prior to the publication by Korsakoff. This case of mine has since been published. I recorded one case resulting from lead poisoning. I am glad to hear the essayist bear me out in this. You will remember that lead poisoning manifests itself in motor palsies ordinarily. Korsakoff's disease is manifested in sensory palsies attacking the mental impulse carrying sensory neurons, producing mind symptoms—Korsakoff's syndrome—while lead poisoning affects the motor neuron-producing motor symptoms. I have seen two cases in the past year following morphinism. They were both chronic morphin cases.

DR. R. P. SMITH, Seattle: In the case I reported Korsakoff's symptoms were present. They developed possibly a week after we found paralysis of the tongue present, and it was five or six days after the symptom of the twelfth nerve paralysis had cleared up before the Korsakoff symptoms had disappeared.

POSTOPERATIVE RETENTION OF URINE AND CYSTITIS *

J. H. JACOBSON, M.D.

AND

J. G. KELLER, M.D.

TOLEDO, O.

The occurrence of postoperative cystitis is still of sufficient frequency to warrant a discussion and presentation of some of the newer thoughts and methods for the prevention of this condition. A troublesome postoperative cystitis, either temporary or permanent, has often spoiled an otherwise excellent surgical result.

Heretofore a postoperative cystitis has been considered by many authors solely as a cystitis due to catheterization. While this view is largely correct, it is our purpose to show that preventable, abnormal anatomic conditions of the bladder, dependent on the surgical procedure itself, are in many cases the real predisposing etiologic factors in the production of the complication, and that the catheter *per se* is for the most part merely the exciting cause.

All authors agree that for the production of a cystitis it is necessary to have, besides the bacterial infection, one or more of the following predisposing factors, i. e., retention, trauma, or congestion.

According to Caspar¹ and Freyer,² the following organisms, named in order of frequency with which they are present, are to be considered as the cause of cystitis: *Bacillus coli communis*, *B. proteus vulgaris* (Hauser), *B. tuberculosis*, *Staphylococcus ureæ liquefaciens*, *Streptobacillus anthracoides* and *B. typhosus*, *M. gonorrhæa*. Abundant experimental evidence has demonstrated the fact that pathogenic organisms may be present in the bladder without producing cystitis, but that certain conditions favorable to their growth must be present before a cystitis will develop. In the normal urethra numerous bacteria have also been found which, as a rule, are non-pathogenic and remain latent so long as they do not enter into the bladder under conditions which predispose to cystitis.

Baisch³ found that when the urine, aspirated from the bladder during laparotomies, or colpotomies, was examined bacteriologically, the clear urine of women contained no germs. Enriquez, Franz, Hofmeister and

Melchior, have shown that the last portion of spontaneously discharged urine almost always contains germs, even after the most careful cleansing of the urethral orifice, although Melchior succeeded after repeated preliminary irrigation of the urethra in obtaining a practically sterile urine.

Baisch,³ in his most excellent bacteriologic work on this subject, says that the number and kind of bacteria found in the normal urethra are dependent on the condition of the vestibule and vagina, and are subject to the greatest of variations. The bacteriologic findings in the puerperal women differ from those in the pregnant, in the healthy from those in invalids, and in patients operated on from those in patients not operated on. As the colon bacillus was the most common organism found in his cases of cystitis, Baisch endeavored to ascertain the source of the *B. coli* when the examination fails to disclose it in the vulva or the urethra. He believes that his examinations of the vulvar and urethral secretions of bedridden patients, operated on and not operated on, have solved the question. The bacteriologic examinations on forty-five operated patients who were positively known not to be affected with cystitis, gave results as follows: no culturally demonstrable organisms in the vicinity of the urethra and in its lowermost section, on the eve before the operation (after the usual disinfection of the external genitalia); on the second day staphylococci were already found (*albus*, less often *aureus*), and from the third, fourth and fifth day on, in addition to these, the *B. coli*. The presence of staphylococci is explained by the general spreading of the skin-germs, and of the *B. coli*, by the vicinity of the rectum and anus. Systematic daily examinations of the urethral and vulvar secretions in patients not operated on but bedridden showed that although no colon bacilli were present on the day of admission, they were invariably found in the urethra and vestibule after lying in bed for a few days.

Urinary retention or ischuria is the most common complication which predisposes to an inflammation of the bladder following surgical operations. This takes place either by a direct backward invasion of the organisms of the urethra, owing to the absence of the mechanical cleansing effect of the urine during the act of micturition, or it follows the introduction of organisms into the bladder from the use of the catheter.

Many theories are advanced in explanation of postoperative retention of urine, among which are especially to be mentioned: the inability of some patients to urinate in the recumbent posture; a neurosis especially in nervous individuals; a reflex condition, contributed by the sympathetic nervous system producing urethral spasm and vesical paralysis; disturbances of the intra-abdominal pressure; paralysis or atony of the detrusor muscle from toxic substances similar to postoperative atony of the intestine; trauma of the peritoneal covering of the bladder; interference with the blood- and nerve-supply to the organ and a swelling or edema of the mucous membrane about the internal urethral orifice.

The relief of urinary retention by catheterization of the bladder has long been known to be a very frequent cause of postoperative cystitis, so much so as to lead many authors to consider it always as a "catheterization cystitis." There can be no question that the catheter is the most important single exciting factor in the production of a cystitis. This is explained by the trauma of the mucous membrane of the urethra or bladder incident to its introduction, and by the conveyance to the bladder

* Read in the Section on Obstetrics and Gynecology of the American Medical Association, at the Sixty-Second Annual Session, held at Los Angeles, June, 1911.

1. Caspar: Genito-Urinary Diseases, English Trans., 1909, p. 1208.

2. Freyer: Surg. Diseases of the Urinary Organs, 1908, p. 237.

3. Baisch, K.: (Univ. Tübingen) Bakteriologische und experimentelle Untersuchungen über Cystitis nach gynäkologischen Operationen, Beitr. z. Geburtsh. u. Gynäk., Leipzig, 1904, viii, 297.

of some of the organisms (notably the colon bacillus), which are present in the lower urethra of bedridden patients. In this manner are the postoperative inflammations of the bladder to be explained after such operations as perineorrhaphy, trachelorrhaphy, rectal operations, hernia and other operations which do not necessitate handling of the bladder.

The predisposing factors of trauma and congestion become of great significance in all operations, whether vaginal or abdominal, in which a separation or dissection of the bladder from its attachments to the cervix or vagina is necessary. As examples we need only to mention such operations as complete hysterectomy, abdominal or vaginal, the Wertheim radical operation for cancer of the uterus, separation of bladder adhesions in inflammatory disease, operations on the anterior vaginal wall, such as anterior colporrhaphy, vaginal cesarean section and the Watkins-Wertheim operation for total prolapse of the uterus. In such operations, on account of the increased danger of subsequent cystitis, greater care is necessary in manipulating the bladder and in its accurate reposition by suture, as well as in its postoperative treatment. Crippling lesions about the bladder, pericystitis, and distortion often result after such operations and prolong a cystitis indefinitely.

Cystoscopic examinations of a number of patients, on whom some of the operations above enumerated had been performed, were made by one of us (J. G. Keller) and a composite picture of the bladder constructed from the findings.

Kolischer,⁴ writing in 1902, says:

The operative step which obviously is most apt to interfere with the integrity of the viscus is the act of stripping off the bladder from the uterus. If this is done in a proper way—that is, if we sever only the connective tissue between the bladder and the uterus—the bladder will remain absolutely intact. But if we come too near the bladder-wall, . . . or the operator digs into the bladder-wall proper, a condition will arise which I have described some years ago as, "traumatic desquamative catarrh."

Again, in 1903, Kolischer⁵ writes:

To this must be added that the circulation in the bladder-wall is considerably interfered with in more extensive operations, on account of the severing of so great a number of large blood-vessels. The traumatic catarrh, therefore, will not heal until sufficient circulation is restored by the establishment of a collateral blood-supply. All these catarrhs do not amount to much if the patient is properly cared for, that is, if the bladder is regularly emptied, if catheterization does not cause infection and if no accumulation of feces in the bowels is permitted to occur, so as to prevent the immigration of colon bacilli to the bladder.

Ellice McDonald,⁶ in 1908, reported four cases of cystitis, the result of gynecologic operations, as follows:

Two cases following suspension of the uterus by the abdominal route. In one case there was marked sacculation of the bladder, with patches of inflammation and congestion; in the other there was considerable distortion of the trigone, alteration in the site of the ureteral orifice and sacculation of the bladder.

The third case was a complete hysterectomy for purulent tubal disease, in which the bladder was very mark-

edly dilated and would retain 1,500 c.c. The walls were much congested, and the fibers of bladder-muscle were separated into a network of firm, stout bands, the largest as great as a lead-pencil and the smallest as the lead itself. The mucous membrane dipped into the crevices, while the ureteral orifices were much distorted, the bladder was very irregularly dilated and had lost its tone. The incontinence of retention was present. The fourth patient had a cystocele operation, and the scar of the operation could be seen within the bladder, although it did not seem to have penetrated the bladder mucous membrane, the left ureteral orifice was displaced and the region of the scar was inflamed and congested.

Sieber,⁷ in 1908, made a number of cystoscopic examinations to determine the situation of the bladder after cystocele operations. He reported that in some cases the trigonum disappeared partly behind the sphincter, and deep recesses in the floor of the bladder were present with an injection of its blood-vessels.

Franz,⁸ in 1908, and Wertheim,⁹ in 1909, write extensively regarding the cystitis which follows the radical abdominal operation for cancer of the uterus, and state that the chief causes are the nutritional changes in the bladder-wall and that it is unavoidable and independent of catheterization.

Stoeckel,¹⁰ after many cystoscopic examinations following gynecologic operations, has come to the conclusion that in the past too much stress has been laid on infection introduced into the bladder by way of the catheter in cases of postoperative bladder disturbances. He emphasizes two important facts: first, that after gynecologic operations very often distinct changes in the bladder-wall, without urinary symptoms, are present; secondly, that such bladder disturbances are caused very often not by infection introduced from without, but rather are to be traced back to the trauma of the bladder during the operation.

Falgowski¹¹ reports extensively on his cystoscopic examinations of fifty-three women, following abdominal and vaginal operations, in whom some injury of the bladder was suspected. His examinations were undertaken in order to ascertain whether vaginal or abdominal operations were more liable to postoperative cystitis; these examinations demonstrated that the vaginal operations were no more dangerous to the bladder than laparotomies, but that under etiologically equal conditions (i. e., septic cases) bladder troubles were found more often after laparotomies. He emphasizes three important factors in the production of postoperative cystitis, i. e., catheterization; the anatomically incorrect care of the bladder during operation; and the septicity of the particular case. He states in particular that through incorrect care of the bladder, errors may be made in both abdominal and vaginal operations, and that the operators who endeavor to cover this organ well with peritoneum will avoid much trouble. He emphasizes the fact that, after vaginal incision of the anterior vault, the parietal peritoneum should be sutured exactly and carefully to the vaginal wall immediately after opening

7. Sieber, H. (Univ. Frauenklinik, Marburg): Ueber den Blasenstatus nach Cystoceloperationen, *Ztschr. f. Gynäk. Urol.*, Leipzig, 1908, 1, 87.

8. Franz, K. (Frauenklinik d. Univ. Jena): Die Schädigungen des Harnapparates nach abdominalen Uteruscarcinomoperationen, *Ztschr. f. Gynäk. Urol.*, Leipzig, 1908, 1, 3.

9. Wertheim: Gynäkologie und Urologie, *Ztschr. f. Gynäk. Urol.*, Leipzig, 1909, 1, 253.

10. Stoeckel: Cystoskopie und Urethroskopie, Berlin, 1910, p. 250.

11. Falgowski, Wladislaus: Ueber cystoskopische Befunde nach gynäk. Operationen, *Ztschr. f. Gynäk. Urol.*, Leipzig, 1909, 1, 283.

4. Kolischer, G.: Condition of the Bladder After Hysteropexy, *Am. Jour. Obst.*, 1902, xlv, 837.

5. Kolischer, G.: Postoperative Cystitis in Women, *Am. Jour. Obst.*, 1903, xlviii, 340.

6. McDonald, Ellice: Cystitis in Women, With Report of 45 Cases Studied Cystoscopically and Some Modifications of Treatment, *Med. Rec.*, 1908, lxxiii, 303.

into the peritoneal cavity, in order to protect the bladder from mechanical insults as much as is possible and not rob it of its nutrition. In laparotomies this can be done, at least at the close of the operation if not sooner. By surrounding the bladder with as much peritoneum as is possible, a natural support is given which is especially needed after extirpation of the uterus. The more careful and successful the care of the bladder, the less subsequent bladder disturbance was observed in his clinic, and vice versa.

The frequency and variety (Falgowski) of cystoscopic findings ranges as follows:

	After 14 Laparotomies	After 39 Vaginal Operations
Kinking of a ureter.....	..	2
Pyelitis	..	2
Excessive sensibility of the bladder-mucosa	..	5
Transposition of the trigonum..	5	5
Cystitis diffusa	4	7
Exudate	6	6
Edema	5	9
Inflammation of the bladder neck	8	7
Pericystitis	5	11

The best-known and next to pericystitis the most common disturbance of the bladder observed was inflammation of the bladder neck, and this after laparotomies as well as after the vaginal operations.

The most important consideration in the treatment of postoperative cystitis lies in its prophylaxis. The factors of trauma and congestion as predisposing causes can to a large degree be eliminated by the avoidance of manipulation, and separation of the bladder, whenever possible. In those operations, either vaginal or abdominal, in which a dissection of the bladder from its attachments is a necessary part of the procedure, more or less permanent pouching, displacement, infolding of the base, and other abnormalities of the bladder can be avoided by always covering the denuded portions with peritoneum, and by the reposition of the organ by accurate suture to as near its normal position as is possible.

Every measure or remedy which will prevent the conveyance of *B. coli* and other organisms from the lower urethra and vestibule to the bladder should be adopted. The catheter being the commonest carrier of infection to the bladder, its use must be avoided whenever possible and employed only as a *dernier ressort*, under strict asepsis. The use of hot applications over the pubes and perineum, rectal enemata, and the practice of allowing patient either to sit or to stand up to urinate, as advocated by Emil Ries, Mayo and others, should be used.

A very valuable addition to our methods of treating urinary retention has been the recommendation by Baisch,³ and Döderlein,¹² of the so-called *Blasenlaxans*, or bladder laxatives for the production of spontaneous micturition. These are remedies which, when introduced into the bladder, excite by their local effect vesical peristalsis. The method is an elaboration of the observation made by Baisch, that when irrigation of the bladder was made to destroy the germs introduced by the catheter, the solutions did not disinfect the bladder, but they irritated the bladder sufficiently to produce a

spontaneous micturition. Following up this observation, Baisch used on the evening after the operation 20 c.c. of a 20 per cent. sterilized boroglycerin solution (acid. boric. 2 gm. to glycerin. 100 c.c.) injecting it into the distended bladder with a piston syringe and Nélaton catheter without a preliminary catheterization. The first spontaneous micturition follows usually within five minutes after the injection. The method has been further modified by Franck,¹³ who employs the solution without the aid of a catheter, simply injecting from 15 to 30 c.c. into the urethra so that from 5 to 10 c.c. will get into the bladder. Spontaneous urination usually follows in about twenty minutes.

We have used the glycerin and boric acid solution, after the method of Franck, for the past six months, using it in a large series of cases of postoperative urinary retention, and can recommend the method as being almost uniformly reliable for both male and female. When the method failed us, and catheterization became necessary, 5 or 10 c.c. of the solution was injected through the catheter and left in the bladder. As a rule further catheterization was unnecessary.

We have found, as did Wertheim and Baisch, that the solution is without effect in cases where the radical abdominal operation for uterine cancer has been performed. After such operations, on account of the extensive dissection of the bladder from its attachments and the separation of more or less of its nerve- and blood-supply, the bladder does not so readily respond to stimuli.

The argument may be urged against the employment of the so-called bladder laxatives, on the same ground as that used against catheterization, namely, the introduction of bacteria during the act of forcing the fluid from the meatus through the urethra into the bladder. With the employment of the catheter there is always some danger of injury to the urethral or vesical mucosa, which injury, plus the introduction of microorganisms, is sufficient to produce cystitis. With the injection of the 2 per cent. boric acid in sterile glycerin we must admit the possibility of forcing organisms backward into the bladder, but as the method occasions no trauma, the development of a cystitis is not so likely to occur. We believe the method to be of sufficient value to warrant its routine adoption before resorting to catheterization in cases of postoperative urinary retention.

CONCLUSIONS

1. Cystitis following surgical operations is not always a cystitis due to catheterization.
2. For the production of a cystitis it is necessary to have a bacterial infection plus retention, trauma and congestion.
3. The colon bacillus is the organism most frequently found in cystitis following surgical operations.
4. According to Baisch, the reason of the presence of colon bacilli in the vestibule and lower part of the urethra is the proximity of the rectum in bedridden patients.
5. Postoperative urinary retention may be due to a variety of causes. Our cystoscopic examinations show that swelling and edema about the internal urethral orifice is a very frequent cause.
6. Trauma and congestion as predisposing factors to cystitis occur in all operations in which a separation of the bladder from its attachments is necessary.

13. Franck, Otto: Glyzerin als Blasenlaxans, *Centralbl. f. Chir.*, 1911. No. 2.

12. Döderlein and Krönig: *Operative Gynäkologie*, 1907.

7. Cystoscopic examinations after such operations often reveal anatomic malposition of the base, distortion of the trigone, and displacement of the ureteral orifices.

8. Whenever extensive dissection or separation of the bladder is a part of the operation, an accurate reposition and covering of its raw surfaces with peritoneum, becomes necessary. Such operations also require the most rigid asepsis in their after-care, should catheterization be required.

9. The use of a solution of 2 per cent. boric acid in sterile glycerin injected through the urethra, into the bladder, has proved itself of sufficient value to warrant its routine employment in all cases of postoperative urinary retention before resorting to catheterization.

2050 Franklin Avenue—209 Wayne Building.

PERICYSTITIS *

M. L. HARRIS, M.D.
CHICAGO

Pericystitis may be due to an extension of an acute inflammation by continuity or by contiguity from one of the neighboring organs or structures, or it may be due to secondary adhesions causing fixation and distortion of the bladder.

The former variety is quite commonly the result of an extension of a peritonitis of appendicular or tubal origin to the peritoneum covering the bladder. In addition to the usual symptoms accompanying the primary condition, these cases are characterized by pain and tenderness over the hypogastric region, difficulty or even inability to start the flow of urine and pain during the contraction of the bladder as it empties itself. When the bladder forms a part of the wall of an intraperitoneal abscess of appendicular origin or when it lies next to a pyosalpinx, the abscess may perforate the bladder wall and evacuate itself through this viscus as I have seen happen several times.

The rather sudden evacuation of a large amount of pus through the urethra—a symptom which usually repeats itself at irregular intervals as the original abscess refills—with aggravation of the vesical symptoms and the history of the case readily distinguishes these cases from an ordinary cystitis. Fortunately in most of these acute cases of pericystitis the patients quickly recover as soon as the primary trouble has been remedied. Occasionally, however, a case is seen which presents considerable difficulty both as to diagnosis and treatment, as illustrated by the following:

CASE 1.—A woman, 30 years of age, was sent to me with a diagnosis of probable tuberculosis of the hip. She had been sick for several months; was greatly emaciated; had fever constantly; the right thigh was markedly flexed on the abdomen and adducted and there were three discharging sinuses, one near the anterior superior spine, one on the anterior aspect of the thigh just below Poupert's ligament and one on the outer aspect of the thigh just in front of the great trochanter. There was frequent urination with pus in the urine varying considerably in amount.

By injection, the sinuses were traced not to the hip or to the bone but to the right side of the pelvis in the region of the bladder. The uterus was in anterior position and a small mass could be felt extending from its right side, anteriorly to the abdominal wall. The trouble followed a confinement and the patient had been well up to that time. The origin of the trouble was thought therefore to be in the right tube.

On opening the abdomen the right tube was found turned anteriorly, lying between the uterus and the bladder, to both of which organs it was firmly adherent. There was a small perforation between the tube and the bladder and a tract leading from the tube extraperitoneally in the abdominal wall down into the thigh, forming the sinuses above described. The tube was removed, the bladder opening closed and the sinuses curetted. The sinuses closed and the patient made a rapid and complete recovery with disappearance of all bladder symptoms.

Our principal interest in the acute cases lies in the fact that the adhesions which form to the bladder may not disappear with recovery from the primary trouble, but may become organized and remain as permanent bands fixing the bladder to a loop of bowel, the omentum, the uterus or other point, so as to interfere with the normal action of that organ. Such adhesions may form even though the patient gives no distinct history of a previous acute abdominal or pelvic inflammatory trouble, in which case the adhesions are most frequently found fixing the bladder to the sigmoid or to the appendices epiploicæ.

Many of these cases are postoperative in their origin and are then frequently the result of faulty technic. This, however, is not always the case, for, as is well known, peritoneal adhesions may form occasionally in spite of everything that can be done to prevent them. It is to those cases, the result of faulty technic, that attention is here specially directed as they are the ones which should be prevented. The technical errors are either general, such as an imperfect peritoneal toilet, or occur in connection with salpingectomy, ventrosuspensions or round ligament operations.

As illustrating pericystitis from imperfect peritoneal toilet may be mentioned the case of a young woman who had had both tubes and the right ovary removed four years previously. Following the operation she developed tenderness in the hypogastric region, irregular attacks of frequent urination, dragging pain on urination and occasionally a sharp pain when the bladder was emptied. These symptoms were aggravated at the menstrual time. They were so annoying that the patient applied for relief by operation if necessary.

On opening the abdomen the bladder was found adherent to the anterior surface of the uterus. The bladder was peeled off the uterus without much difficulty and in doing so a cyst was opened which contained from 25 to 30 c.c. of a dark-colored fluid. At the first operation a large blood-clot evidently had been left in this location and it had been walled off by the bladder becoming adherent to the uterus. The clot gradually became liquefied, thus forming the cyst. Recovery and relief from the symptoms followed the operation.

In attempting to close over the stump after salpingectomy I have seen the bladder so involved in the suturing as to require a secondary operation to relieve the distressing bladder symptoms.

CASE 2.—In March of this year I operated on a woman who had suffered from painful pericystitis ever since an operation for ventrosuspension, which had been made two years previously. On opening the abdomen the bladder, uterus, omentum and sigmoid were found fixed in a mass to the anterior abdominal wall.

CASE 3.—On May 5 of this year I operated on a young woman, aged 23, who had had her tubes removed in 1907 and a retrodisplacement corrected by a round ligament operation. Ever since her first operation she had suffered with pain in the back and down the inside of the left leg to the knee, frequent urination with a dragging pain above the pubes when the bladder was emptied. Her symptoms were so severe that she requested an operation.

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