as he otherwise would have done. No difficulty has been experienced by the child since that time, now nearly three years ago. The second case occurred in a man 37 years of age who possessed a diverticulum which was dilated, being about the size of an orange. It contained fourteen concretions, each being about the size of a hickory nut, besides a great number of other food products, such as grape seeds, etc. The contents of the diverticulum produced such traction on the bowel that it led to an angulation with consequent intestinal obstruction, which in turn disturbed the circulation of the diverticulum so that it became gangrenous. The third case observed was one in which the diverticulum became strangulated in the sac of a right inguinal hernia.

DR. MILES PORTER stated that Dr. Cheyne says that in cases of intussusception of Meckel's diverticulum the mucous membrane alone is turned in, but in the three cases which he has examined it included all the coats.

EXSTROPHY OF THE BLADDER SUCCESSFULLY TREATED BY PETER'S METHOD.*

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I am submitting the report of a single case, because it illustrates well an exceedingly easy method of meeting difficult conditions and controlling them almost entirely, so far as theoretical considerations go, and quite entirely so far as this particular case is concerned.

It is hardly necessary to repeat that the ordinary plastic operations which contemplated the creation of a bladder, in cases of exstrophy of that organ, did not include the creation of a sphincter vesicæ; and yet a bladder with no sphincter is really no bladder, but is only a wider part of the urinary tract. After the most brilliant success in an operation of this type the patient has to wear a urinal, his real bladder, hanging down by his leg.

The utilization of the colon or rectum as a receptacle for the urine, an artificial reversion to the avian type, was resorted to, in order to make the sphincter and do the work of the absent sphincter vesicæ. The genuine brilliancy of the idea, which may be credited to John Simon¹ in 1805 could not at the time of its inception be rewarded by a practical result, for the sepsis that naturally followed any such operation at that period killed the patient. The same sepsis has stood steadily in the way of the method during all the intervening years and probably will always stand there, but in some details it has been circumvented, more especially the septic peritonitis, by the simple plan of avoiding the peritoneum, while the septic nephritis, unless statistics wholly mislead, has been so long postponed as to give rise to the hope that it may never occur.

The operation accomplishing this, described by the originator, George A. Peters,¹ of Toronto, avoids opening the peritoneum by confining the work to the space in the abdomen and pelvis, below the vesicorectal limits of the peritoneum, in both males and females, and so narrows the possibility of septic danger to that inherent in all operation work and avoidable in almost all, and that, too, due to the ascending infection of the ureters and kidneys.

The operation dissects out the ureters individually, keeping a small circular patch of bladder wall around the vesical orifice of each. The rest of the bladder wall is ablated. Each ureter, with its button of bladder wall,

is then drawn through a small slit in the rectal wall of its own side and left hanging from 1 cm. to 1.5 cm. into the rectal lumen.

This very general statement covers the fundamental idea of the operation, for the peritoneum has not been opened; but there are certain details of technic which seem debatable and I have sufficient assurance to wish to discuss them in the light of my one case.

The idea on which the operation of Maydl was based, namely, that there was a sphincteric action in the muscular layer of the bladder wall around the openings of the ureters, and that this required the conservation not only of this muscular fiber which surrounded each ureteral orifice, but also of those that surrounded both of them together, has to be abandoned; and with it may be given over the necessity for transplanting the whole of the trigone of the bladder into the colon or rectum, and making it practically a part of their wall. It is only necessary, therefore, to conserve such part of the bladder wall as surrounds each ureteral opening individually, and even this not with the idea that it contributes a sphincteric control of the opening, but merely with the idea that the wound of the mucous membrane is made at a reasonable distance from the mouth of the ureter and that the ureteral mucosa itself is left absolutely intact.

In the earlier operations which Peters himself did, he passed into each ureter a small catheter and fastened it there. Its presence in the ureter served as a guide which prevented the wounding of the ureter during the operation and afterward served as a means to conduct the urine out of the rectum during the first thirty-six to forty-eight hours following the operation. In one of Peters' patients an ascending infection occurred and the patient died, and Peters thought that the infection possibly was due to the fact that he had left the catheter in the ureter after the transplantation of the ureter into the rectum. This made me desire to avoid the use of the catheter at all, and as I began my operation I attempted to dissect out the ureter without the assistance of the catheter as a guide. I did this quite as much because of the infected state of the exposed vesical mucosa and the fear that in passing a catheter into the ureter I should carry up with it a certain amount of the infection. I found, however, that the dissection in the abnormal anatomic relations of the parts in these exstrophied cases was difficult, and I fortunately put into each ureter a small ureteral catheter to act as a guide, for had I not done so I should quite certainly have cut off the right ureter from ignorance of its anatomic location. In this one case of mine I found that the ureters approached the bladder from either side of the abdomen and passed transversely from the periphery of the exstrophied bladder toward their openings.

I believe that it will be wise for anyone who is undertaking this particular operation to put into each ureter before he dissects it out, a ureteral catheter. After the dissection has been completed, the catheter should be removed. It is no longer of service.

I departed from the Peters technic in that I did not retain the catheter in the ureter after the latter had been transplanted into the bladder. Instead of that I let the ureter begin to discharge urine into the rectum from the first and merely saw that its exit was arranged for by a tube in the anus. In the operation, as Peters has described it, dilatation of the sphincter ani was practiced so as to permit free exit for the urine. Of course, stretching the sphincter is a simple and common

* Read in the Section on Surgery and Anatomy of the American Medical Association, at the Fifty-sixth Annual Session, July, 1905.
1. Peters, Brit. Med. Jour. 22, June 1901.

matter, and very rarely results in paralysis. It is quite possible, however, for a man to stretch the sphincter of a child more than he thinks he is doing, and as the end for which the stretching is done can be equally well attained by fastening a little rubber tube in the anus, it seems wise to me not to stretch this sphincter; and the plan has worked well, at least in this one case of mine. I can not well conceive how a man could be more mortified than to find, after he had made a successful transplantation of the ureters into the rectum, that he had no sphincter ani, and that all that he had accomplished by his operation had been to change the point of incontinence from the hypogastrium to the anal region.

In the operations which Peters has described, he packed the opening in the hypogastrium and let it gradually cicatrize. There seems to me to be a fairly good reason for this, for if there is any leakage from the rectum by the side of the ureter through the little opening which is made for the introduction of the ureter, the packing would act as a drain to the surface and so prevent a local and possibly general infection. Peters has not closed the openings in the rectal wall in any way. In my one operation I put in a single catgut stitch which brought the opening down to a size just sufficient to contain a ureter, and in the stitch I caught up a little of the periureteral areolar tissue which had been kept with the ureter to carry its blood vessels. This precluded the probability of any leakage from the rectum, and I should think it would be quite possible in some of these cases immediately to suture the recti together and so close, at once, the abdominal wall. In my own case I could not do this, for the child was very feeble and was already on the verge of shock when I had completed the transplantation, so that I followed Peters' plan and merely packed the abdominal wound. Later, after the general condition of the child had improved, it was a simple matter to go back and make a firm suture of this abdominal wound, it having in the meantime practically filled up with granulation tissue and nearly cicatrized over. In doing this I was surprised to find how easy it was, in this particular case, to draw the recti together, even though there was no os pubis on either side and no symphysis.

In the ablation of the vesical mucosa I was particularly careful to leave untouched the prostatic urethra which lay as an open saucer-shaped space in its usual location, and in it could be plainly seen the openings of the seminal ducts. From it extended, as a gutter, the open urethra. At a secondary operation I closed in the urethra from the meatus to the prostatic portion by the Duplay method, but I failed at first, to get union over the prostatic sinus. This has been accomplished, however, at later operations. This child, therefore, has a genital canal, normal up to his prostatic urethra, and from that point on to the meatus completed by an artificial closure of the urethra which should, in time, give him the opportunity of doing his duty toward the propagation of the species.

Reverting to the history of the convalescence of this child, it is only necessary to say that from the beginning his rectum acted perfectly well as a bladder, and would retain his urine from one to two hours. Later the period was increased to three or four hours, being only a little longer in the daytime than in the night. An examination of the urine which was voided, usually independently of any feces, though sometimes there were small fecal flecks in it, showed it to be acid, to have a cloud of albumin, and to have no sugar, but there were present triple phosphates, amorphous urates and bacteria. Dur-

ing the period of the child's residence in the hospital, he was given small doses of hexamethylenamin with the idea of preventing an ascending infection. Whether or not this was of use I can not say, but no ascending infection occurred up to the time of his leaving the hospital, and reports from his home state that he is in excellent health. At the time the child left the hospital, he was different from the ordinary child only in having a scar in the middle line of the lower part of his abdomen, representing a place which had formerly been occupied by the bladder. His penis was somewhat short, and a scar ran along its dorsum where satisfactory union of the integument had not occurred. His urethra extended from its proper opening on the tip of the glans backward to the prostatic portion. To urinate he had to sit down as if he was going to have a stool, and his urine came from his rectum. A finger in the rectum could feel, on either side, just above the internal sphincter, the little projections of the ureters which, each with its button of vesical mucosa, hung close to the rectal wall. It may not be an impossibility for him to go through life without any but the most intimate of friends knowing his differences from them.

Peters has reported four cases in the literature, and in March, 1905, he wrote me that he had operated in his fifth case. Katz of Braila, Roumania, reported, in 1903, nine operations transplanting the ureters individually into the rectum, and these include Peters' four cases. Of the other five operations, only one, that of Pye Smith, was by Peters' technic. The other operators, Pozzo, Capello and Colzi (two cases) transplanted the two ureters apparently by one opening on the anterior wall of the rectum; and each patient had a urinary fistula. Of these nine patients, only two have died of ascending infection: Peters' patient and Colzi's first patient, the former on the fourth day and the latter after seven months, Peters' fifth case and my one bring the total up to eleven cases.

Peters' first operation was done in 1901, and the patient has now lived four years with his rectum doing duty as his bladder. It is not false reasoning, I maintain, to argue that as this boy has gone four years he may go eight years, and if he goes eight he may go sixteen; many a justifiable surgical procedure has a less secure foundation. The operative technic is simple and easily performed, and the operation should not prove a difficult task in the hands of anyone who has ordinary surgical ability. The condition for which it is proposed is one in the extreme, and I can not but think that a great deal has been given to us in this method. The Maydl operation had a mortality of about 33 per cent., the deaths being due to chloroform, hemorrhage, hydronephrosis, peritonitis and pyelitis. This particular operation has not been done often enough to warrant the calculation of percentages, but I do not see why the operation itself should entail any mortality, except, perhaps, in very weak and puny children. Septic peritonitis, which can not help being a fatal factor in the Maydl operation, whether the transplantation of the trigone be made into the rectum or into the colon, is here eliminated entirely. The only unavoidable danger is in the ascending infection, and there seems good reason to believe that this may be indefinitely postponed.

DISCUSSION.

DR. E. A. WELLS, Hartford, Conn., stated that he assisted Dr. Hartley¹ of New York in two operations similar to those of Dr. Sherman. The first patient was not operated on for

1. Med. News, Aug. 29, 1903.

exstrophy, but for chronic tuberculous cystitis; however, the principles of the operation are the same. Both patients were 18; one a girl, the other a boy. I say a boy, because his general non-development gave him that appearance. Dr. Hartley dissected out the trigone of the bladder in these cases, and freely opening the peritoneal cavity, inserted this into the sigmoid flexure of the great intestine. The abdominal wound was closed immediately. Both these patients did well. At last reports both could hold their urine a normal length of time and could void it at will and separately from the feces. The girl is married and has had a child. The boy has had several previous operations for his exstrophy, epispadias, etc., to no avail. Dr. Hartley did not use a ureteral catheter. If this is used, one should be very careful to avoid unnecessary traumatism about the ureteral orifice, as on the integrity of this bit of tissue depends in large measure the success of the operation. It is undoubtedly better to do the operation as Dr. Sherman suggests, namely, without opening the peritoneal cavity.

Dr. L. L. McARTHUR, Chicago, said that some experiments have been made by Dr. Peterson of Ann Arbor and Dr. Martin of Chicago, with a method of implanting the ureter into the rectal wall so as to militate against the backward regurgitation. They have been able to accomplish this by making an oblique implantation of the ureter into the rectum projecting a portion well into the lumen of the rectum, as done by Dr. Sherman, but in addition burying the portion outside of the rectum by infolding the rectal wall around the urethral wall for an inch. By these means they claim that as fecal masses pass they tend to milk, rather than to overcrowd infection into the ureter, thus materially lessening the danger of an ascending pyelitis. They seem to have added something to the technic.

Dr. H. M. SHERMAN said that he thinks the operation referred to by Dr. Wells was the regular Maydl operation, and he does not think Dr. Hartley varied its technic. Dr. Dudley Tait of San Francisco and Dr. Sherman spent every Sunday morning for many Sundays trying to do the Maydl operation on dogs. They killed many dogs doing it, and every one died of peritonitis. This is the experience of everyone who has tried to transplant both ureters in dogs, and this difficulty impressed itself on them. The dog's bladder is entirely intraperitoneal, and it is impossible to open it without opening the peritoneum. Peter's operation consists in dissecting out each ureter individually with a button of vesical mucosa, and passing dressing forceps into the rectum and then through its wall with which to grasp the button of vesical mucosa. The transplantation of the ureters into the rectum is thus exceedingly simple and easy, and takes only a few minutes. It is all an extraperitoneal manipulation. The obliquity of the puncture in the rectal wall can not make much difference, for even if it was made oblique it would probably soon become direct. No account is taken of the fact that the feces pass over the opening of the ureter, as they seem to have done no harm. Ascending infection has not occurred in any patient except the one in whom Peters kept the catheter too long in the ureter. One point is important: one must avoid wounding the vesicle or ureteral mucosa. The difficult matter in Dr. Sherman's case was closing the urethra. It is a mistake to approach this operation with the expectation of finding this plastic work on the epispadias easy because of the fact that no urinary function is going on in the urethra. Compared with this the transplantation of the ureter into the rectum is very simple.

DRUGS AND THE DIAZO REACTION.*

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ELKINS, W. VA.

It is not my purpose to enter here into a discussion of the extent of the value of the diazo reaction in clinical work. I take it for granted that physicians are all making use of the test for this reaction, and that like myself

they have found it of much help, particularly in the diagnosis of typhoid fever.

During the past year, a statement from an Italian source appeared in the medical press of this country to the effect that certain drugs when ingested will cause the urine to react positively to the usual diazo test. An editorial in a leading medical journal seemed to take this statement for granted. This has induced me to institute some observations on this subject in the wards of the Davis Memorial Hospital, the details and results of which I herewith submit.

Observation 1.—A man aged 40, recovering from a compound fracture of the femur. All functions were normal; urine normal. To simulate the dietetic conditions of typhoid fever, he was placed, during the period of observation, on an exclusive milk diet preceded by an effective dose of castor oil. Three grains of thymol were administered every three hours for forty-eight hours, and the urine tested for the diazo reaction at the middle and at the end of this period. Result negative.

Observation 2.—A man, aged 19, recovering from a fracture of both femurs. General diet. All functions normal; urine normal. Five grains of salol were administered every four hours for a week and the urine was tested for the diazo reaction every twenty-four hours. Result negative.

Observation 3.—Patient of the last observation. All functions were normal; urine normal. After the salol was stopped, he was placed on guaiacol carbonate gr. 3 every three hours for forty-eight hours. Urine was tested for the diazo reaction at the end and at the middle of that period. Result negative.

Observation 4.—A woman, aged 39, recovering from an oophorectomy. There was some intestinal fermentation, otherwise normal: urine normal. General diet. She was given 5 grains of sodium sulphocarbolate every three hours for three weeks. Urine was tested repeatedly for diazo reaction during that period. Result negative.

Observation 5.—A man, aged 55, recovering from a simple fracture of the femur. All functions were normal; urine normal. Exclusive milk diet. Five grains of salol were given every four hours for 48 hours. Urine was tested for the diazo reaction at the end and at the middle of that period. Result negative. The dose was then increased to 7 grains and continued for another 48 hours. At the end of this period the urine showed the characteristic dark color. Diazo reaction was absent.

Observation 6.—A woman, aged 39, recovering from an operation for hemorrhoids. All functions were normal; urine normal. Exclusive milk diet. Five grains of salol at intervals for forty-eight hours and the same drug in doses of 7 grains for 48 hours longer. Urine was tested for the diazo reaction at intervals of twenty-four hours. Result negative.

Observation 7.—A man, aged 35, recovering from a contusion of the thighs. All functions were normal; urine normal. General diet. Three grains of thymol were given every three hours for seventy-two hours. Urine was tested at the end of each twenty-four hours. Result negative.

It would seem, therefore, that while the observations are not large in number, as far as they go they most emphatically disprove the assertion that salol, thymol, sodium, sodium sulphocarbolate and guaiacol carbonate have the power of producing the diazo reaction in the urine of persons taking these drugs.

While working on this subject it occurred to me that it might prove of interest to the general practitioner to learn whether this reaction, when present in the urine, would continue to be present after the urine stood for some time with or without the addition of preservatives, as it so often happens that a physician is unable to test it for some time after it is voided. The following observations were made:

Observation 1.—Sixty c.c. of typhoid urine with a marked diazo reaction was allowed to stand in an open conical glass

* Read before the West Virginia State Medical Association, 1905, at Wheeling, W. Va.