OPERATIVE TREATMENT OF EXSTROPHY OF
THE BLADDER BY TRANSPLANTA-
TION OF URETERS ON TO THE
SKIN OF THE LOIN.APPLICATION OF THE PRINCIPLE TO OTHER BLADDER SUR-
GERY—REPORT OF TWO ILLUSTRATIVE CASES.*

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It is fortunate that exstrophy of the bladder is a relatively rare condition, for its unfortunate possessors are in a pitiable condition and, though surgeons have for years devised and tried many operations for its relief, it can not be said that the procedure is yet known that will afford a cure in the sense of a restoration of the parts affected to a condition even approximating the normal. To effect a cure in that sense, a muscle with sphincteric action must be manufactured—evidently an almost impossible task. Our hope then must lie in relief of the condition, and that by such a procedure as will not expose the life of the patient to too great danger either through the mere technic of the operation or through its more remote effects.

Operations for this malformation are many and various. To those interested Hartley¹ and Orlov² offer an excellent summary and extensive bibliography of the subject. Little can be added to these except the Lendon³-Peters⁴ method and the procedure which forms the subject of this paper. In a broad way the operation may be classified under three heads:

1. Plastic operations which attempt to substitute for the missing anterior bladder wall either skin flaps turned in from various directions (Roux, Nélaton, Wood, Thiersch, Billroth, Pancoast and others) or a separated loop of intestine (Rutkowski and others).

2. Operations which have for their object the formation of a urinary reservoir (Gerody, Czerny and others) or conducting groove (Segond) by freeing the separated edges of the vesical mucous membrane and joining them by suture. To facilitate this procedure, to form a more spacious bladder and to attempt to establish a muscular sphincteric action, ingenious methods have been devised, among the most important of which are separation of the sacroiliac synchondrosis (Trendelenburg), moulding the pelvis by apparatus (Passavant), osteotomy or osteoclasis of the pelvis (Konig, Koch and others) and freezing or transplanting the rectus muscles (Schlange, von Mikulicz and others).

3. Operations which divert the urinary stream by transplanting the ureteral ends into the urethra (Sonnenburg), the vagina (Chevasse, Pawlik, Summers and others), the intestine (Maydl, Gersuny, Frank, Fowler, Lendon, Peters and others) or on to the skin surface of the loin (Harrison).

What may we reasonably expect as a result of any of these measures? There can be no question that if certain conditions could be eliminated and others attained the methods proposed in Classes 1 and 2 would become ideal, for the normal anatomic relation of the parts is preserved and the urine passes through the natural channels—a great desideratum. But the occasional

failure to get properly nourished flaps, the frequent tendency to calcareous deposits and to stone formation, obstinate fistulæ requiring numerous operations and, above all, the fact that sphincteric control is practically never obtained⁵—all these factors have combined to bring this class of operation into disfavor or disuse. This lack of sphincteric control makes necessary the wearing of a collecting apparatus over the external genitals—a locality where impedimenta of any kind are particularly disagreeable and uncomfortable. Trendelenburg's procedure and the operations having to do with the pelvic girdle are usually applicable only to the very young and many of them are attended by no inconsiderable risk of life. A series of fourteen Trendelenburg operations has been reported with a mortality of 28 per cent.

Transplantation of the ureteral openings into the vagina or into the urethra is seldom done. The objections to it are evident. The substitution of a separated portion of the intestine for the missing bladder wall is an operation of altogether too great magnitude to be considered as a routine measure.

It is natural that in the absence of a vesical sphincter and in the face of the practical impossibility of forming an artificial one, operators should turn their attention to the feasibility of making use of the anal sphincter by transferring the ureteral ends into the sigmoid flexure or into the rectum. Much brilliant work, experimental and clinical, has been done in this line; the scope of this paper, however, will permit mention of but two methods, both typical and probably the best of their kinds—the Maydl⁶ intraperitoneal method and the Lendon³-Peters⁴ extraperitoneal method, recently modified by Sherman⁷ of San Francisco. In both the ureteral ends are transplanted into the intestine, Maydl transferring with the ureters the vesical trigone, Lendon, Peters and Sherman only a small button of the vesical tissue adjacent to the ureteral openings.

No one can doubt that both methods have frequently been followed by results gratifying to both surgeon and patient; the rectum usually tolerates without much difficulty the presence of the urine, while the anal sphincter in the majority of instances does its new duty well; on the other hand, both methods are attended by real dangers. In that class of operations of which the Maydl is a type the peritoneal cavity must be entered, the intestinal canal must be opened intraperitoneally and an intestinal suture must be carried out. All this means that the danger from the operation *per se* is more than nominal. Orlov,² in reviewing the results of sixty-one Maydl operations, found that over 8 per cent. of the patients died of peritonitis; the total early mortality was 17 per cent. Other patients died of narcosis, pneumonia, etc., but such deaths do not come into consideration here, because they are incident to all operations. It may be said, perhaps, that with the improved technic of the present day an 8 per cent. mortality from general peritonitis in an operation of this kind would not obtain; be that as it may, the operation is a relatively long and tedious one and the danger of peritonitis either from infection during the operation or from faulty suture must always remain a menace. Drucbert's⁸ analysis of eighty-two cases operated on by the Maydl method shows a mortality of 27 per cent. within fifteen days after the operation.

* Read in the Section on Surgery and Anatomy of the American Medical Association, at the Fifty-eighth Annual Session, held at Atlantic City, June, 1907.

1. *An. Surg.*, 1901, xxxiv.

2. *Rev. de gyn. et de chir.*, 1903, vii.

3. *Trans. Austral. Med. Cong.*, 1901.

4. *Brit. Med. Jour.*, June 22, 1901.

5. Hartley could find record of but one satisfactory case; this followed a Trendelenburg operation.

6. *Wien. Med. Wochschr.*, 1894, xxv.

7. *THE JOURNAL A. M. A.*, Feb. 4, 1905.

8. *Echo méd. du Nord*, Lille, 1904, viii.

Now, the Lendon-Peters method avoids this danger and is open to criticism in practically only one particular, i. e., the danger of an early or late infection of the ureter and of the kidney itself from the rectum; this is the strongest objection not to the Lendon-Peters method alone, but likewise to the Maydl and to all other methods of which intestinal implantation of the ureters is a part. Just how great this danger is can be determined only when the lapse of time has been sufficiently long to permit the collection of a large number of cases and the study of their postoperative condition over a number of years, for the renal infection may come early or late in the postoperative course.

In the Drucbert⁸ series one-half the early mortality was due to double pyelonephritis; on the other hand, he reports one fatal case thirty-four months after the operation and Orlow another two and one-half years after operation. Yet it must be borne in mind that all these deaths from pyelonephritis are not to be attributed to intestinal implantation. The pyelonephritis may precede the operation, for the exstrophy itself promotes its inception. Orlow quotes Berger to the effect that of seventy-four patients born with exstrophy only twenty-three passed the twentieth year of life, the others dying of pyelonephritis. However, this predisposing influence affects the results of all methods of operation equally. From a study of the statistics it seems fair to assume that one-third of the total mortality following intestinal implantation is due to the implantation itself and that a fatal pyelonephritis may be expected in about 12 per cent. of the cases that survive the fortnight immediately following the operation.

Besides, mention must be made of the fact that, following intestinal implantation, there is occasionally diurnal incontinence, more frequently nocturnal incontinence and sometimes both. Now and then, according to Walsham,⁹ there is difficulty in keeping the ureteral orifices open. In seven cases of the Orlow series a fecal fistula followed the operation.

In 1896 Reginald Harrison¹⁰ treated a case of exstrophy of the bladder by removing the kidney on one side and, after a lapse of time, transferring the cut end of the ureter of the remaining kidney to the skin of the corresponding loin. The vesical mucous membrane was not removed, but was left to cicatrize and contract. Why Mr. Harrison removed one kidney is not apparent; it is certainly an unnecessary, harmful procedure and has nothing to recommend it. His, I think, is the only case of exstrophy other than the one now reported in which the ureter has been intentionally transplanted onto the skin surface. I was in ignorance of the existence of this case when I operated on mine.

My technic differs from Mr. Harrison's in that I removed neither kidney, but transferred both ureters to the skin of the loin. Of course, the ureters have often been transplanted on to the skin of either the abdomen or the loin because of injury in the course of other (usually gynecologic) operations. Bovée¹¹ collected ten such cases, including Harrison's; to these I can add a case of Bardenheuer (reported by Thelen¹²) and two cases of my own.

The postoperative history is known in nine of these thirteen cases. Walsham⁹ reports that Harrison's patient died after some months of pyelonephritis. Extension

of the malignant disease for which he originally operated caused the death of Le Dentu's¹³ patient in one month; the kidneys were microscopically intact. Pozzi,¹⁴ three months after the ureteral implantation, removed the kidney; here, too, microscopic examination proved the kidney to be normal. Chalot's case died of shock following a hysterectomy in the course of which he found it necessary to transplant both ureters. After a similar operation Budinger's¹⁵ patient succumbed to a renal abscess caused by an infection which, the operator admits, had long preceded the operation. Recurrence of the original malignant disease proved fatal to Fullerton's¹⁶ case four months after operation; the kidney had practically ceased functioning before operation; moreover, placing a catheter in the opening of the transplanted ureter, as was done in this case, was unwise, for such a procedure must be conducive to infection. Noble transplanted a ureter because of an injury received in the course of an operation for the removal of an ectopic pregnancy; later he removed the kidney, but no note was made of its condition. Bardenheuer¹² sutured a ureter into an operative wound in the loin under the most unfavorable conditions; recovery followed.

My patient, a young woman with exstrophy, is alive and entirely comfortable eighteen months after implantation of both ureters in the loin. An old woman on whom I did a similar operation as a preliminary to removal of the bladder survived the transplantation and was comfortable; she succumbed, however, to cachexia seventeen days after removal of the bladder.

In but one of these cases can death be attributed to the transplantation. It is claimed that Harrison's case died of pyelonephritis due to an ascending infection from the eroded and ulcerated skin surface. Harrison, however, imposed a most severe handicap on his patient by removing one kidney. Moreover, there is no way of knowing what amount of intelligence and cleanliness was exercised by the patient in the after-care; a certain amount of both these qualities is requisite. A death should not be attributed to a method when the fault is a purely personal one; hence, in all fairness, the evidence in this case against the method is not strong.

What objection can be urged against the implantation of the ureters on the skin? (a) The danger of infection of the ureter and kidney because of contraction of the orifice or of excoriation of the skin in its immediate vicinity. (b) No sphincter is provided.

First, as to the danger of infection. I believe that, given healthy kidneys before operation and granted intelligent care and cleanliness after operation, infection of the kidney will rarely if ever result from skin implantation. Naturally if a patient takes no care of the skin in the neighborhood of the orifice, if the area is allowed to become excoriated and inflamed and if no measures are taken to prevent or to check these occurrences, then it must be granted that the chance of infection is very considerable, but this is not the fault of the method; it is the fault of the individual. After eighteen months the skin of the loin of my patient is still perfectly healthy. Were contraction of the orifice to begin, its treatment could be easily undertaken.

It must be admitted that no sphincter is provided by this operation. This is a legitimate objection to the

9. *The Practitioner*, 1899, 151.

10. *Lancet*, 1897, 1091.

11. *Trans. Am. Gyn. Soc.*, 1900.

12. *Centrbl. für Chir.*, 1882, xii.

13. *Affect. chir. des reins, etc.*, Paris, 1889.

14. *Des blessures de l'urètre au cours de la lap.*, *Ann. des mal. gen. urin.*, 1891, 539.

15. *Arch. für klin. chir.*, 1894, lxxviii.

16. *Am. Gyn. and Obst. Jour.*, 1898, xii, 91.

method and is a disadvantage, but I believe that this disadvantage is more than counterbalanced by the greater safety afforded the patient. An apparatus can be provided that will keep the patient dry and which can be worn with but little inconvenience. The patient is comfortable and, in my opinion, is in much less danger of developing pyelonephritis than if the ureters were implanted in the intestine, for, looking at the question from a purely common-sense point of view, it seems as if we must regard the skin surface of the loin as a much cleaner locality than the mucous coat of the intestine; it seems evident, too, that it is a far easier matter to keep a skin surface clean than to care for a mucous surface properly.

The question that the surgeon must decide is: Shall I do a rectal implantation with a very considerable chance of fatal renal infection and with a sphincter that usually acts well but may not, or shall I transplant onto the skin of the loin, with no sphincter, but with, I believe, practically no danger of future renal infection, if an effective collecting apparatus be used and proper after-care be assured?

The principle exemplified in this operation has a still wider range of usefulness. As far back as 1886 Ballance and Edwards,¹⁷ after experiments on the cadaver, recommended implantation of the ureters on to the skin of the loin as a preliminary to all operations in which removal of the bladder is contemplated and in conditions by reason of which the pelvic ureters are pathologically or physically involved. They made drawings showing the ureters in their new relations. They recall the experimental work on animals by Gluck and Zeller,¹⁸ who were strongly disposed in favor of skin transplantation. Le Dentu's idea is in harmony with that of Ballance and Edwards, and he pictures an apparatus for collecting the urine. Mr. Reginald Harrison¹⁹ also coincides with their views. No one, as far as I know, actually followed out these suggestions. In one case, the history of which will be found at the end of this article, I had an opportunity of employing the measure as a preliminary to removal of the bladder and with so much satisfaction that should a similar opportunity again present itself I shall not hesitate to take advantage of it.

Even if so radical an operation as removal of the bladder be not contemplated, this method of diverting the urinary stream and thus alleviating severe symptoms may be considered simply as a means of relief, as, for instance, in intractable or inoperable vesical disease.

Watson,²⁰ in an excellent article on tumors of the bladder, strongly advises nephrostomy as a preliminary to removal of the bladder. He prefers it to ureteral implantation of any kind; the latter, he says, is often followed by renal infection, while it is "very rare to have the kidney infected after nephrostomy, provided adequate drainage be provided." While thoroughly agreeing with Watson that the urinary stream should be diverted in such cases and fully coinciding in his view of the dangers of intestinal implantation, I must take issue with him as to the superiority of nephrostomy over implantation of the ureter on to the skin of the loin. The argument most strongly urged against implantation is the high mortality attributed to it. An investigation of his statistics with regard to this mortality leads me to believe that he is in grave error when he ascribes 40

per cent. of the total mortality in such cases to the implantation itself. Apart from my personal cases and that of Bardenheuer, we both quote the same group of cases of skin implantation. On examining the original reports of these cases, I could find but one in which the fatal result could be attributed in any way to the implantation; this is the case of Mr. Harrison which I have previously discussed.

To me skin implantation appeals more strongly than nephrostomy; it is a more surgical procedure, its accomplishment is fully as easy and it injures less important structures, the danger of renal infection is at least no greater and the resulting conditions are more easily and just as successfully cared for by a collecting apparatus. After all, the most important thing is not the measure, not the method, but first, last and always the principle and the result.

A CASE OF EXSTROPHY OF THE BLADDER.

History.—The patient was an otherwise healthy young woman, 28 years of age and unmarried. She was in the usual wretched condition of these unfortunates.

Operation.—Jan. 19, 1906, the following operation was performed, my colleague, Dr. Munro, working on the left side, I on the right. A four-inch incision was made, following in a general way the crest of the ilium, about one inch above and to its inner side. The external oblique aponeurosis and muscle was split in the direction of its fibers; the deeper muscular layers were divided sufficiently to allow the peritoneum to be pushed forward; the ureter was freed by blunt dissection for several inches of its length, divided where it crossed the iliac vessels, the distal end ligatured and, through a stab wound in the loin, the end of the proximal portion was brought to the surface and fastened to the skin by chromic catgut sutures which did not penetrate the mucous coat. The end of the ureter, which projected about one-eighth inch, was split and the flaps thus formed were turned outward and sutured. The anterior abdominal wound was sutured in layers. Neither shock nor disturbance of the urinary function followed the operation.

Second Operation.—Two weeks later the patient was again etherized. The vesical mucous membrane was removed and with it the distal portions of both ureters, which were easily freed by blunt dissection. During the operation the peritoneal cavity was opened; the rent was closed immediately. The skin margins about the denuded area were widely freed and by a suture line which took the form of a T, the area was well covered. Temporary drainage was established.

Postoperative History.—Complete recovery followed. An apparatus, furnished by Leach and Greene of Boston, keeps the patient dry; the urine collects in a bag hung to the inside of her skirt. She is very comfortable, has gained much weight, works in a department store and has no urinous odor about her. The urine is normal. At first the apparatus was not effective when the patient was lying down, but this difficulty has now been overcome by the apparatus makers. The apparatus wears out quickly and in the experimental stage had to be replaced frequently.

A CASE OF GANGRENOUS CYSTITIS.

History.—The patient, a woman, 54 years old, was senile; her arteries were atheromatous, she was scoliotyphotic and her general condition was wretched. A vesical stone had been crushed some weeks previously. Subsequently a most severe cystitis caused her constant and almost intolerable suffering. Ten days before she came under our care an unsuccessful attempt to alleviate her distress had been made by forming an artificial vesico-vaginal fistula. The operator was a very competent surgeon, who noted: "By bimanual examination her bladder is solid and stiff-walled and can not be compressed; it feels just as if it were covered with plaster-of-Paris."

Operation.—Under ether, Feb. 2, 1907, an operation similar to the one described in the preceding case was done. The thickened right ureter clearly showed chronic infection. Dur-

17. St. Thomas Hosp. Reports, New Series, 1886, xvi.

18. Arch. für klin. chir., 1881, xx.

19. Surg. Disorders of the Urinary Organs, fourth Ed., 1893.

20. Anns. of Surg., 1905, lix.

ing the operation a large, tuberculous, retroperitoneal gland was removed from just above the pelvic brim on the right. The preliminary operation gave the patient much relief; her general condition improved greatly. Two weeks later the bladder was removed. This was a difficult undertaking; for the wall was a thick, calcified mass enclosing numerous areas of gangrenous slough and pus; the tissue was friable and fragile. The cavity left after the removal of the bladder was packed; the peritoneal cavity, opened during the manipulations, was drained. The patient rallied well from the operation, but soon after began to fail, gradually grew weaker and died on the seventeenth day. I think now that I would have acted more wisely had I been satisfied with the preliminary operation and not attempted the removal of the bladder.

[FOR THE DISCUSSION, SEE THE DEPARTMENT OF SECTION DISCUSSIONS IN THIS ISSUE.]

THE ETIOLOGY AND RECENT TREATMENT OF HAY FEVER.*

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The factors which enter into the causation of hay fever, or better, hyperesthetic rhinitis, a name proposed by Sajous, are: First, a nervous element; second, a pathologic change in the nasal mucous membrane; third, an exciting constitutional dyscrasia, as a lithemic or uric acid diathesis; and fourth, some adventitious irritation, as dust, pollens or animal emanations.

1. Hyperesthetic rhinitis may occur from an adynamic state of the nervous system irrespective of other causes, or may result from a combination of external irritation and a predisposing neurotic factor. The first class is illustrated by the cases of spontaneous attacks accompanied by sneezing and lachrymation, occurring at any time of day and irrespective of the season. Cases of this character demand a careful investigation as to the cause of nervous trouble, and as treatment, toning up of the general system by baths, exercise, diet, etc., I can not help mentioning a tablet which has given very excellent results in this class of cases:

R. Strych. arseniatis	gr. 5/6	1054
Atropin. sulph.	gr. 1/3	02
Camphor	gr. xxv	162
Ipecac. pulv.	gr. v	32
M. et ft. in pil. No. c. Sig.: One of such pills p. r. n.		

From three to six a day have a very favorable effect. Those cases resulting from an external cause in combination with a neurotic susceptibility will be considered later.

2. Hyperesthetic rhinitis may be due to pathologic changes in the nasal mucosa, which may arise from polypi, deflections of the septum, hypertrophies, synechiae, etc. The simple correction of these conditions may effect a cure of the disorder. For this reason before condemning any remedy we should be careful to ascertain that the nasal respiratory tracts are free from abnormalities.

3. Hyperesthetic rhinitis may arise from a lithemic or uric acid condition, as found in subjects of gout, rheumatism, obesity and disorders of digestion. In these cases we may have a change in the epithelium of the nasal mucosa or an indirect action through derangement of the sympathetic nervous system. Remembering how frequently brittle finger nails and hang nails, together with itching scalp, are concomitant symptoms

of uric acid excess, may it not be reasonable to suppose that a similar influence might be exerted on the epithelium of the nasal mucosa? Autointoxications caused by intestinal fermentation are also a prolific cause of nasal irritation, probably due to excitation of the sympathetic ganglia. Digestive disturbances should be eliminated by proper treatment before judging the value of any remedy, especially if it is supposed to be simply antitoxic as regards excitation of the mucosa from pollens.

4. Hyperesthetic rhinitis may be produced by dust, drugs, perfumes, animal emanation and many pollens. We are all familiar with travelers' hay fever, caused by tunnel gases and coal dust, elephant and even cat hay fever (banish the term), and the evidence is very convincing that some individual predisposition is essential to the development of all of these.

We have mentioned various causes which produce hyperesthetic rhinitis independent of any external irritation. The question that naturally suggests itself is this: How much of a predisposing influence do any of these causative factors of hyperesthetic rhinitis exert in rendering an individual susceptible to the reaction of pollen toxins? It may be in the range of possibilities to suppose that a constitutional disturbance might render the sympathetic system very near the state of inhibitory collapse, without exhibiting the vasomotor phenomena usual in hay fever, and that only the slightest local exciting cause as dust, odors or pollens was wanting to make the intoxication complete. Unless this were more than hypothesis it would be difficult to explain the extreme ganglionic explosion caused by simple dust or odors. There has been no more beautiful illustration of the effect of shock impressions conveyed through the sympathetic ganglia than that classical investigation of Dr. Weir Mitchell, when an army surgeon, as to the reason why a soldier shot through the ulnar nerve always fell, when a wound of the radial nerve, though a larger nerve, produced no such result. In this case a clever dissection showed that the cervical sympathetic ganglion which supplied the ulnar nerve intercommunicated by fibrillae with the otic ganglion which supplied the labyrinth, the center of equilibrium. The shock which produced the explosion in the otic may be compared to a toxin shock which affected the sphenopalatine ganglion, reacted on the vagus through the collateral fibers in the medullary substance of Rolando, the receptive nucleus of the trigeminus, thus producing the picture of the asthmatic type of hyperesthetic rhinitis.

So much for the etiology of this puzzling and complex disorder. In regard to the recent treatment, a brief sketch of the subject will introduce the discussion. The various views of the disputants may lead us to a better estimation as to the efficiency of a newer remedy than it has been the good fortune of the writer to discover. One thing is apparent, that the personal element, viz., suggestion, enters largely into the result of treatment. Note in the literature the results of the men who have been dominated by their convictions, as compared with the result of the experiments of the skeptical observer. So also with the patient. It was found with ambrosia that patients of the neurotic type who believed that a specific had been discovered were rapidly relieved, a fact which caused initial results to exceed those of the fourth season of experimentation. I well remember the fifteen tuberculous patients in the Home for Consumptives who were treated under my observation by the first serum of Koch. In every case

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