IN-DWELLING CATHETER AND URINARY TRACT INFECTION

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An in-dwelling catheter is a necessity after some gynaecological operations, and has been considered to be an important cause of urinary infection. An attempt was made in the gynaecological wards of the J. J. Group of Hospitals to study the frequency of urinary tract infections when an in-dwelling catheter was used, as also the causative organisms, and the response to different drugs.

Material and Methods

Forty-two patients with various genital tract abnormalities requiring vaginal operations were selected for the purpose. Table I shows the diagnosis in these cases.

Each patient was questioned regarding symptoms pertinent to urinary tract infection. It was difficult to attribute the symptoms only to urinary tract infection and as such bacteriological examination was required to diagnose the infection.

TABLE I

Indications for vaginal surgery

S. No.	Diagnosis	No. of Cases
1.	Prolapse	21
2.	Dysfunctional uterine bleeding with prolapse	11
3.	Prolapse with complete perineal tear	4
4.	Chronic cervicitis	3
5.	Vesico-vaginal fistula with pregnancy	1
6.	Elongation of cervix	1
7.	Rectocele	1

The clinical history was taken with particular reference to past histories of urinary tract infection, catheterisation, surgery and interference etc. during labour. There were three cases which gave history of catheterisation in the past. Of these, none showed evidence of infection pre-operatively.

On general examination, seven

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patients were found to be having hypertension. Out of these, only one was found to be harbouring infection pre-operatively. There was only one patient who was anaemic.

Cervicitis, cystocele, descent of uterus, stress incontinence and vesico-vaginal fistula were the main genito-urinary lesions found on clinical examinations.

Other systems showed no evidence of abnormalities. Complete haemogram of each patient was done. The following was the plan laid down for examinations of urine.

During the stay in the hospital, urine was collected on four occasions for examination:

I. Mid-stream sample of urine was collected within 2 to 3 days of admission.

II. Immediate pre-operative catheter sample was taken just prior to operation.

Interval between the first and the second samples of urine was usually 2-3 days. No patient was given any antibiotic or chemotherapeutic agent pre-operatively.

III. First post-operative catheter sample of urine was collected soon after the removal of in-dwelling catheter.

IV. Second post-operative catheter sample of urine was collected at the time of discharging the patient from the hospital—usually about 10th post-operative day.

Each patient was asked to come for a follow-up about a month after the day of discharge when fifth and final catheter sample of urine was collected.

Catheterisation was done as aseptically as possible by doctors after putting on sterile gloves. The external genitalia were swabbed with cetrimide and were again swabbed with sterile normal saline to avoid traces of the antiseptic contaminating the urine samples.

The urine was collected in sterile culture tubes obtained from the bacteriology department. The catheters used were autoclaved metal catheters. Each sample was sent to the bacteriology department within half an hour of collection and when this was not possible it was kept in the refrigerator until arrangements were made to do so.

In the bacteriology department, urine analysis, both macroscopic and microscopic, was done. It was cultured to find out the types and number of colonies per cubic centimeter. Sensitivities of organisms to various antibiotics were tested. All these investigations were carried out by qualified bacteriologists. Isolation of organisms showing more than 100,000 colonies c.c. was taken as criterion of infection. Kass calls this significant bacteriuria. Post-operatively, in-dwelling catheter was put in for varying number of days ranging from 1 to 18, depending upon the type of operation performed, the average being 4.1 days.

Some patients had to be catheterised after the removal of in-dwelling catheter, either to relieve retention of urine or to measure the quantity of residual urine.

All these cases were given some antibiotics in the post-operative period. Twenty-four patients were given capsule—Urobiotic, one capsule four times a day for seven days.

It is a combination of :

Oxytetracycline Hydrochloride	..	125 mg.
Sulphamethizole	..	250 mg.
Phenazopyridine Hydrochloride	..	50 mg.

Oxytetracycline is said to be effective against pseudomonas and proteus group of organisms. Sulphamethizole acts against both gram positive and gram negative pathogens commonly seen in urinary tract infections, including pseudomonas and proteus.

Phenazopyridine achieves analgesia locally in the urinary tract and is said to be good for frequency and urgency of micturition brought about by infection. The remaining 18 cases were given other antibiotics as in dosages shown below.

S. No.	Drugs	No. of cases
1.	Inj. Crystalline penicillin 5 lacs 6 hourly Inj. Streptomycin ½ gm. B.D.(5) followed by Tab. Urolucosil II T.D.S.(5)	2
2.	Inj. Crystalline penicillin 5 lacs 6 hourly Inj. Streptomycin ½ gm. B.D.(5) followed by Inj. Crystalline penicillin 5 lacs B.D. Inj. Streptomycin ½ gm. B.D.(2)	2
3.	Inj. Terramycin 100 mg. B.D.(1) followed by Cap. Terramycin 250 mg. Q.D.S.(6)	11
4.	Inj. Tetracycline 100 mg. B.D.(1) followed by Cap. Terramycin 250 mg. Q.D.S.(6)	2
5.	Multiple antibiotics	1

Out of the total 42 cases taken for trial, only 30 came for follow-up.

Results and Observations

The following observations from the results of the study, are made:

(1) On examining the urine pre-operatively, it was found that 2 cases showed evidence of infection and 40 were free from it. Of these 40 cases, 28 developed infection post-operatively i.e. subsequent to catherisation.

(2) The cases showing evidence of infection pre-operatively, had been observed to be having infection with the same organisms in mid-stream as well as catheter samples of urine, thus proving the observation of many workers that a carefully collected mid-stream sample of urine is as good as a catheter sample even for bacteriological purposes. Both the patients did not have any symptoms referable to urinary tract infection.

(3) Table II shows the frequency with which each organism was isolated pre- and post-operatively. E. Coli appears to be a common organism responsible for infection pre-operatively. E. Coli, Pseudomonas Pyocyaneus and Aerobacter Aerogenes appear to be mainly responsible for post-operative urinary tract infection.

(4) Table III shows that the incidence of urinary tract infection increases in direct proportion with the number of days, the in-dwelling catheter is kept.

(5) It is obvious from Table IV that the incidence of urinary tract infection rises with the number of times the patients had to be catheterised post-operatively.

TABLE II

Showing the isolation of organisms

S. No.	Organisms	Frequency with which the organism were culture : Pre-operatively	Post-operatively
1.	E. Coli	4	19
2.	P. Pyocyaneus	....	11
3.	A. Aerogenes	....	4
4.	Staph. Coagulase +ve	....	7
5.	Mixed Flora	....	5

TABLE III

The relation between the period of the in-dwelling catheter and the urinary infection

No. of days for which in-dwelling catheter was kept	No. of cases	Cases showing urinary tract infection
1	1	0
2	3	0
3	19	12
4	14	11
5	3	3

TABLE IV

The incidence of urinary infection in repeatedly catheterised patients

More than five of times the patients had to be catheterised	2 No. of cases	2 Infection
0	25	15
1	14	11
2	2	2
3	1	1

(6) In Table V is given the incidence of the infection in each of the third and fourth samples of urine against the antibiotics given to them. This confirms that the urinary tract is very vulnerable to infection post-operatively when an in-dwelling catheter is used and that it cannot be completely prevented by any antibiotic or drug combinations.

TABLE V

The incidence of urinary infection in the different antibiotics groups

S. No.	Drugs	Total No. of cases	Post-operative samples showing evidence of infection I	II
1.	Urobiotic	24	15	9
2.	Other antibiotics	18	12	9
3.	Total	42	27	18

(7) Table VI gives information about the number of cases harbouring infection at the time of follow-up against the antibiotics given to them.

This shows that urinary tract infection produced by catheterisation is difficult to eradicate in some cases in spite of the antibiotics.

TABLE VI

Infection in the follow-up cases

S. No.	Drugs	No. of cases followed-up	No. of cases showing evidence of infection
1.	Urobiotic	18	4
2.	Other antibiotics	12	5
3.	Total	30	9

Discussion

Catheterisation, as we have seen, is a risky procedure. Even a single catheterisation may cause infection. But opinions have differed on how much harm is done by the infection and how much effort should be made to prevent them. Paterson has found that 71% of patients were infected by the time the in-dwelling catheter was removed after 48 hours. About 2/3 of the patients were infected at the time of discharge in spite of routine antibiotics. While most patients escape without serious harm, an important minority suffer serious results like acute and chronic pyelonephritis and recurrent cystitis. This can best be prevented than cured.

Enumerating the possible means of urinary tract infections after operation, Gillespi feels the organisms may be from the catheter itself which might not have been properly sterilised or the organisms might be from the patient's urethra and introitus which cannot be sterilized. The organisms can also be carried up the drainage tube by rising air bubbles. The organisms are said to proliferate in the secretions between the urethra and the catheter and the movements of the catheter carry them to the bladder. The only way to prevent urinary tract infection, therefore, is to avoid catheterisation. However, this cannot be avoided in some operations like repair of prola or vesico-vaginal fistula.

Pyrah recommends that catheter to be introduced in urethra should be well lubricat and should be of the size which is les than the lumen of the urethra and should be passed with utmost gentleness so as to cause not more than minimal trauma to the urethral mucosa. He further recommends that the in-dwelling catheter should never be so large as to distend the urethra. Closed drainage system containing disinfectants should always be employed. This prevents cross infection. Continuity between the catheter and the drainage tube should never be interrupted lest the infection creeps up with the air bubbles rising up the in-dwelling catheter. He advises judicious use of urinary tract antibiotics and vigo-

rous discipline of residents and nursing staff regarding catheterisation.

Gillespi and others advocate disinfection of the urethra by instilling a solution of chlorhexidine.

Paterson and colleagues suggest instilling 2 oz. of aqueous solution of chlorhexidine digluconate, 1:5000, into the bladder before the catheter is withdrawn, so as to destroy the bacteria before they cause infection. This sort of judicious use of antiseptics is preferable to prophylactic administration of systemic antibiotics, for by breeding drug resistant bacteria they are likely, in the long run, to cause trouble. In the present study, different antibiotics and combinations of drugs were employed to try and prevent urinary tract infection in the presence of the in-dwelling catheter.

ummary

1. Forty-two cases undergoing vaginal operations and requiring the use of in-dwelling catheter were studied.

2. Two cases were found to be infected pre-operatively.

3. Post-operatively, 27 showed evidence of infection at the time of removal of catheter and 18 at the time of discharge.

4. Thirty cases were followed-up. Of these nine showed infection.

5. E. Coli was the responsible organism for urinary tract infection in a large number of cases.

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