FINDING SUITABLE DURATION OF DOUBLE J STENT IN URETEROSCOPIC LITHOTRIPSY- A PROSPECTIVE STUDY

1. DR. DHARMENDRA KUMAR JANGID ASSISTANT PROFESSOR (RENAL TRANSPLANTATION UROLOGY) SMS MEDICAL COLLEGE JAIPUR
2. DR PUSHPENDRA BAGHEL, DIRECTOR, ELITE HOSPITAL CHHINDWARA,
3. DR RAM DAYAL SAHU, ASSISTANT PROFESSOR (RENAL TRANSPLANTATION UROLOGY), SMS MEDICAL COLLEGE JAIPUR,

CORRESPONDIGN AUTHOR:DR RAM DAYAL SAHU, ASSISTANT PROFESSOR (RENAL TRANSPLANTATION UROLOGY), *SMS MEDICAL COLLEGE JAIPUR,

ABSTRACT

Background: For ureteral stone removal, ureterosopic lithotripsy (URSL) is the standard treatment. In uncomplicated URSL, stent helps to combat the ureteral mucosal edema and allows passage of small stone fragments. Approximately 80% of patients have reported DJ associated problems like urinary symptoms. The ideal stent is not yet developed. Shigemura et. al. in their retrospective study showed that lesser(<14 days) the stent indwelling duration, fewer the adverse effects to the patient. Our prospective study was aimed to look for suitable time duration of DJ stent following URSL to minimize the stent related symptoms.

Methodology: This prospective study was conducted in adult patients with ureteric calculi. All patients fulfilling inclusion and exclusion criteria were submitted for URSL and in whom URSL was completed without complication were randomized into group A (stent removed on 7^{th} post operative day) and group B (stent removed on 14^{th} post operative day). The ureteral stent symptom questionnaire (USSQ) was used to measure morbidity to patients on day of stent removal and they were checked for symptoms for 6 months.

Results: Total 81 patients (group A n=39, Group B n=42) were evaluated for final analysis. The mean age in group A and B were 35.92 and 38.16 years respectively. Patients in group B had higher symptoms in all the domains of USSQ. 76% of group A and 68 % of group B patients reported pain, which was more intense during voiding and was over flank region. At 6 month the hydronephrosis in all were resolved or downgraded.

Conclusion: The early removal of stent at 7th postoperative day in uncomplicated URSL could decrease the symptoms to patients without increasing the adverse events.

Introduction:

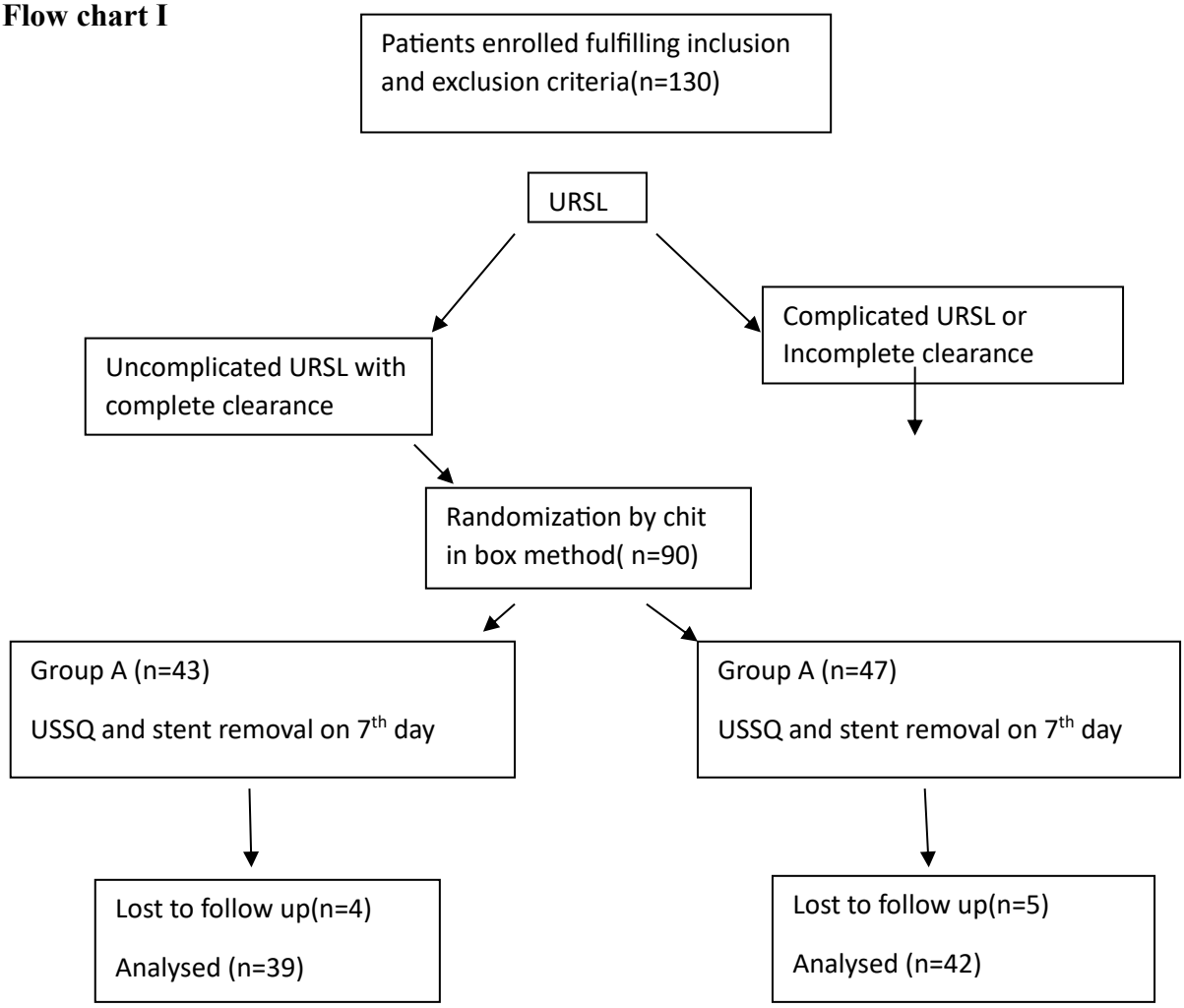
For ureteral stone removal, ureterosopic lithotripsy (URSL) is the standard treatment. In uncomplicated URSL, stent helps to combat the ureteral mucosal edema and allows passage of small stone fragments without hampering urinary drainage. Finney and Hepperlen developed double J(DJ) and pig tail stents to overcome the stent migration and expulsion.(**1,2**) However, approximately 80% of patients have reported DJ associated problems like urinary symptoms.(**3**) The ideal stent is one which is well tolerated allowing optimal urine flow, easy to place, non refluxing, biocompatible and radio opaque. But it is not yet developed. Various ideas were incorporated in practice to overcome the stent related problems (**4-10**). The possible method to decrease the stent related complaints is by decreasing the indwelling duration of stent in the body. Shigemura et. al. in their retrospective study showed that lesser(<14 days) the stent indwelling duration fewer the adverse effects to the patient.(**14**) Our prospective study was aimed to look for suitable time duration of DJ stent following URSL to minimize the stent related symptom.

Material method:

This prospective study was conducted from October 2016 to January 2018 in the Department of Urology and Renal Transplant, SMSMC, Jaipur, INDIA after institutional ethics committee clearance. All adult patients of ureteric calculi of size >5mm and <1.5cm were investigated. Patients having active urinary tract infection, multiple, bilateral calculi, renal calculi, taking alpha blocker and anti cholinergic drugs or having co morbidities like diabetes mellitus(DM), chronic liver disease(CLD), Chronic kidney disease(CKD) or malignancy were excluded from study. All others were submitted for URSL after informed written consent. All the patients in whom URSL was completed without complication were randomized into group A (stent

removed on 7th post operative day) and group B (stent removed on 14th post operative day) by chit in box system.(flow chart I) .

Flow chart I



Operative details

URSL was performed under general or spinal anesthesia. Intravenous antibiotics (third-generation cephalosporin) were given to all the patients at the time of induction which was subsequently maintained for 24 to 48 hours. A semi-rigid 8/9.5Fr (Karl Storz, Germany) ureteroscope was used. All stones were fragmented either with pneumatic or holmium laser lithotripter. Resulting small fragments were removed with uretroscopic forceps. Endoscopic and fluoroscopic stone clearance was confirmed and a DJS (5Fr and 26cm long polyurethane stent) was placed and position confirmed. Patients who developed urinary infection after procedure were evaluated and appropriate antibiotic treatment was prescribed. For all other cases antibiotics and painkiller medications were stopped after 48 hour of procedure and were discharged after educating them about the stent related symptoms.

Postoperatively they were called on 7^{th} and 14^{th} day for DJ removal in group A and B respectively. On day of stent removal, they were asked to complete ureteral stent symptom questionnaire(USSQ)(**3**) followed by stent removal. Patients were followed up at 1^{st} month for procedure related adverse events(PRE) like frequency, dysuria, hematuria and pain over flank or suprapubic region and ultrasonography(USG) was performed at 6^{th} month visit to look for back pressure changes. Appropriate statistical test applied for comparing the data

Results:

Total 90 patients undergoing URSL were enrolled in study. Nine patients did not turn up for follow up after stent removal. Total 81 patients fulfilling inclusion criteria were evaluated for final analysis. As shown in Table I patients of both the groups were comparable.

One or more episodes of hematuria were reported by 9 and 7 patients of group A and B respectively and none of them required further treatment for that. Severe hydroureteronephrosis (HDUN) was present in 2 patients of group A and 1 patient of group B at the time of surgery.

On USG performed at 6 month follow up we found all our patient had resolved HDUN or decreased in grade.

Patients in group B had statistically higher symptoms in all the domains of USSQ as shown in table II. 76% of group A and 68 % of group B patient had reported pain, which was more intense during voiding and was over flank region.

As show in table III, the dysuria, frequency and pain after stent removal at 1 month follow up was statistically insignificant in two groups.

TABLE 1: PATIENTS CHARACTERISTICS AND RESULTS**:**

Variables		Group A	Group B
Patients No.		39	42
Age(mean in years)		35.92±9.69	38.16±9.96
Sex(M:F)		26:13	27:15
Stone location	Middle(uppersacroiliac joint to lower sacroiliac joint level)	18	16
	Lower (below the lower sacroiliac joint level	21	26
Stone size(mean in mm)		8.3±2.4	7.9±3.1
Hematuria(stent insitu)		9(23%)	7(16.7%)
Work abstinence duration for half day or full day (mean in days)		4.07	3.77

Antibiotic course (for >48 hours)		5(13%)	7(16%)
Hydroureteronephrosis	Preoperative	35	38
	6mth after surgery	2	2

TABLE 2:URETRAL STENT SYMPTOM QUESTIONNAIRE

	Group A	Group B	P Value(unpaired t test)
Urinary symptom	28.79±3.40	32.38±6.06	0.001
Body Pain	18.89±2.66	28.8±3.27	0.005
General Health	14.2±2.16	15.69±2.91	0.01
Work Performance	11.76±2.81	13.07±2.71	0.035
Associated symptom	6.38±2.06	7.45±2.32	0.03
Quality of life	3.92±1.13	4.26±1.44	0.24

TABLE 3: FOLOW UP AT 1 MONTH

	Group A (n=39)	Group B(n=42)	
Pain over flank or suprapubic	4	8	Chi square=1.141 D.f.=1

			P=0.285
Dysuria	6	3	Chi square=1.391 D.f.=1 P=0.409
Frequency	2	3	Yate's=0.007 D.f.=1 P=0.9333

TABLE 4: COMPARISON OF CLINICAL OUTCOMES BETWEEN GROUP A AND GROUP B

	Group A	Group B	P Value(unpaired t test)
Urinary symptom	28.79±3.40	32.38±6.06	0.001
Body Pain	18.89±2.66	28.8±3.27	0.005
General Health	14.2±2.16	15.69±2.91	0.01
Work Performance	11.76±2.81	13.07±2.71	0.035
Associated symptom	6.38±2.06	7.45±2.32	0.03
Quality of life	3.92±1.13	4.26±1.44	0.24

TABLE 5: DEMOGRAPHIC AND CLINICAL CHARACTERISTICS OF PATIENTS IN GROUP A AND GROUP B

Variables		Group A	Group B
Patients No.		39	42
Age(mean in years)		35.92±9.69	38.16±9.96
Sex(M:F)		26:13	27:15
Stone location	Middle(uppersacroiliac joint to lower sacroiliac joint level)	18	16
	Lower (below the lower sacroiliac joint level	21	26
Stone size(mean in mm)		8.3±2.4	7.9±3.1
Hematuria(stent insitu)		9(23%)	7(16.7%)
Work abstinence duration for half day or full day (mean in days)		4.07	3.77
Antibiotic course (for >48 hours)		5(13%)	7(16%)
Hydroureteronephrosis	Preoperative	35	38
	6mth after surgery	2	2

DISCUSSION

The reported rate of stone clearance for uretaral stones by URSL varies from 86 to 100% and relatively higher for lower ureteric calculi.(**13-14**) Placing a DJ stent after URSL is a standard procedure with advantage of preventing renal colic development due to ureteral obstruction by passage of fragments of calculi or ureteral edema. But, there exist some dilemma about the duration for which a stent should be left to fulfil its goal. Damaino et.al. in their study have reported significantly higher readmission rate in unstented patients. However they failed to see any radiological difference between pre and post operative ureteral anatomy.(**18**) Katsumi Shigemura et.al. compared results of keeping ureteral stent for less than or more than 14 day in their retrospective study. They concluded that keeping stent for shorter duration may decrease the adverse events like lumbago and urinary symptoms.(**14**) Also, the discomfort to patient could decreased by educating them about consequences of indwelling stent.(**19**) Considering previous studies we further reduced the indwelling stent period to 7 days and compared it's results with indwelling duration of 14 days in our prospective study.

Previously there was no validated parameter to measure stent related symptoms. Joshi et.al. in the year 2003 developed a validated self administered Ureteral stent symptom questionnaire (USSQ) for evaluating stent related symptoms.(**20**) We evaluated our patients symptoms with USSQ and educated them about stent related symptoms at the time of discharge from hospital. To eliminate the effect of Ureteroscopy procedure per se we measured symptom score on 7th day and not earlier than that.

Similar to reported in previous study, 75% of group A and 83% of group B patients had reported bothersome urinary symptoms(**3**) and was significantly more in group B.

The pain score was significantly higher in group B comparing the group A patients with the commonest site of pain being the flank region (40%). This pain was more frequent during

micturation because of stent related reflux. Higher rate of adverse events like fever and lumbago was noted in patients with longer duration (more than 15 days) of DJ stent.(**14**)

Patient with DJ stent insitu were more vulnerable to harbour infection varying from 2-34%.(**11-12**) We avoided prescribing long term antibiotic in our patients as its role is clear.(**13**)

In our study we assessed general health and work performance using USSQ and found higher score in group B, denoting higher morbidity in them. The work abstinence duration between the two groups (group A 4.07 days, Group B 3.77 days) were similar, which was comparatively less than other studies. As most of our patients were from low or middle economical class and were only earning person in their family, they usually started working with persistent minor tolerable symptoms.

Singhinolfi et.al have reported impaired quality of sexual life in both male and females after DJ stenting.(**21**) But as very less number of our patients in both the groups were sexually active(Group A=13, Group B=12) with the DJ insitu, it is difficult to comment on quality of sexual life.

We looked for procedure related adverse events within 1 month of stent removal. Our 4 and 8 patients of group A and B respectively had at least one episode of pain over flank or suprapubic region and no definitive cause was identified on investigating these. All of them were relieved on pain killer medications within 3 days. We found comparable results of residual hydroureteronephrosis between two groups (comparing at the time of surgery and at 6 month after surgery), indicating the early removal does not increase any risk for stricture formation or residual dilatation. The documented stricture rate after URSL is 3-6% and probability increases with impacted calculus or ureteric perforation.(**22**) We had excluded all complicated procedures supporting our nil stricture rate.

Thus, we observed a significantly lower symptom score in group A (at 1 week) compared to group B (at 2 week) in all domains of USSQ. However there was statistically insignificant difference for adverse events (lumbago, dysuria, frequency and ureteral stricture formation) in post stent removal duration. This affirms higher short term morbidity with longer indwelling duration.

CONCLUSION

The early stent removal at 7th postoperative day in uncomplicated URSL could decrease the symptoms to patients without increasing the adverse events. However findings needed to be confirmed in large population group.

REFERENCES

1. Finney, R. P. (1978). Experience with new double J ureteral catheter stent. *Journal of Urology, 167,* 1135-1138. Discussion 1139.
2. Hepperlen, T. W., Mardis, H. K., & Kammandel, H. (1978). Self-retained internal ureteral stents: A new approach. *Journal of Urology, 119,* 731-734.
3. Joshi, H. B., Stainthorpe, A., MacDonagh, R. P., Keeley, F. X. Jr., Timoney, A. G., & Barry, M. J. (2003). Indwelling ureteral stents: Evaluation of symptoms, quality of life and utility. *Urology, 169*(3), 1065-1069.
4. Ecke, T. H., Bartel, P., Hallmann, S., & Ruttloff, J. (2010). Evaluation of symptoms and patients' comfort for JJ-ureteral stents with and without antireflux-membrane valve. *Urology, 75,* 212-216.
5. Venkatesan, N., Shroff, S., Jayachandran, K., & Doble, M. (2010). Polymers as ureteral stents. *Journal of Endourology, 24,* 191-198.

6. Beiko, D. T., Knudsen, B. E., & Denstedt, J. D. (2003). Advances in ureteral stent design. *Journal of Endourology, 17,* 195-199.

7. Chew, B. H., Lange, D., Paterson, R. F., Hendlin, K., Monga, M., Clinkscales, K. W., et al. (2010). Next generation biodegradable ureteral stent in a Yucatan pig model. *Journal of Urology, 183,* 765-771.

8. Chew, B. H., & Denstedt, J. D. (2004). Technology insight: Novel ureteral stent materials and designs. *Nature Clinical Practice Urology, 1,* 44-48.

9. Talja, M., Multanen, M., Valimaa, T., & Tormola, P. (2002). Bioabsorbable SR-PLGA horn stent after antegrade endopyelotomy: A case report. *Journal of Endourology, 16,* 299-302.

10. Zhang, P., Hu, W.-L., Cheng, B., Cheng, L., Zeng, Y.-J., & Wang, G. (2016). α1-blockers for the reduction of ureteric stent-related symptoms: A systematic review and meta-analysis. *Experimental and Therapeutic Medicine, 11,* 660-668.

11. Klis, R., Korczak-Kozakiewicz, E., Denys, A., Sosnowski, M., & Rozanski, W. (2009). Relationship between urinary tract infection and self-retaining Double-J catheter colonization. *Journal of Endourology, 23,* 1015-1019.

12. Akay, A. F., Aflay, U., Gedik, A., Sahin, H., & Bircan, M. K. (2007). Risk factors for lower urinary tract infection and bacterial stent colonization in patients with a double J ureteral stent. *International Urology and Nephrology, 39,* 95-98.

13. Moltzahn, F., Haeni, K., Birkhäuser, F. D., Roth, B., Thalmann, G. N., & Zehnder, P. (2013). Peri-interventional antibiotic prophylaxis only vs continuous low-dose antibiotic treatment in patients with JJ stents: A prospective randomized trial analysing

the effect on urinary tract infections and stent-related symptoms. *BJU International, 111*(2), 289-295.

14. Shigemura, K., Yasufuku, T., Yamanaka, K., Yamahsita, M., Arakawa, S., & Fujisawa, M. (2011). How long should double J stent be kept in after ureteroscopic lithotripsy? *Urological Research, 40,* 373-376.

15. Bozkurt, Y., Sancaktutar, A. A., Bostancı, Y., Kapan, M., & Çaycı, H. M. (2010). Comparison of extracorporeal shock wave lithotripsy versus ureteroscopic stone extraction in the treatment of ureteral stones. *European Journal of General Medicine, 7*(1), 29-34.

16. Park, H. K., Paick, S. H., Oh, S. J., & Kim, H. H. (2004). Ureteroscopic lithotripsy under local anaesthesia: Analysis of the effectiveness and patient tolerability. *European Urology, 45,* 670-673.

17. Yalcinkaya, F., Topaloglu, H., Ozmen, E., & Unal, S. (1996). Is general anesthesia necessary for URS in women? *International Urology and Nephrology, 28,* 153-156.

18. Damiano, R., Autorino, R., Esposito, C., Cantiello, F., Sacco, R., de Sio, M., & D'Armiento, M. (2004). Stent positioning after ureteroscopy for urinary calculi: The question is still open. *European Urology, 46,* 381-387.

19. Betschart, P., Zumstein, V., Piller, A., Schmid, H.-P., & Abt, D. (2017). Prevention and treatment of symptoms associated with indwelling ureteral stents: A systematic review. *International Journal of Urology, 24,* 250-259.

20. Joshi, H. B., Newns, N., Stainthorpe, A., et al. (2003). Ureteral stent symptom questionnaire: Development and validation of a multidimensional quality of life measure. *Journal of Urology, 169,* 1060-1064.

21. Sighinolfi, M. C., Micali, S., De Stefani, S., Mofferdin, A., Grande, A., Giacometti, M., Ferrari, N., Rivalta, M., & Bianchi, G. (2007). Indwelling ureteral stents and sexual health: A prospective, multivariate analysis. *The Journal of Urology, 178*(1), 229-231.

22. Preminger, G. M., Tiselius, H. G., Assimos, D. G., Alken, P., Buck, C., Gallucci, M., Knoll, T., Lingeman, J. E., Nakada, S. Y., Pearle, M. S., Sarica, K., Türk, C., & Wolf, J. S. Jr. (2007). 2007 guideline for the management of ureteral calculi. *Journal of Urology, 178*(6), 2418-2434.