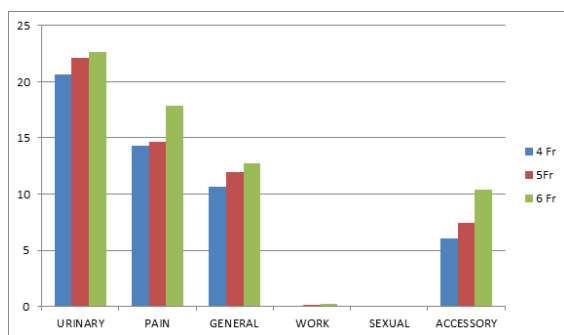


Figure 3 showing comparison of stent symptoms at 7 days

On 21st day check X-ray KUB was performed to see any residual calculi and stent migration before removal of Dj stent and questionnaire was recorded.

On uni-variate analysis only pain and general symptoms were significantly different in various groups with p value of .006 and <.01 respectively. In inter-group analysis by Kruskal–Wallis test pain and general symptoms were significantly lower in group A and B w.r.t C but not among themselves. All the other symptoms like urinary, work related, sexual and accessory symptoms were comparable in all groups. Description of stent symptoms at 21 days are shown in table 3 and figure 4.

Table 3 showing comparison of stent symptoms at 21 days.

STENT SIZE	URINARY SYMPT OMS	PAIN SYMPT OMS	GENERAL SYMPT OMS	WORK SYMPT OMS	SEXUAL SYMPT OMS	ACCESSORY SYMPT OMS
4 Fr	16.2±2.79 ^a	8.7±5.32 ^a	8.82±1.57 ^a	1.12±2.28 ^a	0.42±1.18 ^a	5.8±1.09 ^a
5 Fr	16.78±2.37 ^a	8.16±4.17 ^a	8.72±1.34 ^a	1.54±2.78 ^a	0.82±1.64 ^a	6.1±1.03 ^a
6 Fr	17.22±2.08 ^a	11.28±4.02 ^b	10.08±1.05 ^b	1.3±2.54 ^a	0.46±1.27 ^a	6.18±0.89 ^a
ANNOVA	2.22	7.87	16.06	0.34	1.27	1.98
P VALUE	0.11	0.006*	<0.01*	0.71	0.28	0.14

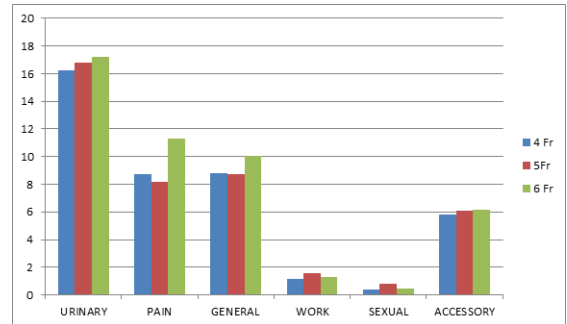


Figure 4 showing comparison of stent symptoms at 21 days

On 28th day i.e. 7 days after removal of DJ stent urinary, pain and accessory symptoms were significant (p = .02, .03 and .02 respectively) but whereas urinary and accessory symptoms were less in group A (i.e. 4 Fr) on the contrary pain symptoms were least in group C followed by group B and A respectively. General, work and sexual symptoms were comparable in all groups. Analysis of symptoms on 28th day are as shown in table 4 and figure 5.

Table 4 showing comparison of symptoms 7 days after removal of DJ

STENT SIZE	URINARY SYMPT OMS	PAIN SYMPT OMS	GENERAL SYMPT OMS	WORK SYMPT OMS	SEXUAL SYMPT OMS	ACCESSORY SYMPT OMS
4 Fr	12.48±1.54 ^b	3.42±4.66 ^b	7.36±1.79 ^a	0.84±1.66 ^a	0.38±0.92 ^a	5.1±0.99 ^b
5 Fr	13.5±2.43 ^a	2.34±3.89 ^a	7.42±1.57 ^a	1.76±2.42 ^a	0.6±0.99 ^a	5.7±1.31 ^a
6 Fr	13.3±1.63 ^a	1.3±3.07 ^c	8.02±1.58 ^b	1.46±2.33 ^a	0.54±1.16 ^a	5.62±1.07 ^a
ANNOVA	4.01	3.64	2.45	2.38	0.61	4.14
P VALUE	0.02*	0.03*	0.09	0.09	0.54	0.02*

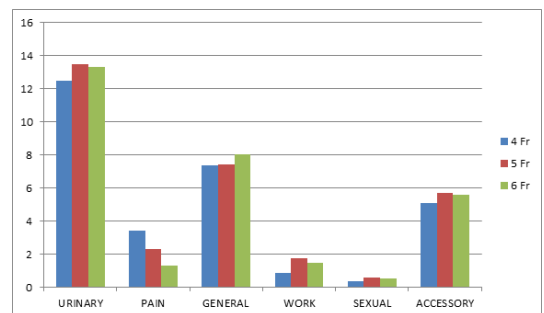


Figure 5 showing comparison of symptoms 7 days after removal of DJ

Discussion

In view of previous representative studies we confirm that to the best of our knowledge this is the first prospective randomized study to compare three different stent sizes including 4 Fr calibre for the 1st time. In our study stent related symptoms were

significantly bothersome in all the stented groups irrespective of stent calibre which is in concordance with various previous studies.^{5,6,7,8} Patients developed tolerance to various stent related symptoms to varying degree as also seen by Irani et al and Giannarini et al.^{6,13} at 1st week post DJ placement we found urinary, pain, general and accessory symptoms were significantly lower in 4 Fr group. However no significant difference was seen between 5 and 6 Fr group in any symptom domain except in pain symptoms. None of the previous studies had compared 4 Fr group but the results of 5 and 6 Fr group were similar to Damiano, Erturk and Candela.^{5,7,12} At 21st day after check x-ray stents were removed and scores were re-evaluated tolerance developed in almost all domains with significant difference only in pain and general symptoms, both being higher in 6Fr group. Damiano⁵ and Erturk⁷ did not find any difference based on calibre of stent. Although research by Irani¹³ used non-validated questionnaires on a small sample size they found dysuria and hematuria improved significantly but general tolerance remained unchanged. Dunn MD et al¹⁵ found significantly lesser urinary symptoms at time of stent removal in smaller stent material group. Both Suryawan⁹ and Giannarini G et al⁵ found intravesical position of loop of stent was most significant factor at time of removal but on the contrary Dominik¹⁶ did not report the same.

7 days after removal of DJ stent symptom score continue to fall in all the groups with significant difference in only urinary, pain and accessory symptoms. Where urinary and accessory symptoms were least in 4 Fr group there was greatest fall of pain scores in 6 Fr group, probably because of maximum relief in larger calibre group. Giannarini G et al⁵ showed pain was relieved in all the patients and rest of the symptoms continue to fall after stent removal which is in concordance with the present study.

There are also some limitations in our study. Firstly we did not record pre-stent placement LUTS score. Secondly, we did not evaluate previously investigated stent-related variables, such as length of intra-vesical portion, location and degree of completeness of distal loop, and intra-calyceal location of proximal loop.

In conclusion, ours is the 1st study to compare three different stent sizes including 4 Fr calibre with USSQ scores not widely different but were statistically significant, so we recommend use of smaller calibre stent wherever possible. Further well designed multi-institutional trials are required to confirm our results and overcome our limitations.

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