

Original Research Article

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Bacteriological Profile and Antimicrobial Sensitivity of DJ Stents

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ABSTRACT

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The aim of this study is to investigate the bacteriology of urinary tract infection associated with indwelling DJ stent. A total of 50 stents were included in the study, during a period was for 6 months carried out in the department of microbiology, PGIMS, Rohtak. 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. A total of 50 cases were included. Mean age in years was 35.70 (10- 78years). Male were 24 and female 26. Of the pathogens identified, CONS was found to be the most common. An increased stent colonization rate was associated with implantation time, female sex. Positive urine culture and positive DJ tip cultures had strong correlation. Longer duration of placement of stent showed stent colonization. The commonest pathogen was Coagulase negative *Staphylococcus*.

Introduction

Insertion of the Double-J (DJ) catheter into the ureter, which facilitates drainage of the upper urinary tract, is one of the most common urological procedures. (Damiano *et al.*, 2002)

The most common problems associated with indwelling ureteral devices are encrustation, bacterial adhesion and biofilm formation on the device surface. Even in patients in whom infection does not develop, bacteria are often isolated from the stent surface despite the collection of sterile urine. (Akay *et al.*, 2007)

Information about the incidence of colonization by different microorganisms

and their drug susceptibility pattern may play an important role in treatment of such infections. (Safdar *et al.*, 2004) The main of this study includes, to assess the frequency of ureteral stent colonization and to find out the microorganisms associated with stent colonization and antimicrobial sensitivity pattern of the isolates from double-J stent, to develop an approach for prevention of urologic devices associated colonization.

Material and Methods

The study was conducted in the Department of Microbiology, Pt. B.D. Sharma, PGIMS Rohtak during a period of 6 months from

April 2015 to September 2015. Fifty double J stents were included in the study. These stents were indicated in patients for different indications for example extracorporeal shortwave lithotripsy, post ureteroscopy, endoureterotomy etc. The average indwelling time was two weeks and varied depending upon the indication of individual patient. At the time of insertion three days of oral antibiotics were given. Urine samples, were collected aseptically before insertion of stent and before removal of stent. Semi-quantitative method of culture was performed with urine samples by the standard laboratory procedure using a calibrated loop (0.01 ml).

Tip end of the devices were taken aseptically, and then thoroughly washed with phosphate buffer saline (pH 7.2) to remove non-adherent cells. The devices were dipped into the tubes containing 5 ml brain heart infusion (BHI) broths and incubated at 37°C for 24 h. One loopful of broth from each tube was subcultured on blood agar plates. Isolated colonies were provisionally identified based on growth characteristics, morphology, motility and biochemical test results. (Collee *et al.*, 2006)

Antimicrobial susceptibility tests for all bacterial isolates were performed by Kirby-Bauer disc diffusion method. (Wayne, 2007)

Results and Discussion

A total of 28 microorganisms were isolated from DJ stents. Out of which, *Escherichia*

coli was the predominant organism. CONS, *Enterococcus*, *Acinetobacter* spp., *pseudomonas aeruginosa*, *Staphylococcus aureus*, *Citrobacter* spp., *Enterobacter* spp. and *Proteus* spp. were other organisms.

Antibiotic sensitivity of staphylococcus isolates showed 100% sensitivity to Erythromycin, Cefoxitin, Norfloxacin, Nitrofurantoin and Linezolid. CONS showed maximum sensitivity to Nitrofurantoin and Linezolid. Antibiotic sensitivity of *Enterococcus* isolates showed maximum sensitivity to Linezolid and Vancomycin.

In our study, members of Enterobacteriaceae showed maximum sensitivity to fosfomycin, gentamicin, imipenem and meropenem.

Non fermenters showed maximum sensitivity to Fosfomycin and Piperacillin-Tazobactam.

The current advances in minimally invasive surgery such as extracorporeal shock wave lithotripsy and endourologic surgery increases the use of internal stents in urological procedures. Many complications are commonly found during the placement of internal ureteral stent placement such as DJ symptoms, migration, encrustation, fragmentation, urinary tract infection. Stent bacterial colonization is one of the most important complication.

Table.1 Number of stents with microbial growth

Total number of stents	50
Sterile stents	24
Stents with monomicrobial colonisation	24
Stents with polymicrobial colonisation	4

Table.2 Organisms isolated from culture positive double J stent

Name of Microorganism	Double J Stent (n= 50)		
	Pure	Mixed	Total
<i>Staphylococcus aureus</i>	2	0	2
<i>Coagulase negative staphylococcus</i> (CONS)	5	0	5
<i>Enterococcus</i>	3	1	4
<i>Escherichia coli</i>	6	1	7
<i>Acinetobacter spp.</i>	3	1	4
<i>Pseudomonas aeruginosa</i>	3	0	3
<i>Citrobacter spp.</i>	1	0	1
<i>Enterobacter spp.</i>	1	0	1
<i>Proteus spp.</i>	0	1	1
Total	24	4	28

Table.3 Antibiotic sensitivity of *Staphylococcus* spp. Isolates

Name of Antibiotic	<i>Staphylococcus aureus</i> (n=2)		<i>Coagulase negative Staphylococcus</i> (n=5)	
	Sensitive	Resistant	Sensitive	Resistant
Erythromycin	2	0	0	5
Doxycycline	1	1	2	3
Cefoxitin	2	0	0	5
Norfloxacin	2	0	2	3
Nitrofurantoin	2	0	5	0
Linezolid	2	0	5	0

Table.4 Antibiotic sensitivity of *Enterococcus* spp. Isolates

Name of Antibiotic	<i>Enterococcus</i> spp. (n=4)	
	Sensitive	Resistant
Cephalexin	0	4
Gentamicin	0	4
Doxycycline	0	4
Nitrofurantoin	1	3
Linezolid	4	0
Vancomycin	4	0

Table.5 Antibiotic Sensitivity of Enterobacteriaceae (n=10)

Name of Antibiotic	Sensitive	Resistant
Amikacin	4	6
Gentamicin	9	1
Imipenem	9	1
Meropenem	9	1
Ofloxacin	2	8
Norfloxacin	3	7
Ceftizoxime	4	6
Nitrofurantoin	8	2
Amoxyclav	8	2
Piperacillin- Tazobactam	9	1
Fosfomycin	10	0

Table.6 Antibiotic sensitivity of Nonfermenters (*Pseudomonas aeruginosa* and *Acinetobacter* spp.) (n=7)

Name of Antibiotic	Sensitive	Resistant
Amikacin	3	4
Gentamicin	1	6
ceftizoxime	1	6
Imipenem	5	2
Meropenem	5	2
Ofloxacin	4	3
Norfloxacin	3	4
Nitrofurantoin	3	4
Fosfomycin	7	0
Piperacillin- tazobactam	7	0

The bacteriuria and bacteremia may occur from colonization because colonization can serve as a nidus for bacteriuria that play an important role in stent associated infection. 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. (Kehinde *et al.*, 2004) Similar observation was made in our study.

In this study, the bacterial colonization was positive in 52% of the stents. In another study conducted by Kehinde *et al*, bacterial colonization was positive in 42% of stents. Commonest pathogen was *Coagulase*

negative Staphylococcus where Paich C H *et al* found to be *Enterococcus* species. Sterile urine does not rule out stent colonization. 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. (Niël-Weise *et al.*, 2005; Akay *et al.*, 2007)

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