slight decrease in the diameter; that the main branch with its thicker walls would be more apt to look whitish when empty, than the smaller branches which in Hirschberg's case were, where empty, invisible; and finally that the bit of artery containing the real plug, between the central end of the whitish stretch and the bifurcation of the central artery may have been so foreshortened as to appear wanting. The color of the plug might, at first thought, be urged against its genuineness, but *a priori* the objection is hardly warranted. Virchow⁹ in prophesying that emboli would be directly seen with the ophthalmoscope, said they would be recognized by their whitish appearance.

Regarding the suggestion that the plug was probably composed of leucocytes, this coincides with the friability which it must have possessed in order to be disposed of with so little permanent injury; though it is hard to imagine where such a clump of leucocytes could have originated in a healthy young person. The permanent contraction of the field and the scotomata indicate secondary plugging of small arteries, such as would be naturally expected after the breaking up of a clot in a large branch; and though these were not detected with the ophthalmoscope, it is possible that they might have been if the fundus had been gone over with the pupil widely dilated.

With regard to therapeutics, there appears to be no good reason why massage should not be tried in every fresh case of embolism. In old cases nothing is to be expected from it, nor is there much reason to be sanguine as to its effects in cases where the plug is situated so far back of the disk as to be uninfluenced by changes in the intra-ocular pressure. In other words results are to be looked for from massage, mainly in cases of embolism of a branch rather than the main central artery. It will be observed, that the three cases in which it has apparently done good were very recent. In Hirschberg's case the embolism occurred during the afternoon and the patient was seen at seven the same evening. Mule's patient was at the hospital within an hour after the embolism took place; while my case seems to have been observed earlier than any other on record, namely, after about half an hour. A fair estimate of the value of massage and other therapeutic measures is interfered with by the fact that while it is only in fresh cases that any particular result is to be hoped for, these are also the cases in which spontaneous recoveries occur. Such recoveries are probably much more frequent than we have any idea of, for, occurring as they do, generally before there is time to consult a physician, there is little chance of the oculist ever hearing of them and if he does, after they have occurred, they cannot be recorded as recoveries from embolism on account of the uncertainty

in the diagnosis. Mauthner,¹⁰ who had the fortune to witness a spontaneous recovery while he was studying the fundus of the affected eye, lays such stress on this chance that he advises doing nothing for an hour after the embolism has occurred, lest the plug be fixed more firmly, while, if left to the natural forces, it might be loosened gradually and carried away. That this unfortunate result of interference might possibly occur cannot be denied, still it seems altogether probable that as a rule such remedies as massage and nitrate of amyl would only facilitate the natural process. I should therefore, most decidedly urge the use of active measures as soon as possible.

With respect to the use of nitrate of amyl I supposed until recently that mine was the first case in which it had been employed. I find, however, that in the discussion of Mule's case, Jessop mentioned having tried it in a similar case, without effect. Theoretically, it would seem to promise more than massage, especially in embolism of the central artery where the plug is so far back as to be uninfluenced by variations in the intra-ocular pressure; and where there is no heart lesion, both should be certainly tried. I ordered 5 minims every three hours not knowing how much could be borne. In another case, I should try using it every hour. Where a heart-lesion is the probable source of the embolus, it might be questioned whether the chance of its relieving the embolism were greater than that of sending a second embolus after the first or perhaps into the other eye. Still if the heart itself could stand it, I should think its use warranted, even then, if massage alone should fail.

[Since writing the above it has occurred to me that the embolus may have been of fat. This would correspond well with its appearance and friability.]

EXTROVERSION OF THE BLADDER.

Read in the Section of Surgery and Anatomy, at the Fortieth Annual Meeting of the American Medical Association, June, 1889.

BY CHARLES B. PORTER, M.D.,

OF BOSTON, MASS.

The subject of the communication which I have the honor to present to you to-day is the report of operations upon two cases of extroversion of the bladder, a congenital deformity in which the bladder, with mucous surface exposed, protrudes hernia-like in the lower hypogastric region. Its anterior wall and corresponding portion of the abdominal parietes are wanting, and usually the symphysis pubis. The urine dribbles from the ureters, or is ejaculated in jets on coughing or sneezing. Its constant contact excoriates the skin of the genitals and thighs, and makes its possessor miserable and, with the attendant foul urinous odor, an object of repugnance to those

⁹ Virchow, quoted by Samelsohn, loc. cit.

¹⁰ Mauthner, Nagel's Jahresbericht, iv, 337.

about. This deformity is more common in males than in females. The other parts of the genito-urinary system are usually present in a more or less developed state. My cases present one of each sex, and in the description of the abnormalities in the two will appear a résumé of nearly all those found in the two sexes. Although this deformity is distressing, persons affected with it live for many years. Vigneau collected seventy-one cases which had not been operated upon, and found that ten died between 10 and 20 years, seventeen died between 20 and 40 years, five died between 40 and 50 years, and one reached the age of 70 years.

Nevertheless, in some cases the mucous membrane takes on a change resulting in malignant disease, due, probably, to the constant irritation of the urine and clothes. In one case, a man of middle life which I had the opportunity to watch, the exposed bladder became studded with epitheliomatous masses, and his last days were those of supreme suffering. It will be interesting to spend a few moments in considering the evolution, so to speak, of operative interference to remedy this deformity. So far as I can ascertain, no operation for the relief of exstrophy was performed until the last half of the present century, when Mr. Lloyd, of St. Bartholomew's, in 1851, made an attempt to divert the passage of the urine into the rectum by passing a seton from the bladder through into the rectum, intending subsequently, after the fistulous tract was established, to close the gap in the abdominal wall by refreshing its edges and uniting them by suture. Unfortunately he was not able to complete the operation, as his patient died on the fifth day from peritonitis. Post mortem examination showed that the recto-vesical fold of the peritoneum descended much lower than normal, and had been perforated by the seton. Since Lloyd's unsuccessful attempt to establish a fistulous communication with the rectum this has been accomplished by Simon. I have not been able to obtain an account of the operation and the length of time the patient lived, but another writer who refers to the case states that death was due to pyelonephritis, rather than the result of operative procedure. Holmes, in order to avoid a wound of the peritoneum, endeavored to establish a tunnel through the perineum, with communication of the ureters with the rectum. Its permeability was delusive and he abandoned his idea. Thomas Smith diverted each ureter into the colon of the corresponding side by successive operations. His patient died after the second, and the ureter first operated upon was found impermeable. Sonnenburg has extirpated the bladder, uniting the ureters to the abdominal wall at a central point. A shield and urinal was a subsequent necessity. In all the various operations mentioned for diverting the urine from its natural outlet there are ele-

ments of serious danger. In connection with this subject it will be interesting to refer to the results of some experiments on dogs by M. Tuffier, of Paris, to establish a communication between the ureters and intestine, and others by M. Dastre, to unite them to the abdominal wall; all died of peritonitis or pyelo-nephritis. The transplantation of the ureters into the rectum upon a dog has been done successfully by Prof. Novarro, of Sienna, and the operation reported before the Italian Surgical Society of Genoa. Until 1853 no successful attempts had been made to cover the exposed bladder by flaps, when almost synchronously Roux, Richard, Pancoast and Ayers each performed a successful operation by the transplantation of flaps of skin from the adjacent parts. The method of transplantation of the flaps and the region from which they are taken varies with each operator and the extent of the case, and results only in a cover for the exposed bladder, since no sphincter vesicæ can be formed. In the adult, and especially the male, the introverted skin grows its hairs, and the deposition upon these of the salts of the urine forms concretions which are analogous to stone in the bladder, and produce similar symptoms. To reduce this reservoir to a minimum, Dr. H. J. Bigelow, of Boston, in 1876, dissected the mucous membrane from the exposed surface above a line drawn transversely across the orifices of the ureters, and turned a flap of skin on to the denuded surface, which united, leaving only the part below the line of the ureters exposed. This was afterwards covered by another operation. Tredeburg, of Bonn, reported to the sixteenth Congress of German Surgeons a number of cases by a new method. He says that an effective bladder covered with a genuine mucous membrane can only be obtained by the direct closing of the edges of the fissure, forming in the same manner a urethra lined with mucous membrane and a normally formed penis, with the possibility of the subsequent establishment of the function of the sphincter vesicæ. This is the conception of an ideal operation. According to his experience the loosening up of the soft parts enough to allow this is not possible, on account of the wide separation of the pubic bones. He has, therefore, in children, and he limits the age to those under six years, performed section of the sacro-iliac synchondrosis on both sides, and, by continued pressure kept up by special apparatus, has lessened the pubic hiatus to one centimetre. In no case has he obtained continence of urine.

The bringing together of simply the refreshed edges of the bladder has been attempted twice. A Strassburg surgeon first dissected up a small flap around the bladder two centimetres broad. Having pushed back the bladder by means of a rubber ball ending in a small tube, he united over it, by interrupted sutures, the refreshed borders

of the skin, so that the ball found itself shut up in the new formed bladder. The stitches, with the exception of the two uppermost, came to naught, and the mother declined having anything further done.

Second Case.—In November, 1884, Dr. Hal. C. Wyman, of Detroit, did on a child five days old an operation as ideal as that of Tredelenburg, and without section of the sacro iliac synchondrosis. It was reported in the *Medical Record* of December, 1885, and from it I will quote the description of the operation:

"The child was given chloroform and the mucous membrane was removed in a strip one-half inch wide, running round the margin of the vesical wall, where it blended with the integument of the abdomen, except a small area which corresponded to the inferior wall of the urethra. Then an incision was made on each side through the integument and superficial fascia arising from Poupart's ligament, just forward of the anterior superior spine of the ileum, upward a distance of 2 inches, for the purpose of securing sufficient relaxation of tissue to let the opposite pared surfaces come together and unite. The pared surfaces were then transfixed with three hare-lip pins and a figure-of-eight ligature was passed about them, bringing the margins of the abdominal cleft in contact. Additional sutures were passed between the pins and on either side of them, securing perfect apposition of the opposed surfaces. The child progressed rapidly to recovery and a perfect union of the opposed surfaces resulted. It was my intention to make a second operation for the restoration of the urethra and dorsal portion of the penis, when two months later the child was attacked with convulsions, which terminated fatally, but had no apparent cause in the conditions leading to or growing out of the operation."

M. Pousson, surgeon to the Bordeaux Hospital, published last year a series of papers on this subject in the *Annales des Maladies des Organes genito-urinaires*. He had collected ninety-five cases, in many of which certain important data were wanting. He calls attention to the seeming great mortality, which amounted to fifteen deaths in the ninety-five cases, and says that at first sight the number seems enormous, for painful as the deformity may be, it does not compromise life. In justly estimating the mortality it must be remembered that of the fifteen deaths one was from cholera infantum five months after operation, one from pulmonary trouble one and a half months after, and one of erysipelas of the face; that reduces the mortality to twelve. Of these, Pousson was convinced that four ought to be attributed rather to a preëxisting pyelo-nephritis than to the operation itself. All told there remained eight cases in which death may be attributed to operative interference. Of these, four

died of peritonitis, one of erysipelas, one of shock, and one an accident during anæsthesia. Of these eight cases three occurred where the urine was diverted into the intestinal tract, and five where the closure by flaps was performed. No deaths in the four cases of Sonnenburg and Niehans, where the bladder was extirpated and the ureters sewed to the anterior wall of the abdomen. No deaths in the six cases in which the approximation of the pubic bones was followed by bringing together the refreshed edges of the bladder; so that the operation of diverting the urine gives a mortality of 30 per cent.; operation by flaps, 6.33 per cent.; approximation of pubes, none; diverting of urine to abdominal walls, none. He concludes that age is indifferent to the success of the operation. All young children should be operated on as soon as possible, to take advantage of the vitality of their tissues and the rapid cicatrization of the wounds. The operator should not count on any coöperation of a child from 7 to 10 years of age, and if he wishes to rely on this as an aid, should defer interference to the age of 15. Although age diminishes the chances of success, it has been achieved in those as old as 40. Sex is unimportant.

CHOICE OF OPERATION.

With regard to the choice of operation, it seems to me that age and the extent of the cleft must determine. Up to the present time no operation has attained continence of urine. The results of diverting the urine into the intestine are not encouraging. Diverting the urine to a central point in the abdominal wall does not commend itself to me, although no deaths have followed the four cases I have been able to collect. Tredelenburg's operation has up to the present time achieved no more than the method by flaps, and I think any surgeon would hesitate to submit his own child to bilateral section of the sacro-iliac synchondroses as a preparative step to a closure of the vesical cleft. On an infant or young child Wyman's method is in suitable cases the best. It is practically Tredelenburg's, minus the objectionable feature of section of the sacro-iliac symphysis. The method by flaps is one adapted to both sexes and all ages. The surgeon, before operation, should inform himself as to the condition of the kidneys, and continually keep in mind the main result for which he is striving, namely, a free drainage of the urine, for otherwise the ordinary results from obstruction ultimately follow; these are dilatation of the ureters and destruction of the kidneys. None of the accompanying malformations contra-indicate the operation. The development of the prepuce and scrotum in the male, and the labia minora and majora in the female, furnish the operator abundant material for the display of his ingenuity in acquiring the flaps.

All the general rules of plastic surgery hold in these operations.

The flaps must be about a third larger than the gap to be filled.

They must be arranged in such a manner as to furnish their pedicles an abundant supply of blood.

During any delays in the operation they should be covered with hot towels, wet in an antiseptic solution.

They must be handled as little as possible, and rarely with forceps.

Any dragging on the pedicle endangers the vitality of the flap.

All bleeding must be arrested before the flaps are adjusted in position.

Light and gentle compression prevents any oozing between them.

The operation completed, they should be kept for hours under moist, hot, antiseptic dressings.

Perfect antisepsis should be maintained throughout.

Case 1.—A man æt. 25 years entered the Massachusetts General Hospital April 10, 1877. He had been a farm hand and able to do as much work as any one. There was complete extroversion of the bladder, the exposed portion being about $2\frac{1}{2}$ inches in circumference and somewhat irregular in contour. A little below its middle and a short distance apart are the openings of the ureters. The mucous membrane is covered with ulcerations and concretions of the urinary salts. There is want of union between the pubic bones, which are separated about 2 inches. Just below the bladder there is a rudimentary penis about 2 inches in length; the urethra is exposed throughout, there being complete epispadias. The lower part of the urethra is turned up against the surface of the bladder, and the urine flowed constantly from each end of the sulcus thus formed down over the scrotum and perineum. On the under surface of the penis and the glans there is a large fold of loose skin representing the prepuce. The left testis is still in the abdomen, and on the right side there is a scrotal inguinal hernia. There is a slight umbilical hernia above the bladder. The whole region is excoriated from the constant irritation of the urine and the slightest touch causes intense pain. There has never been the slightest sexual desire or enjoyment. The patient was kept in bed, the parts carefully washed and oxide of zinc ointment applied to the excoriated parts. At the end of two weeks all the excoriations had healed and the skin was in a healthy condition suitable for operation. I decided to divide the operation into two stages: the first to obliterate that portion of the bladder above the ureters by Bigelow's method. The preliminary operation was as follows: The patient having been etherized, the mucous membrane of the bladder above the openings of the ureters was

dissected off and the edge of sound skin surrounding this part of the bladder was refreshed. A skin flap about $1\frac{3}{4}$ by 4 inches large was then taken from the abdomen, the pedicle being above the right inguinal ring, and the longest diameter of the flap being nearly parallel with the axis of the body. The flap included the superficial epigastric artery, which was cut and tied at the upper end of the flap. The flap was then turned across the refreshed surface of the bladder and stitched to the surrounding skin with silk sutures. The wound from which the flap was taken was easily brought together and united. Warm compresses were held on the flap for several hours. In five days all stitches had been removed, and the wound of the abdomen was healed and the flap was firmly adherent to the upper part of the bladder. About four weeks after the first operation the parts had become entirely cicatrized, and the patient was up and about. A month after the first operation patient was again etherized and a second operation performed. At this operation I decided to make use of the skin of the penis, the preputial part of which was very abundant, to cover in the remaining exposed surface. The patient had never had any sexual desire. The penis was rudimentary and he wished me to make any disposition of it that seemed best. The prepuce devoid of hair would make the best possible flap to turn next the mucous membrane of the bladder, and thus avoid concretions which are so apt to form where hairs are present on the introverted flap. The corpus spongiosum with its urethral surface was dissected from the corpora cavernosa and left attached at its base. The skin of the penis was dissected off the corpora cavernosa as far down as possible, a double ligature of strong catgut passed through the corpora cavernosa at their origin from the rami of the pubes and tied each way, and the corpora cavernosa cut off close to the ligature. This left an abundant mass of skin and all the urethral mucous membrane. The penile portion was then split in the median line, the incision being carried down so as to allow the urethra to be brought through the slit; this was turned down and stitched to the edges of the cut so as to form a sort of trough running from the lower part of the bladder to a point which was near the root of the penis. The prepuce was then folded upon the penile skin and held in place by a catgut stitch on each side, so that on turning the flap up in front of the bladder the preputial portion was opposed to the mucous membrane of the bladder. The edges of the skin surrounding the bladder and the lower edge of the flap covering the upper part were refreshed and united to the edge of the preputial flap, which was also refreshed. The median slit was then united, with the exception of the lower part where the urethra came out. Thus it will be seen that the surface of the bladder was entirely covered in, the skin opposed to

the mucous membrane being the hairless skin of the prepuce, and the urethra forming a tunnel, draining the cavity thus formed at its most dependent point. Silk and wire sutures were used to secure the flaps in position, and the vessels, which were large and numerous, were tied with catgut. A bent glass drainage tube was introduced through the new urethra and left in; warm compresses were held over the parts for several hours. For two days everything seemed favorable for a perfect result; flaps were apparently healing by first intention, and there was good circulation in every part. At the end of the second day, however, there was a sharp hæmorrhage from near the stump of one of the corpora cavernosa, and the clots tore away the upper corners of the preputial flaps. On tearing up the end of the urethra, which was already firmly adherent, and turning out the clots, all bleeding ceased. The flaps were then held in place by means of strips of fine silk gauze fastened on with flexible colloid. In six days there was union throughout except at the upper corner, and all stitches were removed. After this three other trifling operations were necessary to close the very minute openings at the corners, and a little over five months after the operation everything was entirely healed and all urine passed out through the urethra. A shield with rubber bag attached was fitted and the patient discharged from the hospital.

Case 2.—A girl æt. 8 years entered the Massachusetts General Hospital January 3, 1889. She was healthy and well formed, but for complete extroversion of the bladder. The cleft extended through the mons veneris, symphysis pubis and urethra into the vagina, which was split throughout and formed a sort of trough down which the urine ran when she was in an upright position. The pubes were separated 3 inches. The mucous membrane of the bladder and vagina was exposed, bleeding on the slightest irritation. The ureters opened near the middle of the exposed surface an inch apart, and on coughing the urine was forced out in small jets. On straining the exposed bladder bulged out, forming quite a hernia. Surrounding the bladder was a ring of cicatricial tissue $\frac{1}{2}$ inch wide. By the most careful rectal examination under ether, no uterus or uterine appendages could be felt. The child had always been well and healthy, and played about with other children until about two years ago, when she commenced to walk in a stooped and waddling fashion. The urine dribbled constantly and she was with the greatest difficulty kept clean. The parents are healthy and there has never been in either family a case of similar deformity.

OPERATION.

January 11, 1889. Ether given. A pattern in cloth was cut of the size required to cover the exposed surface. A flap of skin a third larger than

the pattern to allow for shrinkage was raised from the middle of the abdomen between bladder and sternum. Its pedicle, which was broad, was attached just above the bladder. The flap was temporarily covered with towels wet in a hot solution of boracic acid. Two side flaps, each half the size of the large flap, were then cut from the pubic and inguinal region, with pedicle at the side of the split mons veneris. These were folded in hot wet towels. The skin around the bladder was now raised up about $\frac{1}{2}$ inch, making a raw groove running around the margin of the vesical wall where it blended with the integument, except a small area which corresponded with the split vagina. The large abdominal flap was then turned down with the skin surface next the mucous membrane, and the edge stitched into the groove above mentioned, with fine catgut, leaving only on middle line a canal for passage of urine formed by the vagina. The two side flaps were then swung round towards the middle line, and their raw surfaces opposed to the raw surfaces of the abdominal flap. They were stitched to each other on the middle line and at their circumference to the same groove as the abdominal flap. In this manner a complete cover for the bladder was made. The abdominal wound from which the upper flap was taken was brought together by stitches in the middle line; the two internal wounds were left to close by granulation. A double rubber drainage tube was placed in the bladder thus formed. The seat of operation was covered with towels wet in a hot 3 per cent. solution of boracic acid, and they were changed frequently for a number of days. She made rapid recovery, the wounds closing by first intention, except those at the side purposely left open to avoid traction on the flaps, and in less than three months was dressed and playing about the wards. A plaster cast was taken of the parts, and a hard rubber shield with urinal attached was fitted by Leach & Greene, of Boston. This she now wears, and I have the pleasure of showing it to you together with the patient herself.

THE RELATION OF TONSILLITIS TO RHEUMATISM.

Read by title in the Section of Laryngology and Otology at the Fortieth Annual Meeting of the American Medical Association, held at Newport, June, 1889.

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I am aware that I present on this occasion no new topic for your consideration, and am sure you might ask very properly, what profit can possibly grow out of its discussion. And yet we are all aware there are many simple questions in medicine not yet fully understood, and it is better to well develop those first, before we make an at-