Original Article

Susceptibility Pattern of Pathogens Isolated from the Prostatic Tissue

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ABSTRACT

Background: There is significant incidence of bacterial growth in the prostatic tissue in the patients with Benign Prostatic Hyperplasia (BPH), whereas pre-existing urinary tract infection is not a reliable indicator by which this group can be identified pre-operatively and prostatic infection could be treated.

Objective: To identify the presence of various types of bacteria and fungi in prostatic tissue and cultures from urine samples of patients undergoing transurethral resection of prostrate

Study Design: Cross-sectional observational study design.

Place and Duration of Study: This study was conducted at The Basic Medical Science Institute at Jinnah Postgraduate Medical Center (JPMC) Department of Microbiology Karachi from .

Material and Methods: The samples were processed by the standard protocol. Culture medium of Blood agar and MacConkeys agar were used and biochemical tests were performed by using different sugar media, triple sugar iron agar, Simon citrate agar, urease, indole and MRVP tests.

Result: Out of 100 cases 25% cases showed identical type of growth, 11% cases had different type of growth in urine and prostatic tissue culture whereas 5% had no growth in urine while 32% had no growth in prostate only 32% had no growth in both urine and tissue culture.

Conclusion: The significance of prostatic tissue culture of patients undergoing surgery facilitates prompt diagnosis and the ideal choice of antibiotic can shorten the duration of treatment.

Keywords: Benign Prostatic Hyperplasia (BPH), Lower Urinary Tract symptoms (LUTS) , transurethral resection of Prostate(TURP).

INTRODUCTION

Benign prostatic hyperplasia (BPH) is the nonmalignant enlargement of the prostate gland. The prevalence of Lower Urinary Tract symptoms (LUTS) due to BPH increases with increasing age. Moderate to severe symptoms occur in 40 and 80% of men after the age 60 and by 80 years, respectively. Nearly all men develop microscopic BPH by the age of 90.[1]

The Recurrent urinary tract infections, like upper urinary tract infections are also the cause of morbidity.[2] the risk of antibiotic-resistant organisms is increased. Therefore, preventing the occurrence of antibiotic-resistant organisms through the use of suitable antibiotics is a major issue.[2]

Bacteriuria is much more prevalent among elderly population than it is among young adults. Catheter related urinary tract infection accounts for 40% of nosocomial infections, urinary tract infection is the complication of long term urinary catheterization.[3]

E. coli ,is the most common organism causing bacteriuria in catheterized patients and there is a significant association between periurethral colonization and subsequent bactiuria.[4]

Obstruction may develop because the bacterial glycocalyx, the slime layer biofilm that some bacteria produce coat the surfaces of the catheter. It encourages the formation of encrustations and infection stones consisting of urea, mucoprotein and other complex substances .[5]

The presence of bacteria was demonstrated in significant number of patients undergoing prostatectomy for benign prostatic hyperplasia. The micro-organism most frequently isolated in the quantitative bacterial cultures were, by order of frequency, coagulase negative Staphylococci, Escheriachia coli and Enterococcus faecalis (Soler et al., 1999).[6]

Catheter-related recurrent UTIs require multiple courses of antibiotic therapy. Eventually, the risk of antibiotic resistant organisms is increased. Therefore, to prevent the occurrence of antibiotic-resistant organisms the use of suitable antibiotics is a major issue.[7]

The study was conducted to isolate the bacteria from the urine and prostatic tissue obtained by TURP, to compare the frequency of the micro-organisms present in urine and prostatic tissue in catheterized and non-catheterized patients.

MATERIALS AND METHODS

One hundred samples of prostatic tissue and urine of the same patients were collected mainly from the department of Urology, Jinnah, PG. Medical Center, Karachi.

Among them, 50 patients had indwelling catheter for more than 20 days whereas 50 patients were non-catheterized. In present study none of the patients were on antimicrobial therapy at least 7 days prior to the collection of specimens.

The patients consent and demographic data was recorded and assessed in accordance with the International Prostate Symptom Score (IPSS). The IPSS is an eight-question written screening tool to rapidly diagnose BPH, track the symptoms of BPH and suggest management of the symptoms of BPH.[8, 9]

The samples were processed. Inoculation of uncentrifuged urine specimen was done with a calibrated (0.001 ml) wire loop on blood agar plates (BAP), MacConkey's and Sabourauds Dextrose agar plates of 9 cm (4 inches) diameters. These plates were incubated at 37°C for 24 hours. Number of colonies on the following day, were counted on the BAP. Cultural characteristics of the positive culture were observed and recorded. Gram positive organisms were further differentiated by doing catalase and coagulase test while bile esculin test was done to identify enterococci. Gram negative bacteria were separated by oxidase test and motility test. Lactose fermenters and non-lactose fermenter organisms were further identified by biochemical reaction after 24-48 hours. The same procedure was followed for the prostatic tissue which was received after TURP. The prostatic tissue was initially washed with sterilized saline and homogenized in sterilized mortar and pestle containing 1 ml saline.

RESULTS

Out of the 100 patients assessed 50 were catheterized and 50 were non-catheterized. The numbers of bacteria isolated in prostatic tissue of catheterized and non-catheterized patients are represented in Table 1 and numbers of bacteria isolated in urine of catheterized and non-catheterized patients are presented in Table2. The infection in the urine was present in 40 patients of which 29 were catheterized and 11 were non-catheterized and the infection in the prostatic tissue was present in 68 patients of which 42 were catheterized and 26 were non-catheterized (P value = 0.001 highly significant).

Out of 68 patients with positive culture in prostate 25 showed similar growth in both urine and prostatic tissue culture. Whereas out of 43 patients with positive culture in the prostate, eleven showed different organisms in urine and prostatic tissue and 32 patients had positive culture only in the prostatic tissue and no growth in the urine culture.

Organism isolated in urine and prostate of catheterized patient is shown in

table 3 and organism isolated in urine and prostatic tissue of non-catheterized patients is shown in Table 4.

Organism in the prostate of catheterized group were E.coli (23%) (8 OF 42), C.N Staphylococci 19% (8 of 42), Streptococcous faecalis 14% (6 of 42), Pseudomonas 11.9% (5 of 42), Proteus 6% (3 of 42), Serretia 4.8% (2 of 42), Providencia 4.8% (2 of 42), Enterobacter 7.1% (3 of 42), Salmonella 2.9% (1 of 42)

Organism in the prostatic tissue of non-catheterized patients was Streptococcus faecalis 27% (7 of 26), C.N. Staphulococci 23% (6 of 26), E.coli 15% (4 of 26), Citrobacter 7.7% (2 of 26), Providencia 3.8% (1 of 26), Salmonella 3.8% (1 of 26).

Table No.1: Bacterial Growth From Urine And Prostatic Tissue In Patients Under- Going Turp

Specimen	No. tested	Positive culture
Urine	100	40
Prostatic tissue	100	68

Table No.2: Organisms Isolated From The Prostatic Tissue In Patients With Bacterial Prostatitis Undergoing Turp

Organisms	Positive culture	Percentage
E.coli	14	20.59
C.N. Staphylococci	14	20.59
Streptococcus fecalis	13	19.12
Pseudomonas	06	8.82
Enterobacter species	06	8.82
Citrobacter species	04	5.88
Proteus species	03	4.41
Serretia marcesens	02	2.94
Salmonella species	02	2.94
Klebsiella species	01	1.47
Total	**68**	**100.00**

Table No.3: comparison of bacterial isolates from urine and prostatic Tissue of patients with bacterial prostatitis

Organisms	Positive Culture		Probability
	Urine (n=68)	Prostatic tissue (n=68)	
C.N. Staphylococci	10 (25.0)	14(20.6)	>0.594
Streptococcus fecalis	04 (10.0)	13 (19.1)	<0.209
E.coli	13 (32.5)	14 (20.6)	>0.167
Pseudomonas species	02 (5.0)	06 (8.8)	<0.464
Serretia marcesens	02 (5.0)	02 (2.9)	>0.584
Proteus species	02 (5.0)	03 (4.4)	>0.888
Enterobacter species	02 (5.0)	06 (8.8)	<0.464
Providencia species	00	03 (4.4)	>0.178
Citrobacter species	02 (5.0)	04 (5.9)	>0.845
Klebsiella species	02 (5.0)	01 (1.5)	>0.354
Salmonella species	00	01 (1.5)	>0.440

Urine culture showed high rate of bacteriuria in catheterized patient i.e. 73% catheterized patients (29 of

40) had positive culture reports of their urine, while 27% non-catheterized patients (11 of 40) had positive culture of urine samples. Most common organism isolated were E.coli 37.93% (11 of 39) and C.N. Staphylococci 27.5% of (8 of 29), Streptococcus faecalis was 13.7% (4 of 29), Serretia and Citrobacter were 6.8% (2 of 29) each while Klebsiella, Proteus and Pseudomonas were 3.4% (1 of 29) each and was also seen in 3.4% (1 of 29) each and was also seen in 3.4% (1 of 29) cases. Organisms difference in urine and prostatic were statistically not significant.

In non-catheterized patients bacteriuria was present in 27% of cases i.e. (11 of 40) had positive urine cultures and the most common organism were E.coli, Enterococci and coagulase negative Staphylococci 20% each i.e. (2 of 10) cases while Streptococcus faecalis, Pseudomonas, Citrobacter and Klebsiella were 10% (1 of 10) cases each, Serretia, Proteus and salmonella were absent in the urine of the non-catheterized patients.

Table No.4: Infection in Prostatic Tissue

Group	Present (68)		Not present (32)	
	No.	%	No.	%
Catheterized	42	61.80	08	25.00
Non-catheterized	26	38.20	24	75.00

P value = 0.001 (Highly significant)

Table No.5: Susceptibility Pattern of Major Pathogens Isolated From Urine

Antibiotics	Coagulase –ve Staphylococcus (n=10)	E.coli (n=13)	Streptococcus (n=4)	Pseudomonas (n=2)	Enterobacter (n=2)	Citrobacter (n=2)
Norfloxacin	07 (70%)	10 (77%)	02 (50%)	02 (100%)	01 (50%)	02 (100%)
Pipemidic Acid	08 (80%)	07 (54%)	01 (25%)	00 (00%)	01 (50%)	00 (00%)
Sparfloxacin	07 (70%)	09 (69%)	02 (50%)	01 (50%)	01 (50%)	02 (100%)
Trimethoprim	06 (60%)	05 (38%)	00 (00%)	00 (00%)	00 (00%)	01 (50%)
Trimethoprim + Sulfamethoxazole	08 (80%)	09 (69%)	00 (00%)	01 (50%)	01 (50%)	02 (100%)

Table No. 6: Susceptibility Pattern of Major Pathogens Isolated From Prostat Tissue

Antibiotics	Coagulase –ve Staphylococcus (n=14)	E.coli (n=14)	Streptococcus (n=13)	Pseudomonas (n=6)	Enterobacter (n=6)	Citrobacter (n=4)
Amikacin	11 (79%)	11 (79%)	10 (77%)	04 (67%)	04 (67%)	02 (50%)
Ampicillin	06 (43%)	03 (23%)	10 (77%)	00 (00%)	01 (17%)	01 (25%)
Ceftriaxone	12 (86%)	12 (86%)	09 (69%)	03 (50%)	05 (83%)	03 (75%)
Enoxacin	10 (71%)	10 (71%)	07 (54%)	04 (67%)	04 (67%)	04 (100%)
Gentamicin	09 (64%)	09 (64%)	11 (85%)	05 (83%)	05 (83%)	03 (75%)
Imipenem	13 (93%)	13 (93%)	04 (31%)	05 (83%)	05 (83%)	04 (100%)
Nitrofurantoin	08 (57%)	09 (64%)	09 (69%)	02 (33%)	04 (67%)	03 (75%)

DISCUSSION

Benign prostatic hyperplasia leads to urinary retention in most of the cases and emergency treatment for the retention is catheterization. Prolonged catheterization leads to urinary tract infection, bacteriuria, prostatitis, urethritis, cystitis, etc. Longer duration of catheterization leads to higher rate of infection. Robert L. et al, found that, the incidence of prostatic infection is more in prolonged catheterization (for more than 20 days) (61%) than in non-catheterized patients i.e. (38%).[10]

This study indicates that prolong indwelling catheter has two times more infection rate as compared to non-catheterized patients, which is also indicated by Mohanty (1996), who stated that pre existing urinary tract infection is not related to rate of isolation of bacteria in prostate.[11] This study coincides with our study in which, in non catheterized patients the bacteria isolated from the prostate were 38% and the bacteria isolated from the urine sample were 27% as well as in catheterized patients in which the bacteria isolated from the prostatic tissue were 61% and the bacteria isolated from the urine sample were 73%.

Mohanty and Holly (1996)[11] in their study they also observed significant incidence (42%) of bacterial growth in the prostatic tissue in patients with BPH. They obtained the sample of prostate from the patients undergoing TURP and the bacteria isolated were mostly E.coli, Coagulase negative Staphylococci and Streptococcus faecalis which is also similar to this study.

Morris and associates [12] found positive prostatic chips in 64% of patients, this study coincides with our study of total positive culture in catherized and non-catheterized patients, which is 68%.

In another study Nielson and associates (1981)[13], observed 76%of the prostatic chips had bacterial growth which is slightly higher than 68%positive culture were reported.

Drach [14] studied urine and prostatic fluid according to Meares and Stamey procedure, in addition prostatic tissue biopsies were also taken. The cultures showed that Gram positive organisms are definitely the predominant organism recovered from prostatic secretions and prostatic tissues. Since Gram positive bacteria are isolated from inflamed tissue, it can be surmised that they create prostatitis or prostatic urethritis and it seems advisable to treat gram positive prostatitis which create a significant personal problem for the patient. Gram positive prostatitis seems to be a benign disease, yet severe complications such as septicemia may occur. Most gram positive organisms from prostatitis do not grow in normal urine therefore urine culture alone should not be the criteria to analyze the presence of prostatic infection in a patient.[15]

Various other studies revealed that the common causative organisms in uncomplicated UTI are E. coli (34.4% to 67.0%), followed by Enterococcus, Pseudomonas, Enterobacter, Klebsiella, and Staphylococcus.[16-20]

Munir et al reported that E. coli was the most common organism causing bacteriuria in catheterized patients and that there was a significant association between periurethral colonization and subsequent bacteriuria.[21]

CONCLUSION

The study shows 40% of urine and 60% prostatic specimens had a positive growth in cultures. Most common organism found in urine and prostate of catheterized patients was E.coli followed by coagulase negative staphylococci and streptococcus fecalis. Whereas in the non-catheterized patients the common organisms isolated from urine were streptococcus fecalis coaglase negative staphylococci, E.coli and Enterobacter. The prostatic tissue from non catheterized patients showed similar organisms but with a high frequency.

Therefore it is suggested that sterile urine should not be taken as a definitive indicator of a sterile prostatic parenchyma .

To conclude the prostatic tissue culture along with histopathology is recommended as an aid in the diagnosis and therapy of the patient undergoing TURP as prostatic infection require an antibiotic coverage of 4-16 weeks, a culture and sensitivity test seems mandatory.

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