

A METHOD FOR THE PREVENTION OF CATHETER INDUCED URINARY INFECTION FOLLOWING REPARATIVE VAGINAL SURGERY

by

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The use of the catheter is considered to be one of the most important causes of urinary infection and the dangers of catheterisation are well recognised (literature cited by Das *et al*, 1967). This warning against the indiscriminate use of the catheter has not only called for meticulous attention to be paid in cases where catheterisation is inevitable, but has revived interest in local instillation of antibacterial agents into the bladder, a procedure common in the pre-antibiotic era.

We report the excellent results obtained with a method of "bladder irrigation" using chlorhexidine solution (1:5000) in 81 cases where an in-dwelling catheter had to be used following reparative vaginal surgery.

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Material and Methods

The cases were of genito-urinary prolapse and had some form of reparative vaginal surgery. Eighty-one cases had been irrigated with chlorhexidine solution (1:5000) according to the method described below. For comparison, 39 similar cases receiving parenteral antibiotic prophylaxis and 20 cases where no antibacterial measures were adopted were included in this study. Except for 7 cases treated with chlorhexidine at the Tagore Hospital, Kondagoan, all others were studied at the Irwin Hospital, New Delhi. Apart from the measures against urinary infection, the postoperative management of all cases was similar.

For those receiving chlorhexidine irrigation, in the operation theatre at the conclusion of the operation, a plain rubber catheter was inserted and 50 c.c. of chlorhexidine (1:5000) solution was instilled into the bladder. In the ward, the catheter was connected with a sterile closed-irrigating set and kept in-dwelling for 48 hours. The set consisted of a three-way glass tube, one end of which was connected to the graduated irrigating bottle containing chlorhexidine solution (1:5000); the second end was

connected to the catheter and the third end connected to the urinary bottle draining the bladder. Two clamps were employed to regulate the flow of urine and irrigating fluid respectively. Every six hours, the bladder was evacuated by unclamping the tubing connecting the urinary bottle. Subsequently, by releasing the tubing leading to the irrigating bottle, 50 c.c. of chlorhexidine solution was allowed to irrigate the bladder through the catheter. This process of emptying and irrigating the bladder was repeated every six hours for 48 hours. On the third morning (i.e. after 48 hours), the catheter was taken out after injecting 50 c.c. of chlorhexidine solution.

Twelve of the 81 cases required further 'post drainage' intermittent catheterisation, and 50 c.c. of chlorhexidine solution was instilled into the bladder following each process of emptying with intermittent catheterisation by a glass funnel and continued till the bladder could void spontaneously.

Chlorhexidine, 1:5000, solution was prepared in a graduated infusion bottle with distilled water from 20 per cent w/v aqueous solution of chlorhexidine gluconate supplied by

M/s. Imperial Chemical Industries, Ltd.

Samples of urine collected under sterile condition were examined prior to surgery and post-operatively on every second morning for eleven days. Centrifuged deposit of urine was examined microscopically for pus cells and bacteria. Three m.m. diameter loopful of the deposit was cultured on blood agar and MacConkey agar media. Following aerobic incubation, the growth, when present, was identified according to the methods described by Mackie and McCartney (1960). The criteria of sepsis were considered to be the presence of more than five pus cells per high power field along with positive bacterial growth (Champ, 1955; O'Sullivan *et al*, 1960; Guttman and Stokes, 1963).

Results

Prior to surgery, all the cases had sterile urine and did not show evidence of urinary sepsis according to the criteria used. The incidence of urinary sepsis in the three groups, those irrigated with chlorhexidine, those receiving parenteral antibiotic prophylaxis and those without antibacterial measures, is shown in Table I.

TABLE I

The comparison of the incidence of catheter-induced urinary infection with local instillation of chlorhexidine, parenteral antibiotics and with no antibacterial measures.

Antibacterial measure.	No. of cases treated.	No. of cases found infected.
(A) Local instillation with chlorhexidine solution (1:5000) by a closed-irrigating set	81	3 : 3.7%
(B) Parenteral antibiotic prophylaxis*	39	33 : 84.6%
(C) No antibacterial measures	20	17 : 85.0%

*Crystalline penicillin, 500,000 units, twice daily and streptomycin, 1 mg. daily, both given I. M.

With the bacteriological methods used, the organisms isolated were *Escherichia coli*, *Proteus* sp., *Klebsiella* sp., *Staphylococcus pyogenes*, *Streptococcus faecalis* and *Pseudomonas pyocyanea*, named according to the order of frequency with which these were isolated.

Of the 81 cases, where chlorhexidine was instilled, there were only 3 cases showing urinary sepsis. In one case, *Proteus* sp. was isolated; in another, there was *Klebsiella* sp. while in the third, there was mixed infection with *Esch. coli* and *Staph. pyogenes*.

In marked contrast to the above findings, sepsis was noted in 33 out of 39 cases (84.6 per cent) receiving parenteral antibiotics and in 17 out of 20 cases (85.0 per cent) with no antibacterial measures.

Discussions

After reparative vaginal surgery, it becomes inevitable that a catheter, whether in-dwelling or intermittent, has to be used. The risk of urinary sepsis is high as has been shown not only in our study but also that of others (Pathak *et al*, 1968). In this study, as also that of Pathak *et al* (*loc. cit.*), the use of prophylactic antibiotics has shown very disappointing results.

During this decade, several studies have reported the incidence of urinary sepsis following instillation of antibacterial agents into the bladder. The different methods adopted and their results in respect to urinary infection are shown in Table II.

Of the many methods shown in Table II the method of closed irriga-

tion with chlorhexidine (1:5000) in the catheterized bladder with a three-way glass tube, as used in this study, has given extremely good results in preventing urinary sepsis. This method is simple to maintain in an aseptic condition. Being an in-dwelling catheter, it is less time consuming and therefore more convenient for post-operative care than frequent, intermittent catheterization. The whole process of irrigation and evacuation can be undertaken with the minimal disturbance to the patient, manipulating the two clamps from outside, without any appreciable chance of contamination.

This arrangement is again as good as a closed drainage system. The catheter and the Y glass tube is filled up with chlorhexidine solution, making a barrier against ascending infection even when the drainage tube is kept free in an open urinary bottle.

Of the three infected cases, two developed urinary retention even 48 hours after operation and as such required subsequent intermittent catheterisation under chlorhexidine cover. It is difficult to say whether an error during subsequent intermittent catheterisation caused the infection. However, in all these cases the possibility of 'post-irrigation' extension of infection, either from the urethra or from the infected operative wound through the traumatised bladder, as suggested by Hurl (1962), cannot be ruled out.

Summary

Since catheterisation is almost inevitable following reparative vaginal surgery and carries the risk of a high

TABLE II

The various methods of instillation of antibacterial agents adopted by different workers with their results in respect to urinary infection.

Authors	Antibacterial agent and method used.	Total cases	Number found infected.
Paterson et al (1960)	Chlorhexidine (1 : 5000) Open instillation after intermittent catheterisation with glass funnel.	52	7 13.5%
Martin and Bookrajan (1962)	Acetic acid (0.25%) Tidal drainage with three-way Foley catheter.	6	1 16.7%
Martin and Bookrajan (1962)	Neomycin & Polymyxin Intermittent irrigation with three way Foley catheter.	10	0
William and Julian (1962)	Acetic acid (0.25%) Tidal drainage with three-way Foley catheter.	64	24 37.5%
Linton and Gillespie (1962)	Chlorhexidine (1 : 5000) Closed drainage with anchoring catheter and chlorhexidine cover for subsequent catheterisation.	39	3 7.7%
Hannah (1963)	Chlorhexidine (1 : 20000) Intermittent closed irrigation with triple lumen Foley catheter.	69	12 17.4%
Gillespie et al (1964)	Chlorhexidine cream. Sterilisation of the urethra with chlorhexidine cream, closed drainage with anchoring Foley catheter and antiseptic barrier by applying cream daily at external urethral meatus.	155	23 14.8%
Asthna and Kishore (1965)	Chlorhexidine (1 : 5000) Open instillation after intermittent catheterisation with glass funnel.	34	4 11.8%
Present study	Chlorhexidine (1 : 5000) Intermittent closed irrigation in the catheterised bladder with three way glass tube.	81	3 3.7%

incidence of urinary sepsis, a method of closed-irrigation with chlorhexidine solution (1:5000) was practised in 81 cases. The incidence of urinary sepsis was 3.7 per cent in contrast to approximately 85 per cent noted with the use of parenteral antibiotic prophylaxis. Other advantages of the closed-irrigation method have been shown.

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