

INJURIES TO THE BLADDER DURING HERNIA OPERATIONS.

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INJURIES to the bladder taking place during operation for the ordinary forms of hernia are of two distinct classes as pointed out by Bruner¹, in 1898. The first and probably least common takes place from the presence within the sac of the bladder or a diverticulum therefrom; or in the paraperitoneal form the bladder escapes along the side of the hernial sac and is injured when the latter is incised or ligated; or otherwise damaged when the neck of the sac is dissected away from the subjacent tissues. The most common injury, however, is probably due to traction upon the sac in an effort to ligate it as high up as possible, with the result that the peritoneum passing from the bladder to the pelvic wall is dragged into the incision carrying the bladder with it, where it is either ligated, incised or torn. Only the former type should be designated as hernia of the bladder, but both types are almost universally so treated in the literature. In order to properly cover the ground the title of this paper was selected to include both classes under proper nomenclature. As an example of a true bladder hernia the following short report is appended.

CASE I.—Florence M., aged five years, was seen in consultation May 1, 1908, during an attack of acute strangulation in a hernia which has been known to be present for a year, when her mother had noticed a small hard mass in the right femoral region which made its appearance rather slowly and when first seen by her physician was not reducible. A larger swelling occasionally appeared which could be reduced. Her previous history was otherwise unimportant. For twenty-four hours she had been suffering severe abdominal pain, had vomited and the bowels had not moved with enemata. There was no abdominal distention and the small tumor had increased markedly in size and become very tender so that palpation was quite painful. Upon examination two distinct masses could be made out. The tender body was

shaped like an ovary and pressure upon it started a sharp attack of vomiting. Steady compression such as is exercised upon a paraphimosis resulted in a rapid diminution of its size and after a moment or two of manipulation, it slipped back through the canal without gurgling, leaving the smaller irreducible portion outside the ring. All pain and nausea immediately disappeared and the child in a few hours was as well as ever. Two days later while the patient was awaiting operation it was noticed that the hernia became much larger when the bladder was full and diminished in size upon its evacuation. Operation showed the adherent mass to be omentum, as was expected, with a paraperitoneal bladder hernia at the inner side of the sac. The sac was ligated below the bladder, the ring merely sewed up and the foot of the bed kept elevated for two weeks. Convalescence was uneventful and there has been no recurrence up to the present time.

CASE II.—Mrs. R. M., aged thirty years, pluripara. This patient states that for some years she has had a small swelling in the right femoral region which has been diagnosed as a hernia, and for weeks at a time has been irreducible. When irreducible it became tender and somewhat painful but not sufficiently so to incapacitate her. She has a chronic bronchitis and during exacerbations the hernia is far more troublesome. When first seen she was having one of these acute exacerbations and I was unable to reduce the hernia. Operation was done some weeks later under nitrous oxide and oxygen but the hernia had previously reduced itself. A very small empty sac was found which was so narrow at the neck as to be almost obliterated, and it was not thought possible that this could be the sac of the hernia which was felt at the earlier date. A little deeper dissection revealed a second sac situated median to the first one, thin and translucent. Both sacs were included in one ligature and cut away.

The patient was returned to bed in good condition but complained more of pain than is customary. Six hours later she was still complaining bitterly of pain which was not localized but spread over the entire abdomen and there was a little tympany. Her pulse was normal in rate, but very soft and the visible mucous membranes were distinctly too pale for a patient who had taken gas. In casting about for a solution of her rather serious appearance I remembered that several large veins were encountered in close proximity to the second sac, and immediately

passed a catheter which withdrew a small amount of blood and no urine. An attempt to perform cystoscopy failed because of inability to inflate the bladder and the diagnosis of injury to that viscus was positive. Gas was again administered and a second incision through the right rectus revealed the pelvis full of blood and urine. This was sponged away and the bladder opening easily found and repaired in two layers. A drain was inserted, probably unnecessarily, down to the bottom of the pelvis and the wound closed. A retention catheter was placed and the patient made an uneventful recovery excepting for the supervention of a femoral phlebitis—a condition, by the way, which has seemed to me to occur rather frequently after this particular anesthetic. While this may have been primarily a hernia of the bladder it seemed to me quite evident that the bladder was drawn into the incision by traction upon the empty sac first found.

In the article by Bruner above mentioned all literature up to the end of 1896 was searched, and 181 cases of bladder hernia found reported, 128 in the male, forty-four in the female with eight unknown. In the male there were 122 inguinal, two femoral and four of other less common varieties. In the female ten inguinal, twenty-seven femoral with seven of the less common varieties, and of those in which the sex was not mentioned there were six inguinal and three others. The right side presented the greater number of these hernias especially of the crural variety, there being twenty-three on the right side to six on the left. Bruner also found that very few cases of bladder hernia had been reported in patients under the age of thirty and the decade presenting the greatest number was between fifty and sixty. Of this large number thirteen were diagnosticated and treated without operation and of the whole number of operated cases, five were diagnosticated before operation. In those cases in which exact observation had been made ninety-nine were first recognized at the time of operation and in twenty-two instances the existence of bladder hernia was unknown until after operation had been completed, when later developments proved that injury to that viscus had taken place. In the ninety-nine instances in which the bladder was recognized during the course of the operation it was injured in fifty-eight or more than one-half, many times being accidentally cut or torn before its recognition: having been mistaken for the sac eleven times and for tumor, cyst, omentum or lipoma at others.

In the twenty-two instances in which nothing was known of the existence of bladder hernia until after the operation was completed it was mistaken for the sac nine times, for a second sac five times, and for a lipoma twice, and six times nothing had been seen at operation which resembled the bladder. Most striking, however, is the large number of fatalities for of the eighty-one cases which he tabulates in which bladder injury was known to have taken place twenty-one died, or a fraction over 25 per cent., and thirteen of them could be laid positively to the bladder injury.

Following along somewhat the same statistical lines as Bruner, I have been able to trace 144 cases of bladder hernia, including my own, from the end of 1896 to the end of 1907, of which number eleven reported are indexed but the literature is not available for reference. Of the 133 tabulated, ninety-seven were male and thirty-six female. In the male there were ninety-four inguinal, two femoral and one of both varieties. In the female there were eleven inguinal, twenty-three femoral and two other varieties. The youngest was a year and a half old and the oldest eighty-two. The largest number, thirty-two, occurred in the fifth decade and there were thirty in the sixth, but the first decade had five. Of those cases 133 in number concerning which complete statistics were found the diagnosis was made before operation eight times and two of them were not operated. At the time of operation diagnosis was made 116 times; not until after operation nine times. In those cases in which the bladder was recognized at the time of operation it was injured in thirty-two, making a total of forty-one cases out of 131 operated cases in which the bladder was injured. Of the thirty-two in which the bladder was recognized and injured four died and the outcome is unknown in three. Of the nine instances in which the bladder was injured, but the injury was not apparent at the time of operation, three were first disclosed at the autopsy. Two others died in spite of the condition becoming known and four recovered. A comparison of these figures with those of Bruner eleven years earlier reveals several interesting facts.

Bruner was able to collect but 181 cases in the entire literature preceding the end of 1896 while 133 have been reported since that time with the literature available. Eleven case reports are made, the literature being for some reason not at hand, and incidentally I have seen mentioned a number of other cases with such vague statistics as to make them of no use. The reason for

this apparent great increase in the number of cases is partly those which usually apply to a little recognized abnormality when attention is drawn to it by one or more forceful papers such as those of Bruner(1) in 1898 and Moynihan(2) in 1901. Every surgeon is then on the expectant list and Moynihan mentions in this paper von Hacker's experience in which in 455 hernia operations only one bladder hernia had been observed while so soon as the order went forth to examine carefully for this feature in any hernia operation it was found six times in the next 187 Bassini operations. Again, and this has been emphasized by various writers, the present modes of operating especially upon inguinal hernia in which the canal is laid open gives opportunity for observing a beginning protrusion of the bladder wall covered by the median side of the hernial sac, and further, the more complete loosening of the sac up to its neck together with the attempt to ligate as high as possible, undoubtedly in itself many times causes the bladder to present in the wound as an artificially produced hernia of that viscus. I am the more convinced of this because of the fact that in 131 operated cases the diagnosis was made before the operation in but six instances including my own, and it is hardly conceivable that it should have been overlooked in 125 cases had the condition existed before operation.

In Bruner's series the bladder was injured in 59.5 per cent. of the cases recognized as bladder hernia at the time of operation. In the later series the bladder was injured in but 27.6 per cent. of those cases first recognized at the time of operation showing again that operators were put upon their guard in respect to this complication and were recognizing it before any damage had taken place. This is more completely proven by the fact that out of the total number of cases which he records 12 per cent. were first recognized at autopsy or at least not until after the abdomen was closed while this later series shows only 6.7 per cent. entirely overlooked at the time of operation. Again in Bruner's series out of a total of eighty-one cases in which bladder injury took place twenty-one died, a mortality rate of 25 per cent., not all attributable to the bladder injury. In the later series of forty-one cases of bladder injury nine died, a mortality of 22 per cent.: not a particularly good showing when it is considered that the mortality rate for hernia operation *per se* is practically nil at the present time. It is altogether likely too that many deaths from this source are unreported; in fact, I have personal knowledge of one such and have no doubt that many of the Fellows could

narrate instances of which they know but which were never made public.

As to the etiology and pathology of bladder hernia I believe nothing more can be said than Moynihan gave in 1901 excepting to insist upon the probability that a far larger proportion of the paraperitoneal form is artificially produced than has been suspected. The recognition of the bladder hernia and avoidance of injury to its wall is the most important consideration. In the intraperitoneal form no difficulty is apt to arise as no operator purposely opens a viscus contained in the sac. The extra-peritoneal variety is more subject to damage as the bladder may be opened under the mistaken idea that it is the sac. The paraperitoneal form is particularly apt to be caught in the bite of the ligature with disaster following later. It has been stated that the color of the bladder wall and its great thickness should lead one to recognize it, but in many of the cases reported the wall was so thin that neither its consistence nor color was sufficient to put the operator on his guard. Of more use is the appearance at the inner side of the sac or suspected sac of a large amount of fat and the large veins which are almost universally present on the bladder fundus but in a difficult operation these may be entirely overlooked.

For the purpose of absolutely identifying the bladder when opened by accident I would advocate the routine use of methylene blue for a day or so prior to the hernia operation. Thus the urine could not be mistaken for serum nor the thinned out bladder wall for sac. While such a procedure may seem unnecessary, nevertheless, since the common forms of hernia are so readily cured by the simplest of operations and the risks of such operations have been reduced to those purely accidental it seems incumbent upon us to reduce these accidental complications to the vanishing point by any means which may be possible.

REFERENCES.

1. Bruner. *Deutsche Zeitschrift für Chirurgie*, 1898-8, vol. xlvii.
2. Moynihan. *The Lancet*, 1900.

DISCUSSION.

DR. JOSEPH H. BRANHAM, Baltimore.—This paper is one of great interest, and, as the author very well says, there is no question but what there are a great many cases of hernia of the bladder that have not been detected during operation, and have caused death afterward, and these cases often are not reported. I know of several such cases that were not reported, as naturally an accident of this kind does not enthruse the operator to place it before the medical public. Of course operators neglect to report these cases because they do not make quite as much effort to do so as they do other cases that are successful. I do not pretend to say they intend to keep them a secret, but a large proportion of them do not find their way into the literature.

On the other hand, a great many cases that are operated on successfully are not reported. I have run across two cases of hernia of the bladder in operating. I did not operate in a hurry. I believe there is some advantage in not being in a hurry or in trying to rush an operation too much. Operating slowly in these cases and finding what looked like an extra sac closely adherent toward the inner side of the hernia, I simply took a curved catheter and succeeded in passing it into the bladder and around into the sac. I would suggest this method of recognizing a hernia of the bladder as being very much superior to the methylene-blue method. I believe if we would carefully examine the bladder in each case of hernia before operating, we would find all diverticulæ extending into the hernial sac, and it would not be necessary to use methylene blue.

DR. W. N. SPRAGUE, Washington (by invitation).—In determining the presence of a hernia of the bladder in this class of cases, I had the opportunity some twelve years ago of seeing a case of this nature, making use of the ordinary uterine probe to determine the presence of the hernia, and was able to demonstrate it easily. I found, when I got down to the hernial sac, there was thickening of the median side, and suspecting it might be a hernia of the bladder, it being the first case I had ever seen, I used the uterine probe and demonstrated it very easily. Since that time I have in every suspected case of hernia of the bladder used the uterine probe with which to explore the bladder at that point, but have not encountered a second case of hernia of the bladder.

DR. HUGO O. PANTZER, Indianapolis.—I recall a recent observation which bears interestingly on this subject. A general surgeon operated upon a spare individual having a femoral hernia, with very slight protrusion, but very adherent sac. The operation by the surgeon was followed with an abdominal operation done by me. When I opened the abdomen, I found

the peritoneum of the entire right half of the pelvis denuded—in other words, the inordinate pulling out of peritoneum for the purpose of doing high suture, as mentioned here, had drawn down the peritoneum of that half of the pelvis and brought it out into the wound. Afterward the suture under high strain had slipped and here I had a large denuded surface. I am confident that the frequency of hernial protrusion is in large part due to the inordinate effort to strike the peritoneum at a high point.

DR. ALBERT GOLDSPOHN, Chicago.—In two instances of inguinal hernia in the male in my hands, a suspicious pouch appeared in the wound, which was proven by the introduction of a male sound to be the bladder. Of course, after its recognition it was successfully avoided from injury. In another instance I made bi-inguinal shortening of the round ligaments, or inguinal laparotomy, the operation having been done for complicated, severely adherent retroverted uterus; after breaking up adhesions with the finger through the inguinal canal and doing some resection of the appendages, then shortening the round ligament by drawing it more directly forward, and anchoring to the posterior surface of Poupart's ligament, it developed on one side that the patient had leakage of urine from the wound the next day. It was not serious, in that it did not lead to any evil consequence, and it ceased of its own accord within two weeks. But it shows what may occur, and in this latter case, where extensive adhesions existed, it can be easily seen that the bladder may be found adherent to and up to the round ligament.

DR. GEORGE W. CRILE, Cleveland.—It seems to me that Dr. Skeel has covered the subject very thoroughly in this timely and admirable paper, and I simply want to add to his statistics. Dr. Lower, my associate, and myself in over four hundred operations for hernia have seen five cases of hernia of the bladder, and in two of these I opened the bladder myself in operating.

One was the case of a little girl, nine years of age, who had a femoral hernia. The child was operated on previously by a colleague. In operating I opened the bladder, but sutured it. The healing was not interrupted.

In another case I opened the bladder, but if I had had my mind opened to the possibility of this accident, I should not have made the error, because afterward I questioned the patient closely about his symptoms; the urinary symptoms were distinct, and the clinical history would have shown that he had a bladder hernia. In this case the bladder was immediately sutured and a good recovery followed.

DR. ROBERT T. MORRIS, New York.—Did I understand Dr. Skeel to trace the causal relationship between femoral phlebitis and the form of anesthetic—gas anesthesia?

I have not opened the bladder in hernia operations, but have opened it twice elsewhere, accidentally, once in removing fibroids

and once in a case of ovarian cyst, and in both of these cases by putting a catheter into the urethra I found there was a subsequent flow of urine in the line of least resistance, hence there was no complication resulting from opening the bladder.

DR. WALTER C. G. KIRCHNER, Saint Louis.—Unfortunately, I did not hear all of Dr. Skeel's paper, but he has brought before us a very important subject. I have come across such cases as he has mentioned. In the City Hospital of Saint Louis we have a great number of hernia cases, but I have only come across one case of hernia of the bladder. In this particular instance there were three rings which, of course, I recognized later. The larger one was in the position of what would usually be represented by a direct hernia; the outer one corresponded with the internal inguinal ring, and there was a small compartment in between. The larger and inner one contained the bladder. This I did not recognize until the bladder was opened. A catheter was passed into the bladder, and it was found that the bladder extended on the left side to within two inches of the crest of the ilium. This hernia had existed for some time, and the ring being large the greater portion of the bladder was drawn to that side. The bladder was repaired, the true hernia also looked after, and the abdominal wall strengthened. A complete and satisfactory recovery was obtained. It is the only case of this nature that has come to my attention.

DR. SKEEL (closing the discussion).—I fully agree with the gentlemen that in a true hernia of the bladder there is no difficulty in making a diagnosis by passing a sound into the bladder. Also, in true bladder hernia there should be practically no difficulty in making a diagnosis before operation. The point I tried to make was that the greater number of all so-called bladder hernias are produced during the operation by traction on the neck of the sac in ligating the sac high up. We slip the ligature a little higher in the effort to get it up as high as possible, and if we have pulled the peritoneum covering the fundus of the bladder into the hernial sac, slipped a ligature up above that, snipped it off, and also snipped the bladder protrusion off, we will have artificially produced a bladder hernia in which we have damaged the bladder wall. So soon as the bladder fills, it will drag back from the ligature, there will be an opening into the free peritoneal cavity, and it will soon be full of blood and urine. If we had administered something like methylene blue we would be able to see the stump afterward and recognize at once we had cut the bladder. It would be a comparatively simple matter to give methylene blue as a routine measure before hernia operations. If we have a plain straight case of bladder hernia, no one would blunder in the course of operation unless it were without thinking about the matter. It is this paraperitoneal form which comprises more than nine-tenths of all injuries of the bladder and are reported. I was careless in incising the bladder and tied it off with a ligature, then cut it off, and thought the urine was serum that came

from the interior of the sac. When I found I had injured the bladder, my chagrin was marked, and that led me to look up the literature of the subject. I looked it up for consolation to see whether any other surgeon had been so foolish, and found a number of cases reported, largely from the German literature, and, in addition, I found that many of our most distinguished operators abroad pointed out that they had been unable to distinguish previously what they later found to be the bladder.

Moynihan does not believe that bladder diverticula play any part in these cases. A small portion of the bladder is drawn into the wound alongside of the sac; many times exuding urine has been mistaken for serum or for cyst contents in cases of femoral hernia, the most distinguished operators having made this blunder, and have done it because the sac lacked translucency, and because the muscular color of the bladder was not characteristic, hence they did not recognize the mucosa. The enormous percentage of cases in which injury of the bladder was overlooked at the time of operation led me to look up this subject, and I found that a number of writers suspected they had injured the bladder during their operations; that while they had passed a sound, they failed to find any connection between the bladder and the sac which they had torn or cut. The probability is that in dragging down such a protrusion of the bladder wall, the opening had been made so small that they could not get a catheter into it, and thus they injured the bladder without knowing it. In the straight bladder hernia of the intraperitoneal form, no one would make the mistake more than once; he would recognize it and close it up. In the form produced in the Bassini operation, in the effort made to drag the sac down, a certain number of bladders will be injured which might be avoided by the simple routine measure I have suggested. It would be practically automatic, and would show at once what had occurred.

Dr. Morris asked with reference to gas anesthesia. I am glad he has referred to this. I believe the use of nitrous oxide gas and oxygen has been employed to a greater extent in the part of the country where I reside than anywhere else, compared to the population and number of operators. The use of nitrous oxide gas and oxygen in these operations is very popular in Cleveland, particularly in cases of nephritis; cases of bad organic heart disease, with failure of compensation; bad cases of bronchitis and bronchopneumonia. I am impressed, however, with the greater number of cases of femoral phlebitis following the use of gas as an anesthetic than from the use of ether. This is not based on statistics, but is merely a personal impression which one gets as he looks over the field.

DR. BRANHAM.—Did I understand Dr. Skeel to say that there is no such thing as a bladder diverticulum?

DR. SKEEL.—No, sir. I quoted B. J. Moynihan as saying that he had never been able to find a single thing which would lead him to think of the bladder diverticulum; that eventually,

when the case was proven at autopsy to have been an injury of the bladder, it was then a diverticulum artificially was produced, but that bladder diverticulum was a rare occurrence except in the presence of stone or hypertrophy of the prostate which offered great obstruction to urination.

DR. BRANHAM.—It seems to me, if the inference is drawn that bladder diverticulum does not exist, it would be clearly an error.

DR. SKEEL.—Bladder diverticulum as the cause of hernia has never been proven.

DR. BRANHAM.—Bladder diverticula do occur, and I use the term bladder diverticulum in the sense of an artificial traction diverticulum, which is perfectly legitimate, and not in the sense that these bladder herniæ are true bladder diverticula. Anyone who has studied specimens has seen them.