

MANAGEMENT OF POSTOPERATIVE URINARY TRACT COMPLICATIONS*

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WE have been afforded the opportunity of acting as urologic consultants for the Department of Surgery at the Lahey Clinic which does approximately 10,000 surgical procedures yearly. At this time we will attempt to outline some of the common problems we have encountered, presenting a general resumé rather than an exhaustive statistical study. All too frequently the postoperative urinary tract complications supersede the patient's original complaint, and upon the treatment of these complications may depend the outcome of the case. Therefore, even though valuable contributions to the subject of postoperative urinary tract complications have been made in the literature, a review seems indicated.

COMPLICATIONS

The three most common complications which still plague the general surgeon are *postoperative urinary retention*, *postoperative urinary tract infection*, and *postoperative urinary suppression*. These are frequently related and may occur in any order, but often develop in the order given.

Postoperative Urinary Retention. Since postoperative urinary retention may be dependent upon the anesthesia, the type of anesthetic, its depth and length are important. It is generally recognized that marked depression of sensory perception from any anesthetic permits vesical distention; and it would seem that local field block, spinal and inhalation anesthesia, in the order given, least affect the ability to urinate. At the Lahey Clinic, the use of inhalation anesthesia is limited to head, neck and chest cases, spinal anesthesia

being employed for all abdominal and lower extremity operations. However, small amounts of inhalation anesthetic are given if apprehension occurs. A recent survey at the Clinic showed that 17 per cent of patients had to be catheterized after anesthesia.

In pelvic surgery the denervation of the bladder and the relocation or final malposition of the bladder constitute a well recognized factor. The distortions of the bladder seen on the cystogram and on cystoscopic examination, particularly after hysterectomy, advancement procedures and interposition operations are so definite that one is surprised when the patient can urinate at all. (Fig. 1.)

Removal of the lower bowel allows definite bladder distortion. (Fig. 2.) With removal of the rectum, the bladder loses its posterior support and practically hangs from the bladder neck down into the hollow of the sacrum. A definite acute angle is formed by the posterior urethra or vesical lip and the floor of the bladder. In many instances, the trigone is unable to correct this angle; and the detrusor muscle, moving about in space, so to speak, with no fixation of its base, is only weakly effectual. This malposition, with only minor disturbances in the balance of the autonomic nervous system, predisposes to urinary retention. This bladder difficulty is much more frequent and severe in the presence of even the slightest amount of prostatic enlargement; and since men in the age group in which prostatic enlargement is most common also are most susceptible to carcinoma of the rectum, many of these patients fall to the care of the urologist.

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We have proved by cystometric determination, and numerous other investigators have done likewise, that these bladders demonstrate such changes as markedly

tensing these muscles. It is frequently necessary to advise the nursing staff that if these patients are put in Fowler's position, they will be able to urinate.

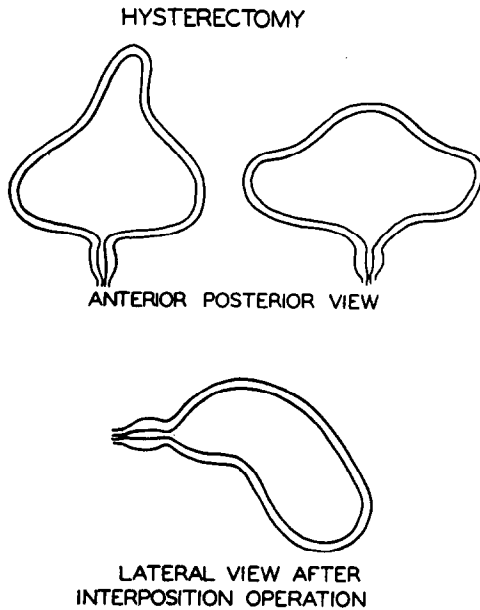
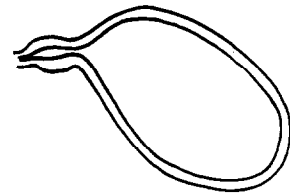


FIG. 1. Change in shape and position of bladder after hysterectomy.

diminished sensory component, increased bladder capacity, decreased intravesical pressure, and absence or definite diminution of the maximal voluntary pressure curve. (Fig. 3.) The anatomic and neurogenic lesions affecting the bladder often are happily transient, this organ having the faculty of adjusting itself readily to unusual positions and disturbances of innervation.

Postoperative retention due to true anatomic obstruction of the urethra is often either latent or overlooked. This is particularly true following repair of a hernia or a hemorrhoidectomy in a person past fifty years of age, when the reason for the hernia or hemorrhoids was not ascertained. Even on rectal examination, median lobe enlargement, contracture of the bladder neck, and urethral stricture may be overlooked.

Also, many obese persons lack the necessary abdominal wall component (Bauchpressor), and large ventral hernias or separation of the recti prevent them from



LATERAL VIEW AFTER ABDOMINOPERINEAL RESECTION

FIG. 2.

The *prevention* of postoperative urinary retention should be our first thought. Our impression is that if the house physician or the resident staff always appreciated that the urinary bladder undergoes decompensation just as truly as does the heart, patients would not be allowed to become distended so that their bladders held 1,000 to 1,500 cc. If the term "postoperative bladder decompensation" were attached more often to the consultation sheet, perhaps closer attention would be paid to the condition of the patient's bladder. If it were the custom more often for the physician to put his hand under the sheet and feel the patient's bladder, at least for the first forty-eight hours, fewer cases of postoperative retention would be encountered.

Postoperative decompensation may be said to occur when the bladder is allowed to reach the level of the umbilicus. In modern times, most patients receive parenteral fluids after abdominal surgery; consequently, in the first twelve hours 3,000 cc. or more of fluid may be given. In the absence of shock, the use of hot blankets and hot water bottles, with resulting loss of large amounts of body fluid, now is being omitted; consequently much of the fluid intake may be expressed in urinary output. It is manifestly impossible for a patient to void after eight hours of retention, since by this time the bladder is so huge that the bladder wall has lost its ability to contract in response to the

ordinary sensations. Normal persons taking 3,000 cc. of fluid have to void more often than every eight hours. To expect a patient

degree. In a recent series limited to gall-bladder and stomach surgery, retention occurred in only approximately 6 per cent

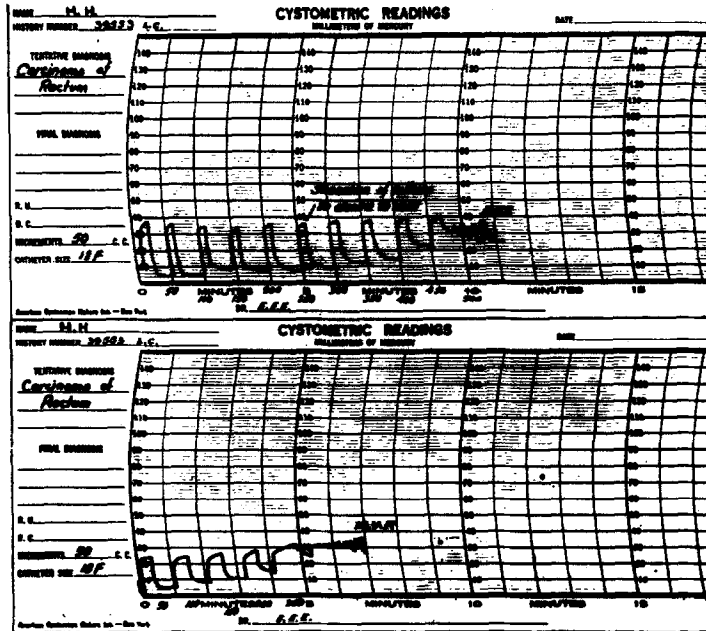


FIG. 3. Cystometric readings after abdominoperineal resection of the rectum.

who has had an anesthetic, has an abdominal incision, and is lying in bed, to void only once in eight, ten or even twelve hours, as is so frequently recorded in the postoperative instructions, needs no comment. The order to catheterize at intervals longer than six hours is distinctly unphysiologic.

The use of drugs is perhaps the most widespread method of combatting retention, those that stimulate the parasympathetic nerves being the most useful. The most familiar is prostigmine, used alone or in combination with morphine. Recently, Hand² of this Clinic has used the combination of prostigmine and morphine because of the recent reports of its potentiating effect. The addition of prostigmine, 0.5 mg., $\frac{1}{130}$ gr., or 1 cc. of a 1:4,000 solution, to morphine, gr. $\frac{1}{8}$, will result in therapeutic effects similar to those resulting from the use of morphine, gr. $\frac{1}{4}$.

Our clinical investigation tends to confirm the laboratory findings to a moderate

of the patients. Prior to this, retention occurred in 15 to 20 per cent of the patients. Furthermore, this combination (morphine, gr. $\frac{1}{8}$, and prostigmine, gr. $\frac{1}{130}$) by subcutaneous injection, relieves pain within only ten to fifteen minutes, produces an effect which lasts for four to five hours, and does not dull the sensorium too much. Because of its apparent value, it is now being employed routinely at the Clinic.

Doryl, an acetylcholine derivative, has also been employed; however, recently a death occurred in a young man in whom no other reason for death than the use of the drug could be found. The dose given was supposedly 0.25 mg. Rupture of the bladder in patients with diverticula or with marked degeneration of the bladder itself is within the realm of possibility.

The prophylactic instillation of various drugs into the bladder locally is an attempt to increase the irritability of the bladder and to overcome the depression of the sensory component produced by the anes-

thetic, postoperative medication and fear. The use of mercurochrome by Woodruff,⁵ Helfert³ and others is a more recent application of this.



FIG. 4. Excretion urogram after right ureteral ligation. The right side shows hydronephrosis and hydroureter. The left side is normal.

Our practice for the avoidance of bladder decompensation follows: The patient is catheterized every six hours until the residual urine is 60 cc. or less. After each catheterization, 2 oz. of $\frac{1}{2}$ of 1 per cent aqueous mercurochrome is instilled. This method reduces the residual urine more quickly than intermittent catheterization without an irritant solution. If after twenty-four hours the residual urine is not reduced appreciably, the patient is placed on closed drainage with an indwelling catheter; and the bladder is irrigated every three hours with 2 per cent boric acid or 0.8 per cent sulfanilamide solution. Once having established the decompensated bladder, the patient is allowed to remain on closed drainage for a minimum of five days, and then is given a trial without a catheter and tested for residual urine every six hours as before. Usually one such course of management will suffice. In borderline cases, when the bladder is not lessening its residuum well

enough, we have used 0.5 to 1 cc. of doryl one-half hour before catheterization as an added stimulus to the contractile power of the detrusor muscle. This is used, however, only in the absence of any obstructive lesion. Also, immediately upon starting the catheterization program, the patient is given 0.25 Gm. of sulfathiazole by mouth four times daily.

Under this plan of treatment, fluids can be forced without concern; and we have yet to see a resulting upper urinary tract complication. This plan has been invaluable in those patients with advancement of the bladder or cystocele-correcting procedures. In the past some of these patients have broken down their repair because the residual urine was not checked or the bladder was allowed to distend to an enormous degree because the ability of the bladder to empty itself was not determined.

A patient who has undergone abdominoperineal surgery or who is in the age group of prostatic disease, after two trials of this management, is given a cystoscopic examination and any bladder neck obstruction is corrected. If no mechanical obstruction is found, cystometric studies are done to detect an undisclosed nerve lesion.

In the male with a urethral stricture, the passage of a filiform into the bladder and tying it in place is often of assistance. This method, which is applied by older urologists, is unknown or unappreciated by many of the younger men. It results in less damage to the patient than forcibly dilating a stricture to allow spontaneous voiding or to enable a catheter to be put in place.

Postoperative Urinary Tract Infection. It seems inevitable to link postoperative urinary tract infection with bladder atony or a persistent undiscovered residual urine. The type of surgical patient in whom this is most frequent and is least appreciated is the woman with a large cystocele. Many multiparous women carry a bacteriuria which flares up into a clinically evident urinary tract infection on bad postoperative management.

Sulfonamides in small prophylactic doses, totalling 1 Gm. a day, should be used more often, since this amount will control postoperative urinary tract infection. When we are consulted preoperatively concerning a patient with prostatic hypertrophy who will undergo surgery for a malignant condition elsewhere in the body, which has taken precedence over the prostatic condition, we prescribe 0.25 Gm. of sulfathiazole four times a day. If the patient is easily upset by this drug and especially if he is undergoing surgery of the gastrointestinal tract, the use of enteric-coated tablets materially avoids the nausea which, despite popular belief, does not always seem to be due to a central effect. For the patient in whom both forms of sulfathiazole elicit a reaction, sulfadiazine or sulfamerazine may be prescribed, in the same dosage. When all the sulfonamides are attended by reaction, mandelamine (0.5 Gm. four times a day), although less effective, will be useful.

Postoperative Urinary Suppression. The fact that true partial or complete anuria is present rather than retention must always be established. The classification into prerenal, renal and postrenal forms permits of a workable clinical arrangement.

The search for loss of excessive body fluids through vomiting, hemorrhage, diarrhea and gastrointestinal fistula is required. Periodic blood pressure readings to rule out shock, vascular accident and coronary occlusion, of course, must all be kept in mind. Post-transfusion anuria in the presence of hemorrhage and shock may confuse the picture greatly so that a definite diagnosis at times is difficult. The widespread use of the blood bank demands adequate crossmatching. Reaction in Rh-negative recipients given repeated transfusions from Rh-positive donors is now an appreciated cause of anuria.⁴ In this situation, the treatment consists of transfusion with Rh-negative blood, and the use of alkali to prevent precipitation in the renal tubules.

Chronic Bright's disease always has

seemed to us a dangerous condition in an obese person undergoing abdominal surgery and having some degree of postoperative shock. Recently an obese male with chronic Bright's disease was in partial shock following cholecystectomy and developed oliguria. The urine had a low specific gravity; and the blood pressure, which previously had been elevated, approached normal. It was only after the use of 50 per cent glucose and intravenous fluids that the urinary output became normal. Even with a diminished output, the fluid intake must at all times be maintained. Also, in the presence of edema, so long as there is output, fluids must be continued. We have not recommended or seen any benefit result from renal decapsulation and denervation.

We are now all familiar with the notorious offenders, namely, the sulfonamides, as a cause of anuria. Our experience indicates that if sulfadiazine is given without adequate fluids to a patient with some degree of acidosis or an acid urine, some degree of diminished urinary output must be expected. In postoperative patients without too many factors to be controlled, sulfathiazole seems to be more soluble. Our consultations for this form of diminished output have been almost always for sulfadiazine and rarely for sulfathiazole; however, it would seem that no trouble should result from either in the small dosage of 1 Gm. a day. We have had to cystoscope and catheterize the ureters of five patients with crystallization of sulfadiazine, but have avoided this complication in quite a few other patients by an increased intake of fluid and alkalization. If the non-protein nitrogen is not approaching a critical level, the use of parenteral fluids may ward off manipulation.

Under postrenal causes for diminished output of urine, we are impelled to discuss surgery in the pelvis. Hysterectomy is a notorious offender in injuries to the ureter. Bilateral ligation of the ureters is a tragic occurrence if allowed to go unrecognized. Our experience in injury to the ureter during gynecologic surgery is limited to the

unrecognized ligation of a ureter which finally established a communication to the vagina on the eighth postoperative day. The management of this case is representative of the plan we had long entertained for dealing with such a situation. Since this woman had undergone a hysterectomy, the strain of childbearing was past. After proving by excretory urograms that the other kidney was normal (Fig. 4), and by attempting to catheterize the suspected side and establishing the site of the difficulty, a nephrectomy was done. The patient's postoperative stay in the hospital was prolonged, possibly two weeks; however, she was not subjected to returning for a hazardous plastic operation and the many necessary cystoscopic trials for patency thereafter, which might also have been an extreme economic burden.

Many unilateral ligations occur in patients in whom the anatomy has become distorted by intraligamentous fibroids and cysts. This type of pathologic condition must be kept in mind when a stormy course follows pelvic surgery.

Over a period of years we have followed several patients with endometrial implants on the ureters in whom some injury to the ureters during pelvic surgery was thought likely. We have noted narrowing of the ureters, but this did not progress, as interpreted by the excretory urogram. We believe that attempts to dilate an apparent narrowness might lead to an intractable upper urinary tract infection.

We would like to interject a comment here in regard to the ureteral atony and ureterectasia which result when large segments of the ureter are exposed, especially in lower bowel surgery, and the importance of avoiding this procedure if possible.

It is instructive to review a case in which a ureter was cut purposely by Dr. R. B. Cattell of our staff when removal of a section of the ureter was necessary because of involvement by a carcinoma of the rectosigmoid. When the ureter was cut, a No. 12 soft rubber catheter was passed down the distal segment and up into the

proximal. An end-to-end anastomosis was done by tacking the cut ends together with interrupted fine catgut sutures. An indwelling catheter was placed in the bladder, as is customary in all patients undergoing this form of surgery. The posterior wound was drained and since this was adequate, no other drainage was provided intra-abdominally. The patient's postoperative course was not unusual. On the twelfth day a cystoscopic examination was done and the ureteral splint was removed. On checking the urogram three months later, only the slightest dilatation of the ureter in an otherwise normal upper urinary tract was found.

We must confess that in the light of present knowledge we would have allowed the ureteral splint to remain in place at least three weeks and preferably longer. If any complication had marred the removal of this catheter, we intended to remove the kidney so as to shorten the patient's postoperative course and not subject him to additional manipulation when the eventual prognosis at best was not promising.

We recognize that prolonged ureteral splinting and complicated plastic procedures may at times not be feasible, and that the surgeon is confronted with the problem of attempting a surgical bridge for the patient's postoperative course at a time when the question of his recovery is critical. Dr. Cattell's idea was that the simplest form of establishing ureteral continuity was demanded, and that if the patient could be tided over until his second or third week, this result would be achieved; and that any other radical surgery then could be handled by the urologist without adding an unnecessary burden in the first critical days.

We recently were consulted in another case for advice regarding the severance of a ureter which was involved in a carcinoma of the rectosigmoid. The ureter was ligated and dropped back into place. The patient had had a urinary tract infection, and he was placed on more than the usual amounts

of sulfathiazole postoperatively. The resulting hydronephrosis and fever were controlled until the second week when a nephrectomy was necessary because of fever, flank pain and lack of progress. The important point is that this patient was tided over his acute surgery and management of his complicating urologic problems was simplified.

Large Bowel Surgery. Several years ago, one of us (E. E. E.)¹ analyzed 750 cases of large bowel surgery, because of the high incidence of associated genitourinary complications. Nearly all the patients had a malignant condition, and because the operability rate of carcinoma of the rectum was calculated to be 85 per cent, it was assumed that the extensive lesions and the poor risk would produce a comparative rise in the genitourinary complications. All patients undergoing abdominoperineal resection, as well as many of those with sigmoidal and colonic lesions, had a catheter in place and were on constant drainage. Since it was impossible to determine preoperatively the type of procedure necessary, most of them were handled by inlying catheter.

From this study it was concluded that genitourinary complications after large bowel surgery are most common following removal of the rectal portion, 74 per cent of the whole group having postoperative difficulty in emptying the bladder. This is perhaps due to the fact that the portions of the genitourinary tract most frequently involved by carcinoma of the rectum and sigmoid are the prostate gland and the bladder. In five patients in whom resection had been performed, the process invaded the prostate gland after operation and produced obstruction which necessitated resection of the bladder neck. These complications may be so serious that they definitely prolong the patient's convalescence.

The patients with postoperative difficulty in emptying the bladder seem the most important. Of the fifty-three males who had resection of the rectum, thirty-two had sufficient difficulty to require

revision of the bladder neck. All these patients had some symptoms prior to operation. The question of preoperative correction of the vesical neck had been raised previously, but we believe that postoperative correction is wiser since some of these patients with difficulty preoperatively may get along sufficiently well after bowel surgery to avoid two major surgical procedures in quick succession. Also, the removal of obstruction does not eliminate possible paralysis of the detrusor muscle, which nearly all these patients have to some degree after abdominoperineal surgery. Another factor is that the reaction following transurethral operations done after the abdominoperineal resection is much less, due to destruction of the blood supply to the prostate gland and the walling off of the lymphatic system. Definite bladder paralysis for longer than two months has occurred in only two patients; and in only six patients of our series was it necessary to maintain tidal drainage longer than three to four weeks. A suggested clinical classification of detrusor paralysis follows:

1. Pure detrusor paralysis from parasympathic denervation
 - (a) A mild form cystometrically evident in large numbers of patients the first week following operation
 - (b) A severe form necessitating prolonged tidal drainage, present in a small number
2. Mixed forms of detrusor paralysis in combination with:
 - (a) Vesical neck obstruction
 - (b) Almost complete loss of anatomic support and lack of fixation
 - (c) Inherent resistance in the male urethra.
3. Vesical neck obstruction alone

Ureteral dilatation which apparently is not due to obstruction at the bladder neck has been noted in some of these patients. While isolation of the ureters is important to the general surgeon, needless dissection is a mistake, since it deprives

the ureters of blood supply and also denervates them.

The abdominoperineal patient routinely is handled by an inlying catheter. The urethral catheter of the Foley type is inserted the night before surgery and closed drainage is instituted. In the patient in whom difficulty is anticipated, the inlying catheter should not be removed until he is able to sit up. Many of these patients incur damage to the upper urinary tract in the form of pyelonephritis at the time of removal of the catheter. Since this is the crucial period, these patients must not be allowed to become overdistended. Patients voiding small amounts, even though they are comfortable, should be catheterized and if more than 2 oz. of residual urine is present, the catheter should be reinserted for a few more days. The usual plan of catheterizing patients with ordinary postoperative retention should be followed, and thus the bladder is not allowed to revert to complete atonicity. Many times the patient's clinical progress in regard to the genitourinary system may be retarded during this crucial period by a co-existing infection, which may be exceedingly stubborn.

Many patients, especially males, even with an adequate bladder neck, continue to have residual urine. We have been impressed with the fact that the removal of the slightest amount of bladder neck

obstruction will allow such a patient to urinate freely. Since many patients continue to have pyuria after dismissal, although they have no symptoms, persistent urinary check-ups should be done and small doses of urinary antiseptics prescribed.

SUMMARY

The three most common postoperative urinary tract complications are retention, infection and suppression. The causes of these manifestations are reviewed, and our experience in their management is presented. Particular attention is given to the urinary problems attending pelvic and large bowel surgery. The consulting urologist to a busy surgical service can render invaluable aid by relieving the clinical picture in a patient already overburdened with other serious difficulties.

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