

Lower Urinary Tract Infection and Bacterial Colonization in Patient with Double J Ureteral Stent

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ABSTRACT

Background: The aim of this study is to investigate the bacteriology of urinary tract infection associated with indwelling DJ stent.

Methods: A total of 60 patients were included and 14 lost during follow up. Study period was for 6 months carried out in the department of surgery, Kathmandu Medical College. Prophylactic antibiotic was given at the time of intervention. Mid stream urine samples for routine and culture were sent before intervention. Urine samples during DJ removal and DJ tip cultures were also sent. All patients were "stented" during the various open and endourological procedures. Patients were clinically followed for a period till the DJ was removed. Statistical Package for Scientific Study (SPSS) 11, Chi square Test was used for statistical analysis.

Results: A total of 46 cases were included. Mean age in years was 35.70 (10- 78years). Male were 22 and female 24. Eleven patients(23.91%) had stent placed less than 30 days and 35 patients (76.08%) had it for equal or more than 30 days. DJ indwelling time was in between 12-86 days. Bacterial colonies were found in 28.3% (13 of 46) of the urine samples and 30.4% (14 of 46) from the tip of the DJ stent segment. Of the pathogens identified, E. coli was found to be the most common. An increased stent colonization rate was associated with implantation time, female sex. On urine culture 70.21% had no growth, 14.89% E. coli, 4.25% Klebsiella, Actinobacter, 2.12% E. coli/kleb, multiple org, psuedomonas. Ten patients (21.7%) had positive urine culture before stent insertion. Thirteen patients (28.3%) were shown to have positive urine culture on stent removal. Fourteen patients (30.4%) had positive DJ stent culture.

Conclusions: Positive urine culture and positive DJ tip cultures had strong correlation. Longer duration of placement of stent showed stent colonization. The commonest pathogen was E. Coli.

Keywords: double J stent, escherichia coli.

INTRODUCTION

In the field of urology, use of catheter and stents are of usual practice despite their related complications. Urinary tract infection as hospital-acquired (nosocomial) infections accounts for approximately 40% and out of which 80% are associated with urinary catheters and indwelling stents.⁴ Ureteral stents due to their indwelling nature are often a source of infection, bacteriuria, septicemia and also a cause of discomfort. Urologic surgeons therefore should first consider if a stent is needed at all. Recently triclosan-eluting ureteral stents

are being used to combat these problems and stenting for a longer time.⁵

METHODS

A prospective, cohort analytic study was carried out for a period of six months in the department of surgery, Kathmandu Medical College Teaching Hospital. A total of 60 patients were included out of which 14 were lost in the follow up. Prophylactic antibiotic was given to all the stented patients who had undergone various

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open and endo-urological procedures. Antibiotic was also given during the removal of the stent. Mid-stream urine sample were sent for routine and cultures before the surgical procedure and before the stent was removed. Two 3 cm of tip of DJ stent located in the bladder was sent for its culture after the removal.

Chi-square test and statistical package for social sciences (SPSS) 11 were used for the statistical analysis. P value of 0.05 was taken as statistical significant.

RESULTS

Forty-six cases were enrolled in the study with 14 lost during the follow up period. The mean age was 35.70 (range 10-78 years). There were 22 male patients and 24 females. Total duration of DJ stents placements ranged from 12-86 days. 23.91% (n=11) patients had stents placed for less than 30 days and 76.08% (n=35) had them for equal or more than 30 days. Positive urine cultures before surgery were seen in 10 patients (21.7%) with 13 patients (28.3%) on the day of stent removal. Positive DJ tip cultures were found in 14 patients (30.4%) (Table 1).

Of the pathogens, E. Coli was seen to be the commonest in all groups. Others were Staph. aureus, Actinobacter in urine samples before the surgery and Klebsiella, proteus, pseudomonas were seen in samples on the day of stent removal and in DJ tip cultures (Table 2). On urine culture 70.21% had no growth. E. Coli being the most common was 14.89%, Klebsiella, Actinobacter 4.25%, E. Coli/Klebsiella 2.12%. Microbiological profile of urine culture for the department of Pathology, KMCTH showed E. Coli to be again the commonest pathogen with 63.39% (Table 7).

Comparing urine culture before and after surgical intervention was not found to be significant (p value= 0.034) (Table 3). Patient with positive urine cultures before intervention were seen to have positive stent colonization with highly significant p value of 0.000 (Table 4). Similarly comparing urine cultures on the day of stent removal to the duration of stent placement was also found to be significant (P value= 0.002) (Table 5). Duration of DJ placement when compared to DJ tip cultures P value was found to be 0.013, which is not very significant (Table 6).

Table 1. Characteristics of published studies with stent colonization.

	Fassi et al	Riedel et al	Sung hyun et al	Cemoz den et al	Present study
Colonization (%)	68	69	44	18	30.4
Bacteriuria (%)	30	45	21	9	28.3
Duration of stents	4 months (median)	14 days (mean)	14 days (mean)	15-90 days (range)	12-86 days
Pathogens (%)	Pseudomonas(23) SEpidermidis(19) Streptococcus(16) E. Coli(9)	Enterococcus(51) Epidermidis(33) E. Coli(12) Candida(12)	Enterococcus(24) E. Coli(20) Gm +verods(12) Neisseria(8)	E. Coli(80) E. Coli/Candida (10) Kleb(10)	E. Coli(10) ECol/klebi (1.7) EColi/proteus(1.7) Actinobacter (5) Pseudomonas (1.7)

Table 2. Bacteriological profile.

Micro-organism	Patients infected/colonized (%)		
	Urine before insertion	Urine on stent removal	DJ stent culture
E. coli	11.61	11.66	10
E. coli/Actinobacter	1.66	--	--
E. coli/Kleb	--	1.7	1.7
E. coli/proteus	--	--	1.7
Actinobacter	--	3.33	5
Staph. aureus	3.33	--	--
Psuedomonas	--	1.7	1.7

Table 3. Relationship between urine before stenting and urine culture on stent removal.

Urine culture Before insertion		Urine on stent removal			P value
		No growth	Growth	Total	
	No Growth	29	7	36	0.034
	Growth	4	6	10	
	Total	33	13	46	

Table 4. Relationship of stent colonization with urine culture.

		Urine culture			P value
		No growth	Growth	Total	
DJ tip culture	No growth	30	3	33	0.000
	Growth	3	10	13	
	Total	33	13	46	

Table 5. Relationship between duration of DJ placement and urine on stent removal.

		Duration (days)			P value
		<30	≥30	Total	
Urine culture	Growth	7	6	13	0.002
	No growth	4	29	33	
	Total	11	35	46	

Table 6. Relationship between duration of DJ placement and DJ culture.

		Duration (days)			P value
		<30	≥30	Total	
DJ culture	Growth	7	7	14	0.013
	No growth	4	28	32	
	Total	11	35	46	

Table 7. Microbiological profile of urine culture (KMCTH).

	Percentage
Ecoli	63.39%
Klebsiella	17.24%
Actinobacter	4.2%
Staph	3.98%
Proteus	3.4%
Enterococcus	0.8%
Citribacter	0.26%

DISCUSSION

Ureteral stents are of usual urological practice. Use of these DJ stents for longer period is not without complication. Serious septic complication can be encountered. Drug-eluting stents like triclosan have come in the market to address these problems. These stents have shown to prevent bacterial adhesion and formation of biofilm.⁶ Triclosan alone is not sufficient at times to reduce associated infection but has resulted in decrease use of antibiotic and fewer symptomatic infections.⁵

Bacterial colonization has been seen to increase after 2 weeks of indwelling stent and followed by urine

colonization. Longer the duration of DJ placement, more the rate of colonization seen.³ Similar observation was made in our study. We have found stent colonization in those who had positive urine cultures before surgical intervention. Bacterial colonization was found to be 44% of the stent³ where we found 30.4% in our series.

Commonest pathogen was E. Coli where Paich C H et al found to be Enterococcus species. In another study, the bacteriuria rate was 4.2% for stents removed before 30 days and 34%, which were removed after 90 days (p value <0.001). Longer duration of indwelling stents more than 30 days in our study showed positive cultures with p value of 0.013.¹

Sterile urine does not rule out stent colonization. The sensitivity of urine cultures to stent colonization is poor, showing only 31% in a study by Lifshitz et al, which differed from our study. Table 4 shows strong correlation between urine culture and DJ tip culture (p value 0.000).² Diabetes Mellitus, chronic renal failure, malignancy, pregnancy are high risk factors which was not addressed in our study. These patients need to be carefully monitored for stent-related complications and use of prophylactic antibiotic.^{1,4,7}

Cochrane database reviews have shown limited evidence that prophylactic antibiotic reduced bacteriuria and rate of urinary tract infection.⁴

CONCLUSIONS

There was strong correlation of positive urine cultures before surgery to stent colonization and longer duration of DJ stent placement. E. Coli was the most common pathogen.

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