

THE BLADDER OF WOMEN AFTER OPERATION.*

A CONSIDERATION OF POSTOPERATIVE BLADDER DISTURBANCES, WITH
SPECIAL REGARD TO TREATMENT, BASED UPON A STUDY OF
THIS SUBJECT IN THE CARE OF 465 CASES OPERATED
WITHIN THE LAST EIGHTEEN MONTHS.†

BY

ARTHUR H. CURTIS, M. D.,

Chicago, Ill.

Introduction.—Two years ago the writer reported a study of the part played by stasis of vesical urine in the etiology of urinary tract infections(1). Certain evidence obtained, together with some of the deductions drawn at that time, is herewith repeated because of

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† From the laboratory department and gynecologic service of St. Luke's Hospital.

direct bearing on the work at hand, and may be summarized as follows:

Both in disease and in experimental work, when virulent bacteria pass through the normal bladder, they tend not to infect the mucous membrane. Similarly, when catheterization is performed for conditions other than relief of retained urine, subsequent infection is a rarity. On the contrary, cystitis which develops after catheterization to relieve a distended bladder occurs despite the utmost care.

INCIDENCE OF CATHETERIZATION AFTER 465 ABDOMINAL AND VAGINAL OPERATIONS.

Abdominal operations, 213	Not catheterized, 135	
	Pelvic Operation	
	Bladder not involved	Bladder involved in operation
	93	4
	Other abdominal operation	
Catheterized, 78		
63	4	
Vaginal operations, 188	Not catheterized, 138	
	Bladder involved in operation	Bladder not involved in operation
	20	118
	Catheterized, 50	
	36	14
Abdominal and vaginal operations, 64	Not catheterized, 34	
	12	22
	Catheterized, 30	
	15	15

Based on these facts it was concluded that retention of urine is the most important factor in the development of cystitis after operation; it was further decided that "cystitis seldom results from cleanly and

careful catheterization of a healthy, physiologically normal bladder." It appears highly probable that postoperative and postpartum accumulations of residual urine not only invite cystitis, but also greatly increase the dangers of kidney infection; emphasis was therefore placed upon greater watchfulness of the mechanics of drainage of the urinary tract.

Material.—The work now reported (see chart) embraces a further study of this subject, which would still be in progress if military duties did not interfere.

Of 465 operations performed either by Dr. Watkins or myself, 213 were abdominal, 188 vaginal, and 64 were combined abdomino-vaginal cases. Patients operated for urinary tract infections and fistulæ are not included.

TECHNIC OF TREATMENT.

So-called "catheter cystitis," a misnomer applied to all kidney-bladder infections acquired during convalescence after operation, has presented a most disagreeable problem.

In an operative experience concerned exclusively with abdominal and pelvic surgery, of which the greater part has been limited to pelvic conditions, we have a larger proportion of surgery involving the bladder than is the case with most men who are engaged in this field of work. This may have served to emphasize to us that no small number of patients return complaining of "bladder trouble," after otherwise satisfactory convalescence; such complaints played no small part in stimulating investigation of these cases, and led to the treatment which has now been employed for a period of over two years.

Catheterization.—Those patients who complain of distress are catheterized. It is planned never to permit suffering from distention. Since discovery of the frequency of residual urine after operation, not only when micturition is difficult, but also when the power to void is apparently normal, every patient who cannot thoroughly empty the bladder has been catheterized frequently enough to prevent two occurrences—firstly, overdistention with resultant decreased emptying power; secondly, infection from urine left stagnant in the bladder. It is admittedly desirable to dispense with the catheter; but a catheter is passed without hesitation or fear when needed. In doubtful cases, catheterization is considered more desirable than a possible stasis of urine.

Catheters are held in readiness after preparation by dry-steriliza-

tion or by boiling for fifteen minutes. The region of the urethra, with especial attention to the meatus, is cleansed with 1 : 5000 bichloride solution. The hands do not touch the catheter within $1\frac{1}{2}$ inches of the end to be inserted. When the bladder has become empty, 15 c.c. of $\frac{1}{8}$ per cent. silver nitrate is instilled.

Test for Residual Urine.—Any patient who has been catheterized many times, or even occasionally over a period of several days, and who resumes the power to void in an apparently normal manner, is observed most carefully for evidence of residual urine. Every such patient is catheterized once each day immediately after urination; this test is repeated daily until not more than 20 c.c. of urine is obtained.

Medication and Diet.—Catheterized patients receive hexamethylamine in amount sufficient to maintain a positive formalin test. In the presence of alkaline urine, acid sodium phosphate is also administered. Those who show idiosyncrasy to hexamethylamine, or whose urine yields no formalin, are treated exclusively with alkalis.

In the presence of urinary tract infection, a fairly liberal special diet is ordered. Meats are permitted but twice weekly. Seasonings of all sorts are forbidden, salt excepted. Sugar, sweets and pastry are limited to a small amount.

STUDY OF CASES.

I. *Abdominal Operation*, 213 cases. (a) *Not Catheterized.*—One hundred and thirty-five were not catheterized and possessed normal bladder function. Four of these, with operative manipulation of the bladder, include three with complete hysterectomy and one with advancement of the bladder on the fundus.

(b) *Catheterized*, 78.—Eleven of this group had extrapelvic operation. In this small list of patients catheterized after abdominal operations for lesions other than those of the pelvic organs, only one with normal postoperative course required repeated catheterization. None revealed evidence of cystitis at a later date.

Sixty-seven were catheterized after abdominal operation for pelvic lesions. Only four of this number were subjected to operation on the bladder; all of these soon resumed the power of voiding normally and made a good recovery.

There remain sixty-three catheterized patients, none of whom had the bladder disturbed at operation; twenty-five were catheterized once; eleven were catheterized twice; six were catheterized three times; twenty-one were catheterized many times.

The twenty-one cases catheterized many times are most instructive. *Almost without exception these patients, after reestablishment of spontaneous micturition, yielded residual urine when tested.* It was noted that, as a rule, residual urine decreased in amount almost daily,

with return to normal within a week. Some of these twenty-one patients, unfortunately not so closely observed, were not examined for residual urine. In such cases pus usually appeared in the urine, attended by symptoms of cystitis. *It would seem that no course of procedure is more pernicious than that of regular use of the catheter over many days, followed by abrupt cessation of all catheterization, on the assumption that, as soon as the patient begins to void, the power of thorough evacuation has returned.* As a matter of fact, almost all such patients leave a residue in the bladder. An illustrative instance is afforded by a patient who, after supravaginal hysterectomy and appendectomy, was catheterized for six days, then began to pass urine spontaneously. At noon 150 c.c. were voided, followed by 150 c.c. at 4 P. M.; at the end of another four-hour interval 660 c.c. were obtained by catheter. On the following day urine was spontaneously voided three times; after the third micturition 240 c.c. were obtained by catheter. Another, after supravaginal hysterectomy and removal of the right tube and ovary, was catheterized nine times for postoperative retention. Catheterization was then discontinued because the patient began to void. Three days later, a test for residual urine showed 90 c.c. stagnant in the bladder. This evidence emphasizes the desirability of residual urine tests for all cases which have been subjected to repeated catheterization.

II. *Vaginal Operation*, 188 cases. (a) *Not Catheterized*, 138.—All had apparently normal bladder function in convalescence. Operation involved the bladder of 20; seven of these underwent interposition operation for prolapse or cystocele and thirteen had the advancement operation of Goffe.

(b) *Catheterized*, 50.—It was found unnecessary to catheterize more than once or twice any of this group in which the bladder was left unmolested; all such cases (14 in number) recovered without vesical disturbance.

Cases Catheterized after Vaginal Operation Involving the Bladder.—To avoid tiresome enumeration of figures I will summarize evidence obtained from a study of these thirty-six cases. It was found that nearly two-thirds were relieved by passage of the catheter not more than a few times and suffered no ill effects in the form of vesical irritability or infection. The remainder were less fortunate.

Of all this group, *transposition cases*, either for cystocele or prolapse, were subject to most trouble; as would be surmised, the more difficult the operation the greater was the tendency to vesical complications. Excision of the anterior portion of the uterus for plastic purposes showed particular tendency to be followed by bladder difficulties; this was especially true in convalescence complicated by an exudate. On the contrary, removal of the fundus, if feasible without undue trauma or bleeding, seemed not to materially interfere with the bladder function. After the advancement operation (*i.e.*, separation of the bladder from the uterus without invasion of the peritoneal cavity, followed by suture of the vaginal flaps to the cer-

vix, thus closing the hernial opening), trouble was encountered very much less often.

Vaginal hysterectomy was followed by accumulation of some residual urine. With careful anchoring of the supports and due attention to a proper position of the bladder, function became normal after a few days of treatment.

III. *Abdominal and Vaginal Operation.*—These sixty-four cases, subjected to double operation and consequently anesthetized for a longer period of time, serve to emphasize those points already discussed.

Of thirty-four patients not catheterized, twelve had bladder operations; these were mostly "advancement" cases. The thirty catheterized patients include fifteen operations in which the bladder was involved.

A feature of influence in the choice of operative procedure is introduced in certain of these double operation cases. Abdominally performed supravaginal hysterectomy, followed by vaginal transposition operation, predisposes to the occurrence of residual urine. The amount is often not great, in fact usually not over 50 to 100 c.c., but, if left in the bladder, this residue becomes turbid from contamination and is a potent factor in the production of vesical infection. A like operation, performed entirely by the vaginal route, less often leads to troublesome retention in convalescence. The explanation for less perfect bladder function when the fundus has been amputated by the abdominal route, appears to lie in the greater shock of abdominal operation combined with sensitiveness of the incision, both of which factors interfere with good function of the accessory muscles employed in micturition.

COMMENT.

A comparison of the vesical conditions formerly observed after operation, in contrast with those at present secured, is highly significant.

In previous years we tried, at times, to completely dispense with the catheter, or catheterized only when overdistention made it imperative; at other times the catheter was used regularly whenever the patients complained of distress, but only at such times. The possibility of residual urine after reestablishment of urination was never given serious consideration. With these methods of treatment we were between fires; such dangers of infection as the catheter brings were present and, on the other hand, regular and complete drainage of the bladder was not secured. As would be anticipated, every patient who did not possess normal bladder function after operation was a source of anxiety and many returned with urinary tract infection and distress.

The 465 cases now reported have been studied, at the time of their

stay in the hospital, with the special object of combating the tendency to postoperative bladder complications.

Of the entire series, only one patient developed more than a transitory irritation of the urinary tract. Those who have received the prescribed treatment, with proper attention to the principles involved, have all recovered in most satisfactory manner. Some have revealed bacteria and temporary increase in the number of leukocytes in the urine, but return to normal has been prompt and permanent.

Certain difficulties have been encountered. Nurses are so impressed with the fear of catheter infection that they often permit overdistention of the bladder, despite explicit orders to the contrary. Again, in cases which have begun to void spontaneously after a long period of catheterization, it seems well nigh impossible to enforce the rule to test for residual urine; some of these cases are overlooked in our daily rounds, until symptoms call this neglect to our attention. The results thus far have been temporary infection and distress, with rapid relief under proper routine. The above-mentioned one patient in whom the outcome was unsatisfactory, is of this group. In her case there was neglected residual urine with the development of cystitis and ascending bilateral colon-bacillus kidney infection.

In a survey of the literature after completion of the above subject matter, I find that Taussig(2), in 1915, arrived at conclusions in many respects similar to mine. He says, "The danger of infection lies less in the technic or frequency of catheterization than in the presence of urine stagnation in the bladder." And, again, "Some of my most serious infections occurred in women in whom I had ceased prophylactic measures as soon as they began to void spontaneously."

More than passing respect should be paid to the keenness of Dudley's observation. Many years ago, in his text-book(3), in speaking of catheterization as a cause of cystitis after operation, he said. "A much more insidious and less obvious cause is failure of the patient completely to empty the bladder on urination and the consequent retention of decomposing residual urine which may set up cystitis."

Residual Urine in Nonoperated Cases.—In so far as can be discovered, no one has called attention to the part played by habit in the causation of residual urine. Over a year ago I had a patient who had for years neglected to void more than once or twice in twenty-four hours, solely due to stress of household duties. She developed inability to thoroughly empty the bladder, followed by

accumulation of highly offensive residual urine. Through frequent use of the catheter after urination, combined with other measures of lesser importance, the residue was gradually reduced until normal function returned at the end of six weeks.

In the case of a tabetic bladder (male) I have but recently completed a similar course of re-education. This required a period of one month. It would appear probable that a large proportion of tabetics with distress caused by residual urine can be entirely and permanently relieved of their bladder symptoms.

Recent experiments by David(4) support a belief, expressed by me two years ago(5), in explanation of the etiology of pregnancy pyelitis. David claims to demonstrate that cystitis does not lead to kidney infection if the bladder empties normally; with partial obstruction of the bladder he finds that the infection ascends to the kidney. This is in agreement with my observation that, in pyelitis of pregnancy, a collection of residual bladder urine is usual. I would again suggest that retention of vesical urine is a factor of the utmost significance in the etiology of pyelitis, especially the pyelitis of pregnancy.

SUMMARY.

A study devoted to postoperative care of the urinary bladder has been made throughout the period of convalescence of 465 patients.

Stasis of urine is believed to be the chief cause of bladder troubles after operation; treatment has therefore been based upon avoidance of urine stagnation. The result has been that postoperative urinary tract infections have disappeared from our service since institution of this principle in treatment.

There are many cases of functional inability to completely empty the bladder. This is notably true of the bladder of pregnancy. Through judicious catheterization, immediately after urination, it is believed that these patients can often be saved from the dangers of pyelitis of pregnancy. A similar treatment of the failing bladder of tabes, at a time when moderate function still remains, promises much help if combined with intensive antisyphilitic therapy.

REFERENCES.

1. *Jour. Amer. Med. Assn.*, 1916, lxvi, 1456.
2. *Trans. Am. Gyn. Soc.*, 1915, xl, 351.
3. Lea and Febiger. *Principles and Practice of Gynecology*. Philadelphia, 1913, p. 540.
4. *Surg. Gyn. & Obst.*, 1918, xxvi, 159.
5. *Jour. Amer. Med. Assn.*, 1916, lxvi, 1456.