Intraprostatic Tissue Infection in Catheterised Patients in comparison to Controls

A. N. Talpur, A. T. Hasan, M. A. Sheikh
Department of Urological Surgery and Transplantation, Jinnah Postraduate Medical Centre, Karachi.

Abstract

Objective: To determine the effect of indwelling urinary catheter on frequency of intraprostatic tissue infection and posto-perative morbidity in patients with benign prostatic hyperplasia undergoing transurethral resection of prostate (TURP).

Methods: Frequency of intraprostatic tissue and urinary infection, prevalent organisms, histopathology of prostatic tissue, post-operative morbidity were analyzed for 25 consecutive patients' of clinically diagnosed benign prostatic hyperplasia who underwent TURP in catheterized and non-catheterized groups.

Results: Patients mean age was 62.2±7.9 years. In non-catheterized group nocturia and frequency were the most common symptoms. Ninety two percent and 28% patients acquired intraprostatic tissue infection in catheterized and non-catheterized group respectively, while 80% of catheterized patients and 24% of the non-catheterized patients had bacteriuria. Catheterized patients had E. coli as prevalent organism both in intaprostatic tissue and urine (34.8% and 40% respectively). E. coli Serratia and enterobacter were equally prevalent in intraprostatic tissue of non-catheterized patients. Enterobacter was the prevalent organism in urine (50%) of these patients. There was no significant difference in the presence of non-specific inflammatory cells in the two groups. Catheterized group showed significantly high frequency of fever >38.5ºC and hematuria for more than 24 hours.

Conclusion: Catheterization significantly increases the frequency of intraprostatic tissue infection as well as morbidity of TURP (JPMA 54:20;2004).

Introduction

About 42-44% of bacterial growth in prostatic tissue occurs in patients with benign prostatic hyperplasia. Pre-existing urinary tract infection is not a reliable indicator by which this group can be identified and treated pre-operatively.[1,2] Twenty five percent of patients undergoing prostatectomy for BPH have bacteriuria.[3] We see large number of patients in our clinic, presenting with retention of urine. Due to long waiting lists, these patients remain with indwelling catheter for long time which increases the chances of bacteriuria and morbidity of TURP. We performed this study to assess the frequency of intraprostatic tissue infection and bacteriuria in catheterized and non-catheterized group as well as post-operative morbidity of TURP in a local setting.

Patients and Methods

A prospective study was conducted on twenty five consecutive patients in both catheterized and non-catheterized groups with clinical diagnosis of BPH who underwent transurethral resection of prostate. Patients with diabetes mellitus, suprapubic catheter and those in whom incidental carcinoma prostate was found on biopsy were excluded from the study.

History was taken for the assessment of the symptoms of lower urinary tract obstruction. In addition to routine evaluation, all the patients had digital rectal examination (DRE), transabdominal ultrasonography of prostate and upper urinary tract prior to the procedure. Urine specimen was collected in sterile a bottle for culture and sensitivity through cystoscope. TURP was performed, first 3 to 5 chips of prostate were collected in a sterile bottle containing normal saline for culture and immediately transported to laboratory. Remaining tissue of prostate was collected in formaline containing bottle for histopathological examination and reviewed by a single histopathologist.

Sample of urine and prostatic tissue collected for culture purpose were inoculated on sheep blood agar, MacConkey agar plate and were incubated aerobically at 37^{o}C for 24-48 hours, while plates of Sabouraud Dextrose Agar (SDA) with the urine and prostate tissue were also incubated at 37^{o}C and were kept for upto three weeks. The specimens inoculated on chocolate agar were kept under 5% carbon dioxide at 37^{o}C and examined after 24-48 hours. Isolated organisms were examined and identified by standard methods.[4]

Post-operative morbidity of the procedure was evaluated and compared in the two groups. Statistical analysis were done with EPI info.

Results

This study was conducted from December 1999 to December 2000. Twenty five consecutive patients in each catheterized and non-catheterized group were included in the study.

Mean age of the patients undergoing transurethral resection of prostate was 62.2±7.9 years ranging from 48 years to 84 years.

Table 1. Clinical presentation of patients with benign prostatic hyperplasia.

Symptoms	Catheterized		Non-catheterized	
	No. of patients	%	No. of patients	%
Retention	25	100	0	0
Weak stream	11	44	20	80
Postvoidal dribbling	5	20	12	48
Urgency	2	8	8	32
Frequency	8	32	21	84
Nocturia	10	40	21	84
Haematuria	4	16	2	8
Hesitancy	9	36	14	56
Sense of incomplete emptying	4	16	7	28

Table 2. Weight of prostate on ultrasonography.

Group	Average weight (grams)	Minimum weight (grams)	Maximum weight (grams)
Catherized	47.76	34.00	90.00
Non-catheterized	44.78	34.00	80.00

Table 3. Frequency of intraprostatic tissue and urinary infection.

Group	Intraprostatic infection*				Urinary infection**			
	Positive		Negative		Positive		Negative	
	No.	%	No.	%	No.	%	No.	%
Catheterized (n = 25)	23	92	2	8	20	80	5	20
Non-catheterized (n =25)	7	28	18	72	6	24	19	76

*Yates mantel test shows P value <0.00001

** Yates mantel test shows P value <0.0002

All catheterized patients had retention of urine with pre retention symptoms of prostatism, while the comparative group had never been catheterized. They had symptoms of prostatism (irritative + obstructive). Of the catheterized patients all presented with acute retention (100%) and the major symptoms in non-catheterized patients were nocturia and frequency 84% (Table 1). On ultrasonography, the average weight of prostate in catheterized and non-catheterized patients undergoing transurethral resection of prostate was not statistically significant (Table 2). Frequency of intraprostatic tissue infection and bacteriuria was higher in catheterized than in non-catheterized group (Table 3).

There was no significant correlation of intraprostatic infection and bacteriuria in catheterized and non-catheterized groups (Table 4). E. coli and enterobacter were the most prevalent organisms in urine and E. coli in prostatic tissue of catheterized and non-catheterized group (Table 4).

On histopathology, mixed inflammatory cells were found in 64% of catheterized and 56% of non-catheterized patients, the difference was not significant. Squamous metaplasia was present in 20% (5 out of 25) of catheterized and 16% (4 out of 25) of non-catheterized patients. Postoperative fever of more than 38.5°C and hematuria lasting for more than 24 hours was significantly more in catheterized group (Table 6).

Table 4. Correlation of intraprostatic tissue infection with bacteriuria.

Bacteriuria	Catheterized* Intraprostatic infection				Bacteriuria	Non-catheterized** Intraprostatic infection			
	Positive (n=23)		Negative (n=2)			Positive (n=7)		Negative (n=18)	
Yes (n=20)	19	82.6%	1	50.0%	Yes (n=6)	3	42.8%	3	16.6%
No (n=5)	4	17.3%	1	50.0%	No (n=19)	4	57.1%	15	83.3%

* Fishers exact test shows p value N.S.

**Fishers exact test shows p value N.S.

Table 5. Prevalent urinary and intraprostatic pathogens.

Organisms isolated	Urine				Intraprostatic			
	Catheterized (n=20)		Non-catheterized (n=6)		Catheterized (n=23)		Non-catheterized (n=7)	
	No.	%	No.	%	No.	%	No.	%
E. coli	8	40	1	16.6	8	35	2	28.6
Staphylococcus aureus	3	15	1	16.6	5	22	-	-
Proteus	2	10	-	-	2	8.7	-	-
Streptococci	2	10	-	-	1	4.3	-	-
Staphylococcus Epidermidis	1	5	-	-	1	4.3	-	-
Pseudomonas	1	5	-	-	1	4.3	-	-
Citrobacter	1	5	-	-	1	4.3	-	-
Non-streptococci	1	5	-	-	-	-	-	-
Candida	1	5	-	-	-			
Enterobacter	-	-	3	50	1	4.3	2	28.6
Klebsiella	-	-	1	16.6	-	-	1	4.3
Providentia	-	-	-	-	3	13	-	-
Serratia	-	-	-	-	-	-	2	28.6

Table 6. Comparison of morbidity in the two groups (n=25).

Complications	Catheterized		Non-catheterized		P value
Fever (38.5°C)	22	88%	4	16%	<0.001
Hematuria (>24 hrs.)	11	44%	1	4%	0.002

Discussion

Urinary retention may be one of the presenting feature of benign prostatic hyperplasia. Catheterization is the treatment modality available for retention of urine.

Prolonged catheterization leads to urinary tract infection, bacteriuria, prostatitis, urethritis and cystitis. The longer the duration of catheterization the higher is the rate of infection and the shorter is the duration of catheterization the lower are the infection rates. Prolonged indwelling urethral catheter has increased risk of bacteriuria and prostatic infection. The infection rate is known to rise with increasing duration of catheterization, with 50% or more of catheter infected within 10 days of insertion.[5-7] The rate of prostatic infection after prolonged catheterization (for more than 20 days) in our patients was 92% and in non-catheterized patients 28%. Very little work has been done to see the effects of catheterization on prostatic infection. Our study indicates that prolonged indwelling catheter has more infection rate as compared to non-catheterized or control group.

Mohanty et al[1] had reported 42% intraprostatic infection in resected specimen obtained from TURP or transvesical prostatectomy. In their study pre-existing urinary tract infection was not related to the rate of isolation of bacteria from prostate.

In this study specimen were obtained at TURP and intraprostatic tissue infection was co-related with bacteriuria, statistical analysis showed no significant difference in both catheterized and non-catheterized groups.

Although catheterized patients had higher frequency of bacteriuria and intraprostatic tissue infection as compared to non-catheterized patients groups. This study confirms previous observations that non-catheterized patient has lower frequency of intraprostatic tissue infection.[3] The most commonly isolated intraprostatic pathogen was coagulase negative Staphylococci, followed by E. coli and Enterococcus faecalis.[3] In this study E. coli followed by Staphylococcus aureus and providential were prevalent organism in catheterized group.

The most commonly isolated pathogen in urine of catheterized patients was E. coli, other organisms isolated were Enterococci, Pseudomonas, Klebsiella, Enterobacter, Staph epidermitis, Staph. Aureus and Serratia.[5] In the present study, E. coli followed by Staph. Aureus, Proteus and Streptococcus were the prevalent organisms.

Kass and Finland[8] reported that the frequency of urinary tract infection in patients with indwelling catheter is directly related to the duration of catheterization when open drainage system are used, 95% of patients became bacteriuria by 4th day. Garibaldi[5] reported that with the advent of closed drainage system the average daily rate of acquired bacteriuria is decreased by 4% per day in males and 10.4% per day in females.According to this study the bacteriuria in catheterized males in 20 days will reach upto 80%. All catheterized patients were catheterized for 20 days or more and in our study bacteria were isolated in urine of 80% of these patients. These results also coincide with the results of Garibaldi.[5] A lower rate of urinary tract infection (40%) was observed by Horgan[9] with a mean duration of catheterization of 3 weeks.

On histological examination of specimen of prostatic tissue, Solar[3] found inflammatory cells in 38.9% cases. Previously Kohan and Drack[10] observed infiltration of inflammatory cells in and around acini and in the stroma in 98% of histopathological reports of specimens of hyperplastic prostates. Results of these studies are far away from each other and are certainly inconclusive. In our study we found he infiltration of inflammatory cells in and around the acini in histopathological reports of 68% catheterized patients. These results are different from previous studies by Solar and Kohan and Drack[3], but these results appear more significant and conclusive.

The prevalence of post-operative hematuria and clot retention was 13% in a series of 388 patients, a third of these patients had a history of acute urinary retention.[11] We observed post-operative hematuria lasting for more than 24 hours in 44% of catheterized group. In our study catheterization significantly increased the frequency of post-operative fever and duration of hematuria. No statistically significant difference in morbidity rate was noted in patients with indwelling catheter by Jerome Melochia.[12]

Reports of pre-discharge urinary tract infection with fever ranged from 2.3%[13] to 19.1%[14], but number of catheterized and non-catheterized patients was not mentioned. Our pre-discharge incidence of urinary tract infection with fever >38.5°C in catheterized group was 88%. In non-catheterized group E. coli, Enterobacter and Serratia were equally prevalent as intraprostatic tissue pathogen and Enterobacter was the commonest organism isolated in urine. Infiltration of inflammatory cells were found in 56% non-catheterized patients.

The prevalence of post-operative hematuria lasting for more than 24 hours and pre discharge incidence of urinary tract infection with fever >38.5°C was 4% and 16% respectively, in non-catheterized group.

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