Urinary Tract Infection in Stone Patients and in Patients with Indwelling Urethral Catheters

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Abstract

Frequency of urinary tract infection was determined in 82 patients with urolithiasis and in 40 patients with an indwelling Catheter. Significantly high proportion of adult patients with renal and vesical calculi were infected while children with bladder stones had high proportion of sterile urine. Indwelling catheter was associated with a high rate of urinary infection (JPMA 31:254,1981).

Introduction

Urinary tract infection is a common problem all over the world. The mechanisms of colonization of the urinary tract in absence of structural defects or foreign bodies is poorly understood. The population at risk and high morbidity has generated keen interest in this field (Kunin, 1979).

Infection secondary to urinary tract disease carries a high morbidity and mortality. The frequency of urinary tract infection in stone disease, which has a high incidence in Pakistan (Khan, 1979), and in catheterised patients, need to be studied to define the risk to the patient, and help in the management of the disease. The present study was undertaken to highlight these problems in our setting.

Material and Methods

A total of 82 stone patients and 41 patients with indwelling Foley's catheter from the Department of Urology, Mayo Hospital, Lahore were included in this study.

Midstream urine samples were collected two days before these patients were submitted for surgery. In case of catheterised patients, the catheter was clamped for half an hour and urine samples were collected after the first part was wasted. At operation urine samples were collected with a disposable syringe before opening the renal pelvis/urinary bladder and the samples were immediately sent to the laboratory.

The urine samples were cultured by pour-plate method and sensitivity tested by Disc-Diffusion method. A bacterial count more than 10s for midstream urine samples was taken as infected. The specimens taken at operation were declared infected when bacterial growth was obtained.

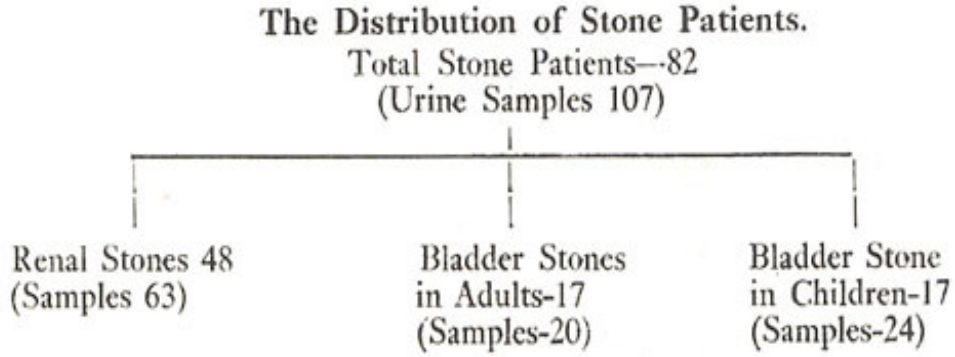
We faced difficulty in obtaining sufficient quantities of urine from a number of cases at operation and we had to use the swab technique in the latter part of the series. We thus have fewer samples analysed in this group.

Results

A. Urine Culture in Stone Cases

A total of 82 stone patients were studied and 107 urine samples were collected. The distribution of stone patients is shown in Figue-I.

Fig. 1



(i) Renal Stones

In 48 patients 63 urine samples were processed. This includes 6 postoperative samples in 5 patients. (Figure-2).

All culture positive urine samples of the above two grouos have been analysed in Table I and II.

Table I

Drug Sensitivity of Organisms Isolated from Stone Cases
Percent of Strains Sensitive

No.	*E. coli*	*Klebsiella*	*Pseudo-monas*	*Proteus*	*Stalplo-cocci*
1. Amoxicillin	33.33	28.50	0.00	50.00	50.00
2. Carbenicilin	40.00	41.11	55.55	100.00	100.00
3. Co-trimexazole	50.00	20.00	40.00	—	—
4. Erythromycin	00.00	9.23	00.00	50.00	100.00
5. Gentamicin	80.00	77.77	85.71	00.00	50.00
6. Furadantin	750.0	75.00	33.33	100.00	50.00
7. Kanamycin	66.66	57.14	66.66	50.00	50.00
8. Kanacillin	66.66	37.50	57.14	50.00	50.00
9. Nalidixic acid	100.00	85.00	50.00	100.00	--
10. Phenethecilin	00.00	9.09	00.00	00.00	—
11. Streptomycin	25.00	00.00	00.00	00.00	50.00
12. Vibramycin	83.33	64.00	25.00	50.00	100.00
13. Minocin	100.00	72.27	16.66	50.00	50.00

Table II

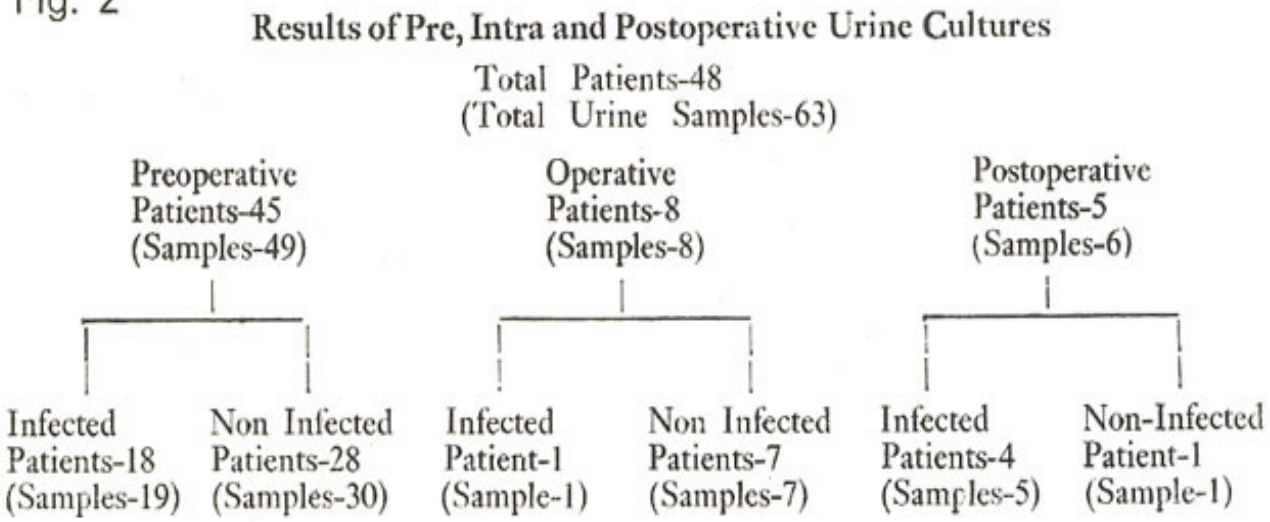
Drug Sensitivity of Organisms Isolated from Prostate Cases
Percentage of Strains Sensitive

No.	*E. coli*	*Klebsiella*	*Proteus*	*Pseudo-monas*
1. Amoxicillin	40.00	12.38	00.00	58.70
2. Carbenicillin	55.50	81.25	50.00	28.70
3. Co-trimexazole	12.50	10.00	–	00.00
4. Erythromycin	10.00	10.34	00.00	08.00
5. Furadantin	50.00	33.33	100.00	00.00
6. Gentamicin	100.00	100.00	100.00	76.92
7. Kananmycin	30.00	34.37	00.00	28.00
8. Kanacillin	40.00	31.03	50.00	26.92
9. Nalidixic acid	100.00	34.21	100.00	64.23
10. Phenethecillin	00.00	4.34	00.00	00.00
11. Streptomycin	50.00	80.00	100.00	25.00
12. Vibramycin	55.55	64.00	100.00	50.00
13. Minocin	90.00	89.32	100.00	56.00

Discussion

At the outset we must define the limitations of this study. The urine samples collected signify only one point in the history of the disease with its obvious limitations. Furthermore, sample collection at operation was not possible in large number of patients which reflects in our final analysis of this study. One important cause of renal stone formation and recurrence, especially in presence of stasis, is UTI with ammonia forming organisms (Proteus and some strains of E. coli).

Fig. 2



(ii) Bladder Stone in Adults

Patients over the age of 15 years were included in this group. Patients with associated prostatic hypertrophy were excluded. The results are shown in Fig-3.

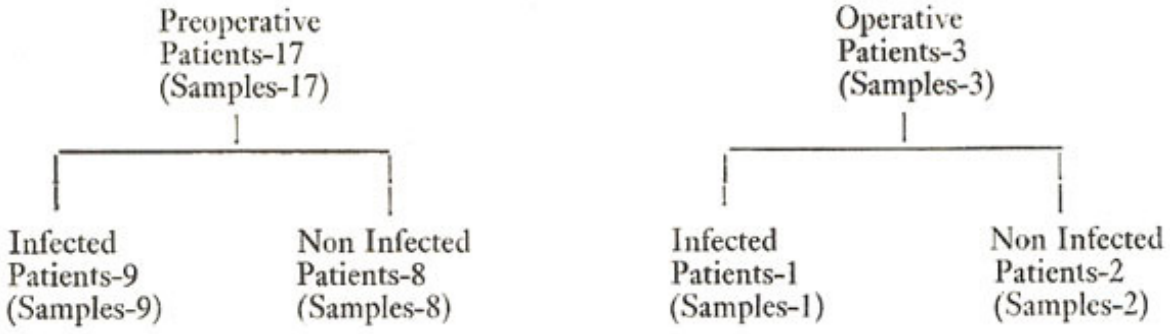
These struvite stones are fast growing and attain the form of staghorn. In Pakistan majority of the stones are of calcium oxalate with a high urate content (Rana and Khan, 1976).

Of the 20 pre-operative urine samples 19 were infected. However, only one of the 8 urine samples collected at operation was infected. The incidence of infection reported from U.K.by Singh et al. (1973) was about 80 percent. It must be appreciated that incidence of struvite stones is also higher in that area.

Urinary tract infection in renal stone patient is most undesirable. Infection in presence of obstruction results in severe renal damage and often leads to renal failure (Khan, 1981). Patients with diabetes and renal failure experience recurrent bouts of urinary tract infection and pose difficult management problems.

Bladder Stones in Adults (Fig. 3)

Fig. 3

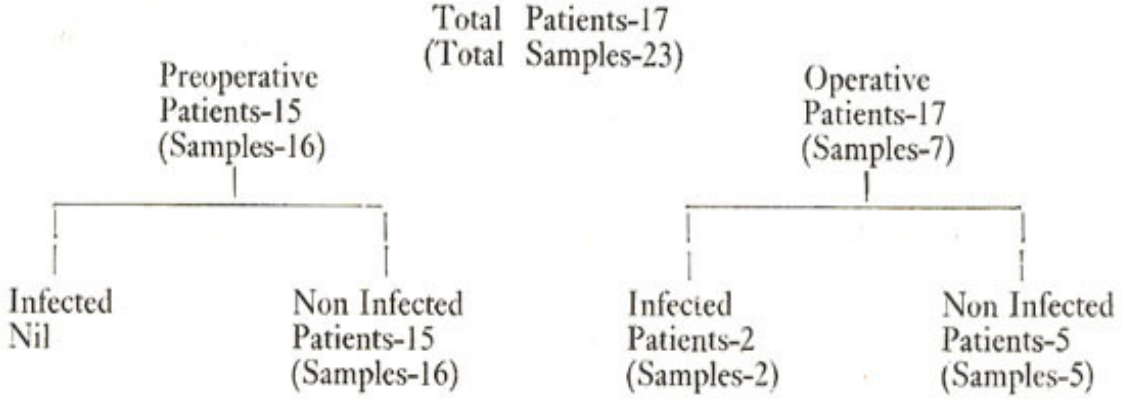


(iii) Bladder Stones in Children

Patients with stone bladder below the age of 15 years were included in this group. Results are shown in Figure-4.

Of the 17 preoperative urine samples 9 were infected. This probably reflects the delayed treatment in these cases. Stasis must be an important factor in bacterial colonization.
We were able to collect only 3 urine samples at operation and thus are not in a position to comment on this aspect.
Bladder Stones in Children (Fig. 4)

Fig. 4 **Results of Urine Culture in Bladder Stone Patients (Children)**

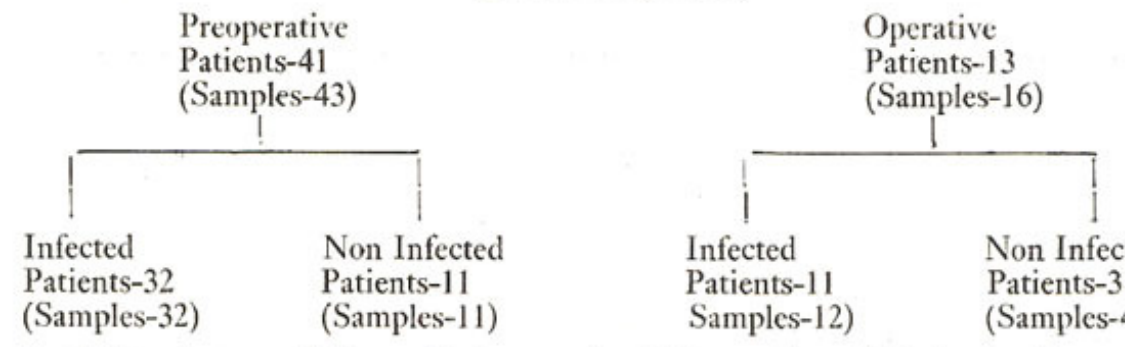


B. Urine Culture of Patients with Indwelling Catheters with Prostatic Obstruction

Patients with indwelling Foley's catheter for more than one week were included in this study. No antibiotic was given for three days prior to collection of urine samples. The results are shown in Figure-5.

None of the 17 preoperative urine samples were found to be infected. However, 2 out of 7 urine sample collected at operation were infected. Our results show low infectivity rate in bladder stone disease in children. The reports from India are similar. Thus Singh (1977) has reported sterile urine in 82 percent and Aurora (1977) in 70 percent of their cases.
Patients with Indwelling Urethral Catheters (Fig. 5)

Fig. 5 **Results of Urine Culture in Patients with Prostatic Obstruction with Indwelling Catheters**



Drug Sensitivity Pattern of Stone Patients and Prostatic Obstruction with Indwelling Catheters.

Urinary Tract Infection in Stone Patients. Renal Stones (Fig. 2)

Ever since bladder catheterisation was introduced on large scale in recent years, urinary tract infection has become a major problem. In the last 15 years closed system of drainage has become a standard procedure and non-irritant presterilised disposable catheters have become freely available so as to reduce the frequency of urinary tract infection. These and other innovations have reduced the initial incidence of urinary tract infection but it is well established that after 10 days of catheterisation the infectivity rate is almost 100 percent. The source of infection is the urethra (Bultitude and Eykyn, 1973). It is also known that, in normal patients, catheterisation has minimal effect on the upper urinary tract (Cattell et al., 1963). This has led Lapides and co-workers (1976) to establish self catheterisation in cases of neurogenic bladders as a standard, form of management. Various methods of prevention of urinary tract infection in catheterised patients have been attempted without significant success (Islam and Chapman, 1977; Warren et al., 1978).

Our study has shown an unusually high incidence of urinary tract infection in the catheterised patients (Fig. 5). This is not surprising under the existing system of health care in Pakistan.

Drug Sensitivity Pattern of Stone Patients and Prostate Cases with Indwelling Catheters (Table I and II)

It is significant to note that klebsiella was the commonest organism in both groups of patients. This is difficult to explain especially in the uncatheterised stone patients. Pseudomonas was the second and E. coli the third most common organisms in both groups.

The overall sensitivity patterns is peculiar to our patient population and can not be correlated to our previous work (under publication) or other studies done in Pakistan (Ahmed, 1975).

The establishment of urinary tract infection secondary to disease of upper urinary tract is a far more serious problem as compared to primary urinary tract infection. The former carries a definite mortality and has a high morbidity. We thus make a plea for an aggressive approach in the erradication of infection and early corrective surgery if indicated.

Catheterised patients are a different category. Despite a high infectivity of the bladder in these cases the mortality appears to be low. Antibiotic therapy may actually be harmful, though it would erradicate organisms of low virulance, with subsequent colonisation of resistant strains. However, surgery on these infected patients may carry a higher incidence of postoperative infection. This aspect needs to be studied in future.

Acknowledgement

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References

1. Ahmad, S.I., Zafar, T., Farooqui, S. and Naqvi, S.A.J. (1975) Urine examination of 1,460 patients suspected of urinary tract infection. JPMA., 25:169.
2. Aurora, A.L. Vesical calculus disease of childhood, in idiopathic urinary bladder stone disease, edited by R. Van Reen. DHEW Publication, 1977.
3. Bultitude, M.I. and Eykyn, S. (1973) The relationship between the urethral flora and urinary infection in the catheterized male. Br. J. Urol., 45:678.
4. Caltell, E.R., Curwen, M.P., Shooter, R.A. and Williams, D.K. (1963) Catheter-induced urinary infection. Br. J. Urol., 6:923.
5. Islam, A.K.M.S. and Chapman, J. (1977) Closed catheter drainage and urinary infection; comparison of two methods of catheter drainage. Br. J. Urol., 49:215.
6. Khan, F.A. Calculus Renal Failure. Lahore Newfine Printing Press, 1981.

7. Khan, F.A. (1979) Basic data on stone disease in Pakistan. Bulletin, 12:3.
8. Kunin, C.M. Detection, Prevention and Management of urinary tract infection. 3rd ed. Philadelphia, Lea and Febiger, 1979.
9. Lapides, J., Diokno, A.C., Gould, F.R. (1976) Further observations on self-catheterization. J. Urol., 116:169.
10. Rana, M.N. and Khan, F.A. (1976) Chemical analysis: 128 stones from the urinary tract. Prog. Med., 5:45.
11. Singh, S.M. (1977) Idiopathic urinary bladder stone disease in India, in idiopathic urinary bladder stone disease. Ed. by R. Van Reen. DHEW Publication, 1977.
12. Singh, M., Chapman, R., Tresiderd, G.C. and Blandy, J. (1973) The fate of the unoperated staghorn calculus. Br. J. Urol., 45:581.
13. Warren, J.W., Platt, R., Thomas, R.J., Rosner B. and Kass, E.H. (1978) Antibiotic irrigation and catheter-associated urinary tract infection. Urology, 11:142.