



Effect of Time Duration on Bacterial Colonization in Double 'J' Stent after Ureteroscopy and Intracorporeal Pneumatic Lithotripsy in Adult

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Conflicts of interest: None

Abstract:

Introduction: Ureteric stone disease is common all over the world. Because of advancements in endourology and instruments- urologists manage ureteral stone effectively by ureteroscopy and lithotripsy using various energy sources. Commonly, lower ureteric stones are managed by ureteroscopy and intracorporeal pneumatic lithotripsy (URS and ICPL). After completing the procedure surgeons prefer to install double J (DJ) stent for a variable period within the ureter to overcome ureteral edema. There is no guideline for the optimal duration of keeping DJ stent in ureteral lumen. Urologists decide the duration of DJ stent according to their clinical experience & judgment- that makes a wide variation of stent period. Keeping the double J (DJ) stent for a longer duration may produce harmful effects, those even may be life-threatening.

Objective: To observe the effect of time duration on bacterial colonization in DJ stent after URS and ICPL.

Material and method: This experimental study was conducted in the Department of Urology, Bangabandhu Sheikh Mujib Medical University (BSMMU), for 1-year duration.

The total sample size was 82. Samples were allocated into two groups. In group A: Double J stent was kept in situ for d" 4 weeks, whereas in Group B: stent duration was > 4 (up to 8) weeks. In this study, purposive sampling technique was implemented.

Unilateral ureteral stone managed by URS, ICPL were included in the study. Patients having bilateral stones, co-morbidities like diabetes mellitus (DM), malignancy, immunosuppression, chronic kidney disease (CKD), and who had per operative ureteral injury were excluded. After removal of the DJ stent, 2-3 cm bladder-end tip was sent for culture and sensitivity. Reports were collected and documented.

Keywords: Bacterial colonization, Double 'J' stent, ICPL (Intracorporeal Pneumatic Lithotripsy).

Result: Out of 82 cases, 40 were in group A and 42 in group B. 62 patients were male, 20 were female. DJ stent culture was positive in 14 cases (17%), whereas urine culture was positive in 7 cases (8.5%). Among those- both stent and urine were positive in 4 cases (4.8%). Stent positive but urine negative in 10 cases (71%). In positive cases, stent and

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urine were colonized by a similar organism. *E. coli* was the commonest causative organism. Stent culture was positive in 4 cases (28.6%) in group A, 10 cases (71.4%) in group B but it was statically insignificant (*p*-value 0.09).

Conclusion: Bacterial colonization in DJ stent increases with longer indwelling time. Individually stent or urine culture can not detect all pathogens in the urinary tract. So urine culture, as well as stent culture, is required to detect the uropathogen. The final recommendation is that-removal of DJ stent as early as possible is the key to prevent bacterial colonization.

Introduction:

With the advancement of endourology and endoscopic instruments, many options are currently available for the management of lower ureteric stones. Ureteric stones can be managed effectively by ureteroscopy and lithotripsy using various energy sources. Management of lower ureteric stone by ureteroscopy and intracorporeal pneumatic lithotripsy (URS and ICPL) is a common practice.

This endoscopic procedure may cause ureteral edema, which leads to interruption and obstruction of urinary flow. (Damiano R. et al. 2004). To overcome these hazards, inserting a double J (DJ) stent in the ureteral lumen is a recommended procedure. (Wang, C.J. et al. 2018).

DJ stent has some beneficial effects but as it is a foreign body, it may lead to inflammatory and irritative effects like suprapubic pain, urinary frequency, urgency, nocturia, haematuria, urinary tract infection, and even urosepsis. Cevik, I. et al. (2010), Wang, C.J. et al. (2018).

As soon as the purpose is served, the DJ stent should be removed. Unfortunately, there is no consensus regarding the optimal indwelling period of DJ stent after URS, ICPL.

Urologists in most institutions practice keeping DJ stent for 2-6 weeks. In this study, two experimental groups were defined as d"4 weeks stent indwelling time (Group A) and over 4 weeks (Group B).

This study aimed to investigate the effect of time duration on bacterial colonization in Double J stents after URS, ICPL.

Materials And Methods:

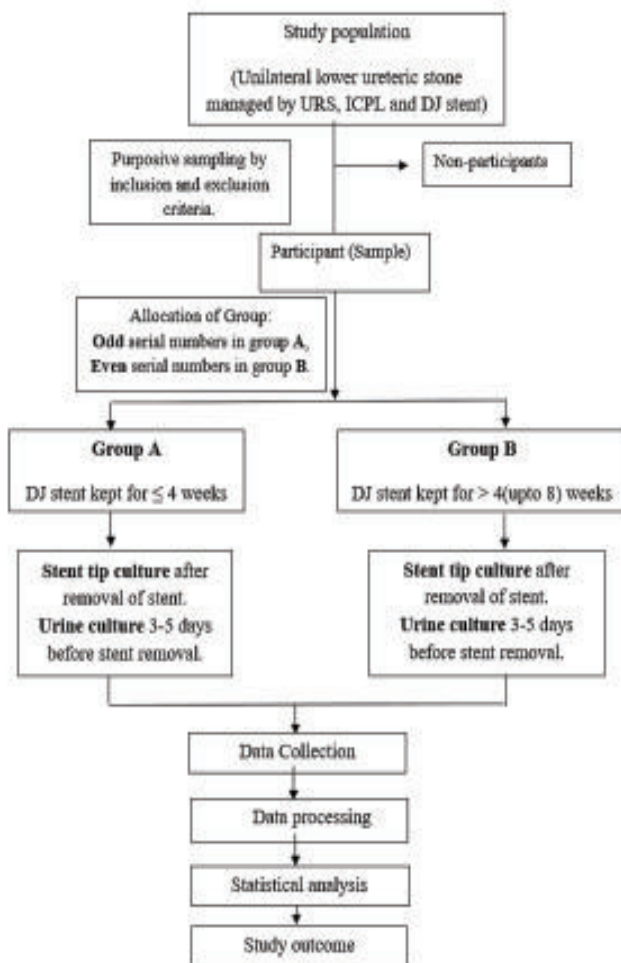
This experimental study was conducted in the Department of Urology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka from June 2019 to May 2020.

Total 82 Patients who underwent URS, ICPL for unilateral lower ureteric stone, were included.

Patients who had Diabetes mellitus (DM), immunosuppression, malignancy, Serum creatinine level > 1.5 mg/dl (chronic kidney disease), per operative ureteral injury. (laceration, perforation) were excluded.

Data analysis performed using computer-based software. *p* vale < 0.05 was considered as significant.

Study Design:



Results

Total 82 cases were included, 40 in group A and 42 in group B. Minimum age was 18 and maximum 70 years, 62 (75.6%) were male and 20 (24.4%) were female.

In group A, 3 (7.5%) patients had a positive urine culture. In group B, 4 (9.5%) patients had a positive urine culture, comparison of the two groups was statically insignificant.

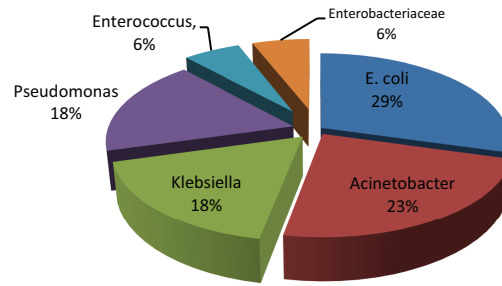


Fig-1 :

Table I: Comparison of patients by stent culture (n=82) between two groups.

Stent culture	Group A (n=40)	Group B (n=42)	Total (n=82)	Statistics
Negative	36 (90.0%)	32 (76.2%)	68 (82.9%)	p=0.097 ^{ns}
Positive	4 (10.0%)	10 (23.8%)	14 (17.1%)	

^{ns}= not significant, p-value obtained by Chi-square test

Table I In group A, 4 (10.0%) patients had positive stent culture. In group B, 10 (23.8%) patients had positive stent culture.

E. coli (29.4%) was the most common colony forming pathogen followed by Acinetobacter (23.5%), Klebsiella (17.6%), Pseudomonas (17.6%), Enterococcus (5.9%), and Enterobacteriaceae (5.9%).

Table II Relationship of stent colonization with urine culture status.

		Urine culture		Total	p-value
		Positive	Negative		
Stent colonization	Positive	4 (28.6%)	10 (71.4%)	14 (100.0%)	0.014 ^s
	Negative	3 (4.4%)	65 (95.6%)	68 (100.0%)	

^s=significant, p-value obtained by Fisher Exact test

Table II 14 patients had positive stent culture, among those 10 (71.4%) patients had negative urine culture. Among the 68 patients who had negative stent culture, 3 (4.4%) patients had a positive urine culture.

Table III Relationship of positive stent culture with the duration of the stent. (n=82).

Duration (in days)	Negative	Positive	Total	Statistics
<30	36 (90.0%)	4 (10.0%)	40 (100.0%)	p=0.004 ^s
e"30	32 (76.2%)	10 (23.8%)	42 (100.0%)	
Mean ±SD	35.34 ±9.82	44.28 ±11.93		

^s=significant, p-value obtained by Independent Sample t-test

Table III Patients having positive stent culture had a longer stent duration (44.28 ±11.93 days) than patients who had negative stent culture (35.34 ±9.82 days).

Discussion

In this study out of 82 cases, stent culture was positive in 14 (17%) cases, among these 4 (28.6%) patients were in group A (indwelling period \leq 4 weeks) and 10 (7.4%) were in group B (indwelling period $>$ 4 weeks).

Kehinde, E.O. et al. (2002) mentioned that for 1- 30 days stent duration, colonization rate was 20%, for 30 to 90 days stent colonization rate was 34%. Shabeena et al. (2018) stated that for 15-30 days the rate was 27%.

In this study, the bacterial colonization in stents was lower than some contemporary studies. Exclusion of comorbidity (diabetes, chronic kidney disease, immunosuppression, and malignancy) and administration of prophylactic antibiotics for 5-7 days caused this lower rate of bacterial colonization of this study.

In the current study colonizing organisms were- E. coli 29.4%, followed by Acinetobacter 23.5%, Klebsiella 17.6%, pseudomonas 17.6%, Enterococcus 5.9% and Enterobacteriaceae 5.9%.

Shabeena et al. (2018), Buhmann, M.T. et al. (2019), Javed, M.S et al. (2016) also found that E. coli was the most common pathogen, which is similar to this study result.

In the current study, out of 14 stent positive cases, 10 (71%) had negative urine culture. Results showed inconsistency between urine and stent colonization. Lojanapiwat, B. (2006) study result found- 31% of colonized stents had a negative urine culture. Klic̆, R. et al. (2014) study result found bacterial colonization in-stent was 96.6%, where urine culture was positive only in 17% of cases. So, urine culture has a low predictive value for the evaluation of stent colonization.

In this study, out of total 82 cases- 75 cases (91.4%) had negative urine culture. Among these 75 cases 10 (13.3%) had positive stent culture. Shabeena et al. (2018) found that despite negative urine culture, their 16.7% patient had positive stent culture.

It indicates that only urine culture was not sufficient to rule out bacterial colonization in the stent.

The mean duration for positive stent culture was 44.28 \pm 11.93 days and for negative stent culture, it was 35.34 \pm 9.82 days. Ozgur, B.C et al. (2013) study mentioned the rise of stent colonization after 6 weeks, which supports the result of this study.

Conclusion

Based on this study results, it can be stated that- bacterial colonization increases if the indwelling time is longer.

Individual stent or urine culture cannot detect all pathogens in the urinary tract. So urine culture, as well as stent culture, should be recommended for the detection of bacterial colonization after ureteroscopy and intracorporeal pneumatic lithotripsy.

Limitations

Bacterial colonization was not explored for comorbid patients having Diabetes, CKD, and immunosuppression.

Recommendation

Considering the findings of the present study, it is recommended that-removal of DJ stent as early as possible is the key to prevent bacterial colonization.

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