CLEAN, INTERMITTENT SELF-CATHETERIZATION IN THE TREATMENT OF URINARY TRACT DISEASE

JACK LAPIDES, ANANIAS C. DIOKNO, SHERMAN J. SILBER AND BETTE S. LOWE

From the Section of Urology, Department of Surgery, University of Michigan Medical Center, Ann Arbor, Michigan

Based upon a series of studies involving urinary infection we postulated that most cases of urinary tract infection are due to some underlying structural or functional abnormality of the urogenital tract which leads to decreased resistance of tissue and to bacterial invasion. The urothelium or renal parenchyma can be affected through damage to its structural integrity by neoplasm, calculi, foreign bodies such as inlying catheters, traumatic instrumentation and so forth. However, the most common cause for increased susceptibility to bacterial invasion is decreased blood flow to the tissue.

Blood flow to the bladder can be reduced by increased intravesical pressures and/or by overdistention of the organ. The resulting ischemic bladder tissue is then prey to invading gram-negative organisms from the patient’s own gut via the hematogenous or lymphogenous route. Transient bacteremia is believed to be a common phenomenon in healthy individuals. In the female patient poor voiding patterns, such as infrequent voiding, is the primary cause of cystitis whereas obstruction is the leading cause in the male patient.

Thus, it can be inferred from our theory that maintenance of a good blood supply to the renal pelvis, ureter, bladder and urethra by avoiding high intraluminal pressures and overdistension is the key to prevention of urinary tract infection. Residual urine in itself and organisms supposedly ascending through the urethra are of doubtful importance in the genesis of urinary infection. These ideas have led us to treat urinary tract infections in most girls and women with a regimen of frequent day and night voiding and appropriate antibacterial medication when indicated. We rarely have found it necessary to dilate the urethra or perform an operative procedure upon the lower or upper urinary tract, and this includes ureteral reimplantation for reflux.

The concept under discussion provides an explanation for the tolerance of prolonged catheter drainage by many patients without becoming septic (for example cystostomy, ureterostomy and nephrostomy) and the excellent response of individuals following cutaneous vesicostomy, despite the fact that all of these people have continual bacteriuria. It will be observed readily that the hypothesis serves also to account for the complications of catheter usage. As observed by Campbell “retention rather than catheterization is the thing to be feared”. A catheter which drains freely can provoke sepsis within minutes if it becomes obstructed and allows the bladder to overdistend or intravesical pressure to increase markedly. Under these circumstances the bacteria in the urine will be disseminated readily into the systemic circulation. Similarly intermittent catheterization becomes dangerous if the patient is catheterized and then the bladder is allowed to overdistend before catheterization is again performed.

To recapitulate, intermittent catheterization of the bladder should be an innocuous procedure provided the bladder is not permitted to overdistend and it is performed in an atraumatic

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fashion. Furthermore, a clean and not an aseptic technique should suffice since any bacteria introduced by the catheter will be neutralized by the resistance of the host.

METHODS AND MATERIALS

The first opportunity to test some of our concepts occurred in 1970 when a 30-year-old woman with multiple sclerosis complained of urge incontinence, incomplete emptying of the bladder and recurrent urinary infection. The woman had undergone several unsuccessful operative procedures for correction of the urinary incontinence. Cystometric examination disclosed upper and lower motor neuron involvement with a residual urine of 120 ml.

Urinary diversion was suggested for alleviation of the urinary incontinence and incomplete bladder emptying but the patient refused any operative procedure. It then occurred to us that we might be able to help by teaching her to catheterize her bladder every 2 to 3 hours during the day and several times at night. As an additional aid in controlling urge incontinence owing to the upper motor neuron lesion, 15 mg. oral probanthine could be given every 4 hours. The proposed regimen was discussed with the patient who accepted the idea readily and enthusiastically.

The technique of self-catheterization was taught by our clinic supervisor. The patient washes her hands with soap and water. She then assumes a lithotomy position on the examining table with her feet on the table and the knees held apart so as to expose the urethral meatus and introitus. A hand mirror is placed at the foot of the table so that the patient can visualize the urethral meatus when it is pointed out to her by the nurse. The subject is then given a 14F plastic or rubber Robinson catheter with some lubricant on the tip and instructed to insert the catheter through the urethral meatus into the bladder. When the patient has accomplished the catheterization, she is advised to partially empty the bladder through the catheter, withdraw the catheter and then recatheterize herself. Several hours later the patient catheterizes herself again under the supervision of the nurse but this time the catheterization is carried out with the patient sitting on a toilet seat and the mirror being placed on a chair facing the toilet. The patient is allowed to catheterize herself in her room and on her own thereafter. At the time of discharge from the hospital the patient is given several 14F Robinson catheters, a tube of water-soluble lubricant and a bottle of detergicide solution. She is instructed to use a small tupperware or margarine plastic container for sterilizing the catheters. This patient was discharged from the hospital after several days and was seen again as an outpatient for urinalysis and physical examination at periodic intervals.

After we had observed our first patient for 6 months, we began to place other patients on the regimen. The technique of catheterization was taught to mothers in the case of small children. As of March 1971, 12 female and 2 male patients, ranging from 3 to 65 years, were participating in the study.

Nine patients had upper and lower motor neuron bladders associated with multiple sclerosis, myelodysplasia, myelomeningocele, adhesive arachnoiditis and a lipoma of the conus medullaris. Two individuals had reflex neurogenic bladders resulting from traumatic transverse myelitis and 3 patients showed no neurologic deficit but did have bladder difficulties because of atonicity stemming from infrequent voiding.

All patients with mixed upper and lower motor neuron type bladders suffered incomplete bladder emptying, urinary incontinence, pollakiuria, urgency and urinary tract infection. Because of these signs and symptoms most women had difficulty holding jobs, their social activities were limited markedly and their conjugal obligations were restricted because of urinary incontinence during sexual intercourse. Some patients had severe mental depression.

The 2 individuals with transverse myelitis and reflex neurogenic bladders had the usual symptoms and signs of urinary incontinence and intermittent episodes of urinary infection associated with sepsis.

Two women with the infrequent voiding syndrome had large capacity bladders with high volumes of residual urine and resistant urinary tract infections. The third patient illustrates an unusual complication of infrequent voiding, namely intermittent episodes of acute urinary retention requiring relief in the emergency rooms of various hospitals. Because of the frequency of these occasions, which usually were

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precipitated by holding urine for long periods and the dread of having to be rushed to the hospital for catheterization, she over-reacted by urinating every half hour, day and night. This pattern of voiding prevented the episodes of urinary retention but obviously began to interfere with daily activities and sleep.

RESULTS

Our first patient learned to catheterize herself in less than a day. After several days she found that she could locate the urethral meatus by palpation and discarded the use of the mirror. She has no discomfort because of the catheterization and is now enjoying a new life because she no longer needs to contend with difficulty in emptying the bladder and stress and urge incontinence. She has resumed normal sexual activity with her husband because she no longer has urinary incontinence during intercourse. Her social life is full and she has begun to travel. Physical examination after 16 months disclosed no abnormality of the urethral meatus or urethra. The urine was completely devoid of bacteria and cellular elements after 4 weeks of clean, intermittent self-catheterization and has remained so. No antibacterial medication has been given to the patient during this time. During her most recent outpatient visit she disclosed that for the previous few months she had been cleaning the catheter with soap and water and not detergent. She also confessed that she had dropped the catheter often and merely washed it with water and proceeded to catheterize herself.

None of our other patients has found the technique of catheterization insurmountable. Most learned the method after several trials. Some patients have found that self-catheterization is facilitated by placing a tampon or having a finger of the opposite hand in the vagina.

All patients with combined upper and lower motor neuron bladders responded in much the same fashion as our first patient. The adults have found that intermittent catheterization has brought their urinary difficulties under control so that they now can live a normal, happy life. We have never seen a more grateful group of patients. Of the 9 patients in this group 4 had negative urine specimens and were not taking medication, 2 had negative urine specimens but were on antibacterial therapy and 3 had bacteriuria without pyuria. Two patients with infection had been careless about catheterizing themselves at regular, frequent intervals; one is a 13-year-old boy who has found it simple to catheterize himself and has remained afebrile, continent and without urethritis for 5 months.

A young girl and a man with reflex neurogenic bladders have remained continent and afebrile on the regimen. Both patients have negative urine specimens at the present time.

Two of the 3 patients with decompensated bladders have negative urine specimens and are not taking medication. The third patient has infection and we are in process of treating her.

The woman with periodic acute urinary retention presently is voiding at normal intervals and sleeping at night since she knows that she can relieve the retention at any time by self-catheterization. Although it was necessary to catheterize herself for acute urinary retention only once during the past 6 months, she states that she catheterizes herself once a week in order to maintain her technique.

DISCUSSION

The data herein presented clearly reveal that non-sterile, clean, intermittent, self-catheterization of the bladder through the urethra in patients of either sex will help in the treatment and prevention of urinary tract infection. These findings are entirely in accord with our concept of the mechanisms of urinary tract infection and plainly contradict the commonly-held beliefs that intermittent urethral catheterization or instrumentation causes urinary infection and that organisms in the urethra or those carried into the bladder by the catheter are responsible for most urinary infections. To the contrary we have shown that with intermittent, unsterile, catheterization, cystitis and pyelonephritis have been eradicated. However, it should be emphasized that catheterization without regard to the state of distention of the bladder will lead to cystitis, pyelonephritis and sepsis if catheterization is not frequent enough to prevent overdistention or high intravesical pressures.

Various urinary tract abnormalities in patients who have benefited objectively and subjectively by the regimen of clean, intermittent self-catheterization are described. The procedure has obviated the need for surgical operations designed to correct outlet obstructions and to divert the urine. The surface has been barely scratched
insofar as the possible uses of clean, self-cathetherization in the treatment of urinary tract disease are concerned.

Guttmann has advocated the use of intermittent, strictly aseptic, urethral catheterization in the treatment of paraplegics and quadriplegics. However, his regimen required the physician to perform catheterization in the male patients and a registered nurse in female patients. Apparently he believed that urinary infection originated primarily from bacteria introduced through the catheter and that sterile urine could be maintained despite intermittent catheterization "provided proper aseptic precautions are taken". Intermittent, aseptic, urethral catheterization never became popular in the United States since it was believed that not enough physicians were available to perform the number of daily catheterizations in the manner advocated.

Our observations reveal that sterile urine can be obtained or maintained without the use of a sterile catheterization technique by a physician or nurse. Thus, it now becomes possible to consider the use of intermittent, clean, self-cathetherization in patients with spinal cord injuries in the early and late care of their bladders. We have initiated this program at our center and look forward to its development.

SUMMARY AND CONCLUSIONS

Fourteen patients with urinary abnormalities caused by neurogenic and atonic bladders and encompassing urinary retention, incontinence, infection and mental difficulties were treated with a non-sterile technique of intermittent self-catheterization. Tremendous improvement was observed in all abnormal parameters including urinary infection. The fact that clean, intermittent self-catheterization helped eradicate urinary infection and maintain a sterile urine for prolonged periods lends further support for our concept of the physiopathology of most urinary infections.

ADDENDUM

Presently female patients use only a clean catheter; no lubricating material or sterilizing solution is prescribed. The secretions present in the female urethra are quite adequate for smooth passage of a catheter.

Mrs. B. S. Lowe taught patients the technique of self-catheterization.

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