LESIONS OF THE BLADDER DURING ABDOMINAL AND VAGINAL HYSTERECTOMY.[1]

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In bringing the subject of lesions of the bladder occurring during an abdominal or a vaginal hysterectomy before this society, I would say that I have done so because I have long thought that if medical men were more careful to relate to the profession at large their failures or mishaps

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in practice, with reflections and conclusions derived from them, it would greatly promote the common good. It would aid in forming a medical chart in a dangerous navigation, upon which would be discovered the rocks and shoals which will prove of vast importance to subsequent navigators. It is too often the practice for surgeons to report their successful results, and I have sometimes thought that some of them proved too much. They have appeared calculated to lead the sanguine and inexperienced minds of the younger members of the profession into a belief that they had only to go and do likewise; while a moderate acquaintance with the realities of medical life must sooner or later teach some most important and very painful lessons. If a medical man, at the close of a long professional life spent in observing disease, would write a little treatise composed entirely of a detailed account of his unsuccessful cases, he would, in my mind, be conferring an everlasting benefit on the medical profession.

That wounds of the bladder during abdominal or vaginal hysterectomy are not of frequent occurrence, is evinced from the fact that very few cases have been recorded in medical literature; but, without any doubt, this accident does occur oftener than is supposed by those not familiar with abdominal surgery, and I am even cognizant of a case occurring in the practice of another surgeon, where the bladder was opened during an Alexander operation.

Out of some 300 abdominal sections for gynecological affections, I have wounded the bladder but once, and this mishap has occurred in only 1 case of vaginal hysterectomy out of 74 cases that I have performed. I will briefly record the histories of these 2 cases, and will follow them by a few remarks on the normal anatomy of the bladder in its relations to the uterus, as well as its relations with that organ in the state of disease, and the best manner to deal with this operative complication.

CASE I. In November, 1900, I was asked to see a case of diffused fibroma of the uterus in a lady 45 years of age, patient of Dr. Lewis E. Morgan of Brookline. Bimanual examination revealed a uniformly enlarged uterus, which had attained the size of a child's head, freely movable, and no apparent lesion of the adnexa. Excessive loss of blood was the indication for radical measures.

Vaginal hysterectomy was performed, and while peeling off the bladder from the anterior aspect of the uterus, a teaspoonful or so of liquid trickled down, which was at first thought to be peritoneal fluid; but in order to make sure of this, a sound was passed into the bladder and made its exit through a rent in the posterior wall of the organ, which measured about 4 cm. The uterus was rapidly removed by anterior hemisection; the ovarian arteries and adnexa were tied off with catgut, while the uterine arteries were clamped. The wound was packed with subgallate of bismuth gauze, after an attempt had been made to close the opening in the bladder, which proved futile on account of the inaccessibility of the lesion.

Urotropine, at the dose of 50 cgm. 3 times daily, was ordered, and a permanent catheter was introduced into the bladder. In order to prevent the irritation of the neck of the urinary reservoir which is so frequent, both in the male and female, when a permanent catheter is employed, I ordered the nurse to change the catheter every 4 hours, inserting a fresh one each time. The gauze was removed at the end of the week, and was almost as dry as when it was inserted into the wound; the bladder was drained perfectly during this time, and no irritation nor signs of cystitis developed, and the wound in the bladder had entirely healed, so that the patient was up and about at the end of 12 days. I attribute this success very largely to the intelligent care of the excellent nurse in charge of this case.

CASE II. This was a patient age 34, unmarried, with a large fibroid growth which proved to be intraligamentous, and the symptoms of compression demanded surgical interference. After the abdomen was opened, on account of the inclusion of the neoplasm in the broad ligament, as well as the adhesions which connected it with the surrounding intestine, it was found difficult to decorticate it and form a pedicle. During the manipulations necessary to free the growth, the fundus of the bladder was ruptured to the extent of about 8 cm. The wound was immediately closed by a double layer of catgut sutures.

The neoplasm was then completely freed, and a supravaginal hysterectomy was performed. The abdominal wall was closed, and the patient returned to bed. The bladder was drained carefully, in exactly the same manner as in the preceding case, for 10 days, after which time the patient passed her urine voluntarily, and no cystitis resulted from the permanent catheter. At no time during the convalescence did the temperature rise above 38° C.

Let me here remark that in draining the bladder, no matter for what reason, it is important to frequently change the catheter in order to prevent irritation and infection of the viscus, and it has been my practice to order the nurse to keep a half a dozen soft gum catheters, about No. 14 or 15, French scale, already sterilized, and to change them every 4 hours during the day and twice during the night. The use of some good urinary antiseptic during the healing process of the bladder lesion is, I believe, an excellent adjuvant, and I know of nothing better than urotropine or the tincture of eucalyptus.

We will here briefly recall the relation existing normally between the uterus and the bladder. These organs are contiguous, and are united together by a loose cellular tissue. At their upper part they are separated by the peritoneal cul-de-sac, which passes from the posterior aspect of the bladder to the anterior aspect of the uterus. In the large majority of subjects, this vesico-uterine cul-de-sac ceases to exist at the junction of the

upper third with the middle third of the isthmus; below it never extends lower than the upper part of the cervix. Its contents depend upon the amount of urine in the bladder. It is usually empty when the bladder is moderately distended, because this organ pushes the loops of the small intestine before it up into the abdomen, and comes into direct relation with the uterus.

But the condition is entirely different when the bladder is empty, because the cul-de-sac will be filled by coils of small intestine, which immediately come down as soon as the bladder is empty.

The cul-de-sac is very easily detached with the finger from the surrounding parts. At their lower part the bladder and uterus are directly in contact, being only united by some loose cellular tissue, which allows of them being easily separated. Still lower down the bladder rests upon the vagina, and the posterior wall of the bladder and the anterior wall of the vagina form the so-called vesicovaginal septum.

As to adhesions existing between the uterus and the bladder, which have been described by several authorities, more especially by Luschka, who states that the posterior aspect of the bladder adheres more or less to the cervix uteri and the vagina; and Henle, who has described, as existing between the uterus and the bladder, an ascending aponeurotic layer, which is reinforced by a sagittal lamina, which is often muscular in nature, which starts from the posterior wall of the bladder inner to the orifice of the ureters, and is attached to the side at the lower half of the cervical portion of the uterus and the vagina, I would quote Paul Delbet in his excellent work on the "Anatomie chirurgicale de la Vessie,"

He says: "There is, in fact, between the highest part of the vagina and the peritoneum, a fibrous band, which completes the surrounding formation of the female bladder and takes the place of the prostato-peritoneal aponeurosis in the male. Its use is more for the sliding motions of the bladder rather than as a means of fixation. In trying to determine what were the exact connections of the bladder in a surgical point of view, I only found this lamina exceptionally; and when the bladder is peeled off from behind forwards, the following is what is usually found: In some cases, which form the minority, the bladder adheres to the isthmus of the uterus in the median line, and every attempt to peel it off is immediately arrested. In other more frequent cases the bladder may be separated from the farthest point of the upper surface of the vagina to the extent of 1 or 2 cm.

If, then, one continues to push the finger further in following the median part of the upper aspect of the vagina, the bladder may be separated on the median line as far as the interureteral muscle. The bladder only adheres to the vagina to the same extent that the organ adheres to the prostate in the male. As to the adhesions which exist on the sides, they are present at the point where the prolongations of the pubovesical aponeurosis pass; that is to say, to the aponeuroses more than to the vagina."

This quotation will help us in the understanding of the changes that the uterus, in a pathological condition, produce in the relationship that normally existed with the bladder. The influence that fibroma produces on the relationship between these organs naturally varies according to the anatomical type of neoplasm. Those growths which have a submucous evolution, and consequently which project into the uterine cavity, have very little effect on the relationship between them. The same may be said of small multiple fibromata which are disseminated in the uterine parenchyma, which increases the size of the uterus without producing very much change in its shape and anatomical situation.

It is, however, entirely different in cases of large fibroid neoplasms which have a peritoneal or subperitoneal evolution, and under their influence the bladder may be compressed, deviated from its normal position, or forced higher up into the abdomen.

Compression of the bladder is a relatively frequent occurrence during the evolution of uterine fibromata, and is more especially met with, if not exclusively, in those neoplasms having a pelvic development, and which little by little become wedged into the pelvis.

This complication is also met with when the fibroid neoplasm has its starting point in the posterior wall of the uterus, and becomes lodged in the cul-de-sac of Douglas; when the growth develops in the anterior wall of the organ, compression of the bladder is not so apt to follow, and from what I have seen, I should be decidedly of the opinion that a fibroid developing in the anterior aspect of the uterus rarely gives rise to compression of the bladder. Although this statement is based more upon the analysis of recorded functional troubles of the bladder in these cases than upon post-mortem examination, it may be possible to explain this apparent fact by the connections existing between the bladder and the neoplasm in each instance.

A fibroid tumor, developing in the posterior wall of the uterus, pushes the organ up against the pubis, and it is by the action of the enlarged uterus, which has preserved its broad connections with the bladder, that the neoplasm acts on the latter organ. Now, on the contrary, during the evolution of a fibroid which has developed in the anterior wall of the uterus, it often happens that the growth from its slow development frees the bladder from the uterus and pushes it aside, and thus the urinary reservoir escapes compression.

Compression of the bladder is interesting on account of the symptoms that it produces, but I should have little to say about it were it not that it secondarily produces changes which are interesting for the operator. These changes consist especially in an increase in size.

It occasionally happens that the bladder, when compressed against the pubis in the median line,

becomes dilated laterally,—an occurrence which is infrequent,—or it develops above the pubis, which is by far the commonest condition. Consequently, it is important to know that, during a laparotomy for a fibroid tumor in a patient who has had symptoms of retention of the urine due to compression of the bladder, the operator may meet the urinary reservoir quite high up behind the abdominal wall, although the urine may have been carefully drawn off with a catheter just before the operation. I would here point out that this ascension of the bladder under the abdominal wall, which may be termed parietal ascension of the organ which is consecutive to compression, must not be confounded with the ascension of the bladder on the anterior aspect of the fibroid, which is called visceral ascension, and which I will speak of presently.

The deviations of the bladder are most always lateral, and are produced under two different circumstances. Sometimes there is a fibroid tumor developing in the anterior wall of the uterus, pointing directly towards the pubis, pushing the

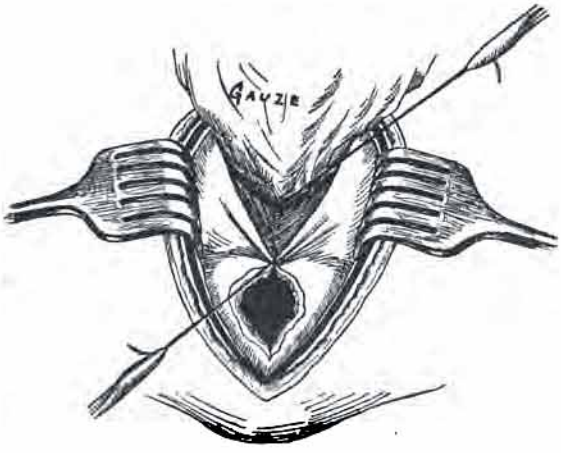

Fig. 2

bladder to one side. In other cases the deviation is due to a fibroid which has developed into the broad ligament, in which case the uterus is pushed to one side, dragging the bladder along with it.

These lateral deviations of the bladder are, however, infrequent, and they are only interesting because the organ is exposed to being included in ligatures that are placed on the broad ligament.

Ascension of the bladder is, however, more interesting, and is relatively frequent. It may be said that, in cases of large fibromata developing within the abdomen, it is always present, although it exists in varying degrees. The bladder may extend upwards to a considerable degree in some cases, and we have all dealt with those conditions where the separation of the bladder from the anterior aspect of the fibroid has required considerable dissection on account of the extensive surface involved. A bladder thus attached to the anterior surface of a fibroid tumor presents most variable aspects. Sometimes it is elongated and has the form of a flattened cylinder, while in other cases the organ is flattened and spreads itself over the surface of the neoplasm.

The peritoneum presents some interesting conditions, which must not be overlooked in these cases, in many of which the uterovesical cul-de-sac has completely disappeared, and the peritoneum of the bladder continues, spreading out directly with that covering the anterior aspect of the fibroid growth.

The ascension of the bladder in cases of fibroid tumor can only be explained by admitting that the fibromatous transformation has invaded the uterine parenchyma, which is in contact with the bladder, and in its development this zone of uterine tissue drags the bladder up along with it. In point of fact, when one carefully examines a bladder whose relationship to the fibroid has been thus modified, it is always easy to perceive that the part of the organ which is drawn up is never in the neighborhood of the urachus, but is always that portion which in a normal condition is in relation to the anterior aspect of the uterus. There thus exists a profound change in the general exterior configuration of the bladder. Its apex remains low down, and the culminating point is no longer the insertion of the urachus, but in reality is the posterior limit of the zone of contact which normally existed between the uterus and the bladder. Consequently, what I have termed visceral ascension differs very greatly from parietal ascension of the bladder.

In fibroids where malignant transformation has not taken place, the growth does not invade the neighboring organs, and the lymphatic system is not involved, but it is quite the contrary in other affections of the uterus whose treatment is by abdominal section. These cases have no relation to the subject of this paper, and consequently will be left aside, and we will only mention those inflammatory lesions which oftentimes give rise to adhesions between the bladder and the uterus, which so frequently renders their separation almost impossible, and very dangerous.

After the bladder has been peeled off the uterus, it may be wounded during further manipulations necessary to remove the uterus. The knife, scissors, or fingers of the surgeon, must work in the close proximity of its walls, and, in order to avoid any possible mishap, I think it advisable to hold the bladder out of the way with a broad, smooth retractor.

But now supposing that the bladder has been wounded. The diagnosis of the lesion is in most cases easy on account of the aspect of the tissue which has been incised, or because the surgeon enters directly into the cavity of the organ; on the other hand, there may be enough urine collected in the viscus to escape at the time the organ is opened, which would naturally draw the operator's attention to the bladder.

At all events, the wound should be immediately sutured; some surgeons have simply closed the intraperitoneal part of the organ and drained the extraperitoneal part, but it is far better to perform a complete suture if the bladder is healthy.

There is a prodigious number of methods for closing bladder wounds; that of Lembert is perhaps the simplest, and many surgeons have endeavored to modify this suture so as to obtain a more complete occlusion of the wound.

Czerny inserts a deep row of Lembert's sutures, and over this a second, so that the wound is united by two layers of superposed sutures. But I may say that Lembert's suture, which is simpler and more rapid in execution, is quite sufficient in the large majority of cases, on the condition that each suture is placed near enough together, and having said this, I will describe in a few words the technique.

The wounded bladder is drawn out of the abdominal incision, and with a small curved Reverdin needle, as shown in the figures, or a fine round needle, somewhat curved at its end and similar to that used for intestinal suture, armed with a No. O catgut, is introduced from right to left a half a centimetre from the border of the wound. It is then made to pass obliquely through the wall of

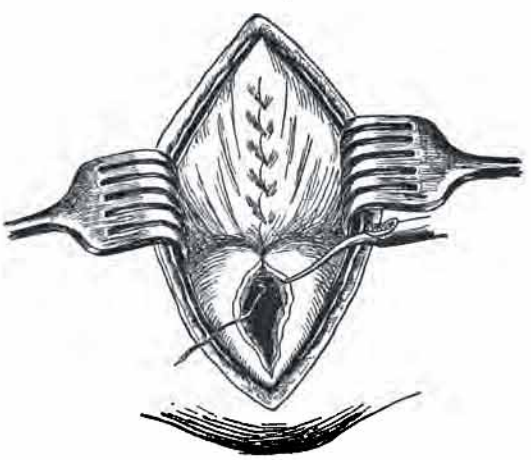

Fig. II

the bladder, being brought out at the free edge of the wound without having been passed through the mucous membrane. The needle is then passed through the opposite border of the wound in an inverse manner; that is to say, it is passed through the free border of the wound just above the mucous membrane, and is brought out a half a centimetre beyond. The sutures are then tied and cut closely off.

The sutures should then be carefully examined with some fine instrument inserted between each, and if the instrument penetrates between the two sutures, an additional one should be inserted.

If the opening into the bladder is a very small one, it can be closed by a purse-string suture, which should only include the peritoneum and muscular layer of the bladder, and over this a longitudinal over-and-over suture, or a Lembert's stitch should be employed.

Brenner's suture is a good one, and gives a very thick cicatrix. It consists in decorticating the mucous membrane of the bladder around the wound, and then to unite the deep surfaces of the muscular layer by a purse-string suture. The suture material does not decrease the vitality of the tissues.

As to suture material, I think that a No. O, dry-sterilized catgut is the proper one to select, and probably does not become absorbed before the seventh or eighth day, which is plenty of time for cicatrization to have taken place. As this cicatricial tissue is formed by the submucous and interfascicular connective tissue, it is quite as extensible as any other part of the bladder, and is certainly more resisting.

In the early cases of suture of the bladder, a through-and-through suture was used by Lotzbeck in 1858, Ultzmann in 1879, and in 1881 by Kispert. Then, after a time, it was shown that the sutures on the inside of the bladder, whether of silk or catgut, became impregnated with the salts from the urine, and might give rise to nuclei for a calculus formation.

In order to avoid this, the sutures were not brought through the mucous membrane, only carrying them through the muscular tissues and peritoneum covering the bladder, and surgeons took up the question more particularly. Von Antal proposed making an oblique section through the bladder walls, so as to give the opening into the viscus an infundibuliform shape, and when the mucous membrane of the organ was reached to cut through this vertically, and then bring together the raw muscular and serous layers of the bladder. He employed this method in 2 instances, and obtained a union by first intention, and Pilcher has also obtained excellent results by this procedure.

Other surgeons have had the solidity of the suture more at heart. Tilling, Franks, Schmitz and Kummel employ a buried interrupted suture, and over this a furrier's suture. Julliard and Petersen carry their sutures a little way beyond the angles of the wound in order to avoid the possibility of infiltration of urine. Lucas-Championniere uses three layers of suture. With the first layer he brings both borders of the wound into contact as perfectly as possible, while the other two layers are intended to protect the first and to prevent any stretching of the deep suture when the bladder becomes distended, so that the external aspect of the bladder becomes adapted twice over the first row of sutures in the muscular and peritoneal layer of the bladder. Bassini also follows the same technique. Guyon, Carlier, Albarran and Nicolich employ a double layer of sutures, the first of which is catgut, and is composed of a number of interrupted sutures placed 8 or 10 mm. apart. Each suture is inserted at about 3 mm. from the borders of the wound, and includes all the layers of the walls of the bladder, even the mucous membrane. Over this first layer of sutures, which we think is quite sufficient, a second layer of superficial Lembert's sutures of fine silk is inserted. This technique, which is derived from the one employed by Pinel-Grandchamp, has given very excellent results to the

surgeons who have employed it, and in no case has any mention been made of calculus formation having taken place.

The technique that I have employed for closing bladder wounds, and one that is used for gastro-enterostomy, is as follows: Two layers of sutures are employed, the first of which includes the mucous membrane alone; for this fine catgut should be used. The second and superficial layer of sutures includes the muscle. If the bladder is deeply seated, and if the abdominal walls are very thick, the mucous membrane may first be united by interrupted sutures of fine catgut, but if the wound in the bladder is easily accessible, a running suture is to be preferred. As to the superficial suture, it should always be done with a running Lembert's suture. In some cases, especially if the wound in the bladder is a long one, these two layers of sutures may be reinforced by a third layer of Lembert's suture (see Figs. I, II and III).

This technique has, we believe, two advantages. In the first place, the mucous membrane is brought into better apposition; it is easy to understand

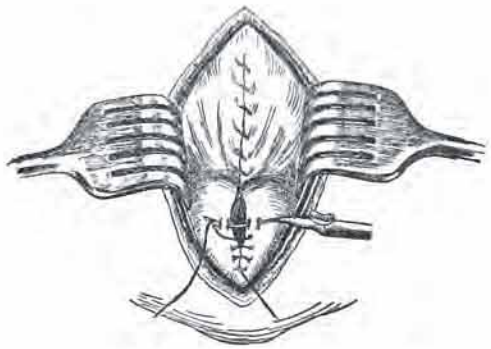

Fig. III

that these two layers of sutures would more completely occlude the opening in the bladder than the technique recommended by Guyon and others.

We now come to the question of drainage of the bladder, which may be accomplished by either urethral drainage, or directly from the ureters. I believe that Küster was the first to propose permanent catheterization of the ureters after suprapubic cystotomy, but before this Schæde introduced the ureteral catheters, leaving them in place for one week, in a case of ureterovaginal fistula, with a very excellent result. Some time later Albarran and Lluria, after having experimented on dogs, again tried ureteral drainage successfully. The patient was a woman with tuberculous cystitis, and the urine coming in contact with the mucous membrane of the bladder produced very severe pain, which immediately stopped as soon as suprapubic cystotomy and ureteral drainage had been practiced.

Albarran believes that permanent ureteral catheterization is indicated in certain cases after suprapubic cystotomy, and I believe that in a case of a very large opening into the bladder made accidently during a hysterectomy, permanent catheterization of the ureters might possibly be of value.

Permanent drainage of the bladder, as ordinarily practised, is, however, the most usual occurrence in practice, and a few words may here be said regarding the choice of the catheter, the precautions that should be taken to prevent infection of the bladder, and the length of time during which drainage should be employed. Personally, I believe that in the female it is better to change the catheter every four or five hours, and then insert a new one, as I already intimated in the beginning of this paper, but if we should desire to employ a permanent catheter properly speaking, the Pezzer instrument is by far the best.

With a self-retaining Pezzer catheter no means of fixation is necessary, but with the plain rubber catheters they must be attached to the pubis by means of a silk thread, which may be hitched to a hook held in place by a strip of oxide of zinc adhesive plaster, just above the pubis.

Infection of the bladder, following the use of a permanent catheter, may be avoided if the latter be put in connection with a sterilized rubber tubing, which extends under the bed and dips into a glass receptacle which is plugged with absorbent cotton.

When a permanent catheter is used, and not changed, it usually becomes occluded by the accumulation of salts in its lumen, and if a Pezzer sound has been used, it is better to use an ordinary catheter, when the instrument is removed, rather than to endeavor to reintroduce another instrument of the same description.

I have found that, after suture of the bladder following suprapubic cystotomy, from 5 to 6 days is usually enough drainage, although in the second case recorded in this paper I drained the bladder longer, but in 1 instance where I did a suprapubic cystotomy for calculus in a male, the permanent catheter was left only 4 days, the patient making an excellent recovery. Franck believes that the sound should never be removed earlier than 1 week, because the sutures in the bladder may give way before that time, and Kummel advises to keep up the permanent drainage for a fortnight, because in 1 case he removed catheter on the fifth day and a fistula resulted. Legueu advises the removal of the sound after the third or fourth day, while Monprofit advises only leaving it 1 or 2 days, but this appears to us a rather short period, and not a safe rule to go by.

If the sound should be left without removal for a week or ten days, it is well to use intravesical injections with a 1-2000 solution of either lactic or phosphoric acid every other day, and this will prevent a deposit of urinary salts on the outside or in the lumen of the catheter.

The urethritis which often follows the use of the permanent catheter in the male, is occasionally met with in the female, but will cease spontaneously after the instrument has been removed. The use of permanent drainage after suture of the bladder is, to my mind, an absolute necessity, be-

cause it prevents any distension of the organ, and at the same time it is in perfect repose, and consequently a better chance for a solid union of the wound to take place is certainly given.

If the bladder is opened during vaginal hysterectomy, the best treatment, I believe, is simply permanent drainage of the bladder, and in the large majority of cases recorded by Richelot and others, the wound in the bladder has become closed, and in only a few cases has a vesico-vaginal fistula resulted. Of course, if this complication should arise, it will have to be closed at a future date, but I would recommend waiting a number of months before attempting its closure, because with patience and care the fistula will often close of itself after a certain length of time.

A few words now regarding septic complications, which fortunately occur more and more infrequently on account of the perfected surgical technique of today. If, however, they should arise in spite of all care, the abdomen should be opened and freely irrigated with a saline solution, and the permanent catheter should be carefully watched to see that the drainage is perfect.

In those unfortunate cases where the surgeon has overlooked the presence of a wound in the bladder, and post-operative symptoms of urinary infiltration or peritonitis should occur, the abdomen must be immediately opened, and the wound in the bladder sutured to that in the abdomen. A simple irrigation of the peritoneal cavity should then be resorted to, and if there are any perivesical foci of suppuration, they should be drained freely.

The post-operative symptoms due to an unsutured extraperitoneal wound in the bladder usually declare themselves by a purulent infiltration containing urine. This infiltration should be dealt with according to the same rules as those resorted to in urinary infiltration taking place after rupture of the male urethra; namely, permanent drainage of the bladder, and free and extensive incisions in the tissues infiltrated by the urine, followed by drainage with gauze or rubber tubes.