

in large doses and administered under most varied circumstances, but yielded to moderate doses by the hypodermic method—in some instances the double salt of quinin and urea being used; sometimes the hydrochlorate of quinin.

With reference to the precipitation of the quinin salts in the alkaline fluid of the subcutaneous tissues our knowledge is somewhat limited. If precipitated it is certainly redissolved and absorbed, as shown by unquestioned therapeutic results. If precipitated under these circumstances, it is equally liable to be precipitated in the blood when introduced into the veins.

The cases of Panama and Chagres fever, at one time common in our coast-wise vessels, usually admitted to the hospital comatose, yielded promptly to large doses of quinin hypodermically and by the rectum.

DR. GEORGE DOCK of Ann Arbor, Mich.—In order to make my paper short I left out all else except that which referred to quinin alone. Individuals differ, and a great deal is often required besides the giving of quinin. Regarding Dr. Fackler's paper, he has given strong evidence of what a number of observers have stated. In all cases of Dr. Fackler's, quinin was given at a time when it was less likely to do good. In regard to the hypodermic injection I only wish to state that the hypodermic method, in my opinion, is necessary in many cases. Deep injections are better than strong injections. If given in the muscles there is less pain and less tendency to the formation of abscesses. In any case the salt of quinin is apt to give pain and to cause abscess; these facts cannot be lightly turned aside.

DR. G. A. FACKLER, in conclusion, wished to be positive that his statement in regard to the method of quinin injection was not misconstrued. In every case the deep injection was resorted to. In no case was an effort made to administer the remedy at a time coincident with a certain phase of the fever, and, yet, to some of our patients it was accidentally given in accordance with the suggestions of Dr. Dock. The question of the proper time for the exhibition of quinin in malaria is still *sub judice* and will probably never be settled to the satisfaction of all. The preceding discussion illustrates the various opinions entertained as to the absorption of quinin. It is universally acknowledged that the conditions of the digestive tract and of the circulatory organs play an important role in the absorption of the drug. The amount absorbed and the period required for this act must vary with the condition of the part into which it is introduced. Hence the utter folly of predicting the positive action of quinin within or at a specified period of time after its administration by mouth or injection. Much more rational is the introduction by either method into the body, of a dose, at stated intervals in the course of the day so as to insure the presence of a therapeutically effective amount of quinin in the circulating media at all times during that day. This plan was followed in all our cases and the results secured were certainly practical illustrations of its efficacy. I desire finally to call attention to the dearth of detailed reports of series of cases treated by the hypodermic injection of quinin and the uncertainty of the value of observations made upon one case by one individual. It would certainly be desirable that those who have made general assertions as to the efficacy of this method in the treatment of malaria should contribute specific reports of their cases to the literature upon the subject.

## EXSTROPHY OF THE BLADDER.\*

BY C. A. WHEATON, M.D.

ST. PAUL, MINN.

None of the congenital defects of man have elicited a greater diversity of opinion as to etiology, or more difficulty in correction than those affecting the genital extremity. Until a comparatively recent date the deformities of the genitalia of the male and female offspring were attributed to failure in the evolution of the structures which go to make up the distinctive characteristics of sex.

Embryology teaches us that the allantois is the fetal structure from which is derived the bladder and its suspensory ligament; that the urethra is primarily a groove opened below, which gradually advances from the urogenital sinus, and from the imperfect closure of this groove and the imperfect elaboration of this allantoic structure arise the defects which I have selected to here

discuss briefly. The latest, and perhaps the best, résumé of this subject is to be found in an article written by F. Tilden Brown<sup>1</sup>. In this he leads us to understand that the etiologic factor in the production of hypospadias and epispadias is practically the same, that "both conditions are due to the rupture of the urethra in consequence of urinary retention by the absence or retarded formation of the glandular urethra."

"The usual theory of epispadias is similar to that which explains hypospadias as due to incomplete or faulty development of the parts affected. Thus, Thiersch regarded the malformation as due to a pelvic closure and division of the cloaca, which was faulty as regards time. Under normal circumstances pelvic closure occurs first, so that the corpora cavernosa, developing in connection with the rami of the pubes, are already agglutinated to the sexual buds before the sinus urogenitalis is pushed forward by the developing perineum. But if the cloacal division occurs before pelvic closure, the two halves of the corpora cavernosa are not united; the urogenital sinus is pushed forward between them, and they unite below instead of above it. This hypothesis evidently depends for its premise on the absence of the symphysis, and, unfortunately for it, the symphysis is not always absent. On the other hand, a number of facts undoubtedly favor the rupture hypothesis, and are quite inexplicable on any theory of defective development. Absence of imperviousness of the urethra leads to accumulation of urine in the bladder and dilatation of that organ; a rupture occurs at a time when the abdominal envelopes are not yet quite perfect, and this rupture may affect the entire urinary sac from the navel down, or only its lower part. So we get epispadias with exstrophy of the bladder, or simple epispadias. Thus, Thiersch has proved, both in the dead and living subject, that the ureters are much dilated in all these cases; he even succeeded in passing a No. 6 English catheter through the ureters into the pelvis of the kidney. Scar tissue also is found all around the bladder opening, as from an unsuccessful plastic operation—distinct evidences of rupture and cicatrization.

"But the most incontestable proof of the correctness of this so-called mechanical theory of the origin of epispadias is found in the cases of intra-uterine healing of exstrophy of the bladder and of epispadias, of which the best case is that of Kuster. Here, in a boy 1 year and 7 months old, an unmistakable scar stretched from the umbilicus on to the dorsum of the penis. In fact, it may well be that the separation of the pubic rami is the direct effect of the same urinary retention that causes rupture of the vesical and urethral walls. Thus, an early rupture of the urethra would give us a simple epispadias with normal symphysis, whereas, if this early rupture does not occur, the symphysis separates; if the urethra now ruptures, we get simple epispadias with absence of symphysis. If both bladder and urethra rupture we get exstrophy of the bladder and epispadias."

It has been unquestionably demonstrated that the excretion of urine is active during the latter months of fetal life, and that the bladder undoubtedly fills and empties itself frequently during that period, and a careful review of the literature of the subject leads me to believe that this is the correct explanation of these peculiar caprices of Nature. It is not my purpose to discuss the causes of these defects; but to submit for your consideration the following cases which seem to me to be of special interest.

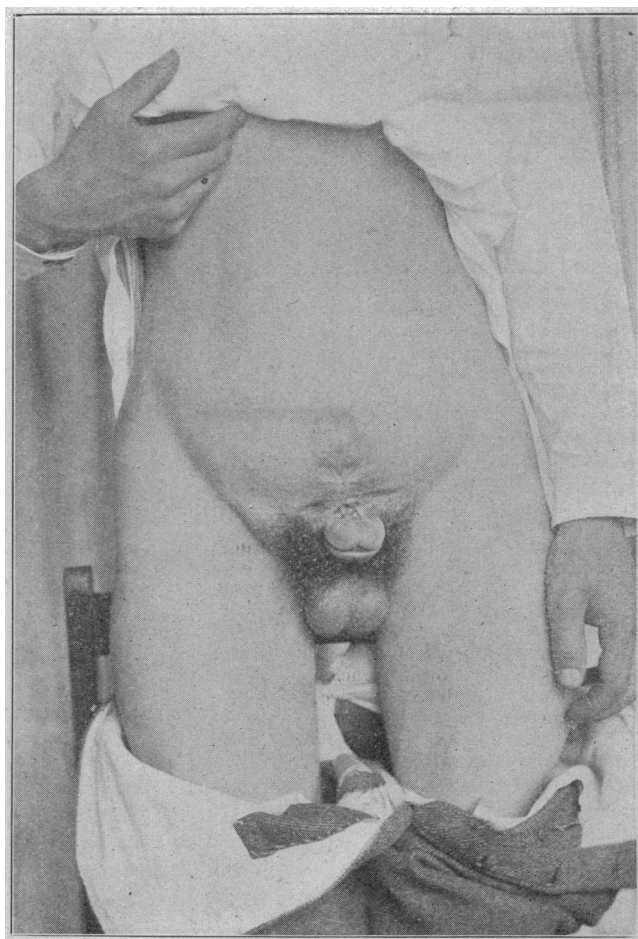
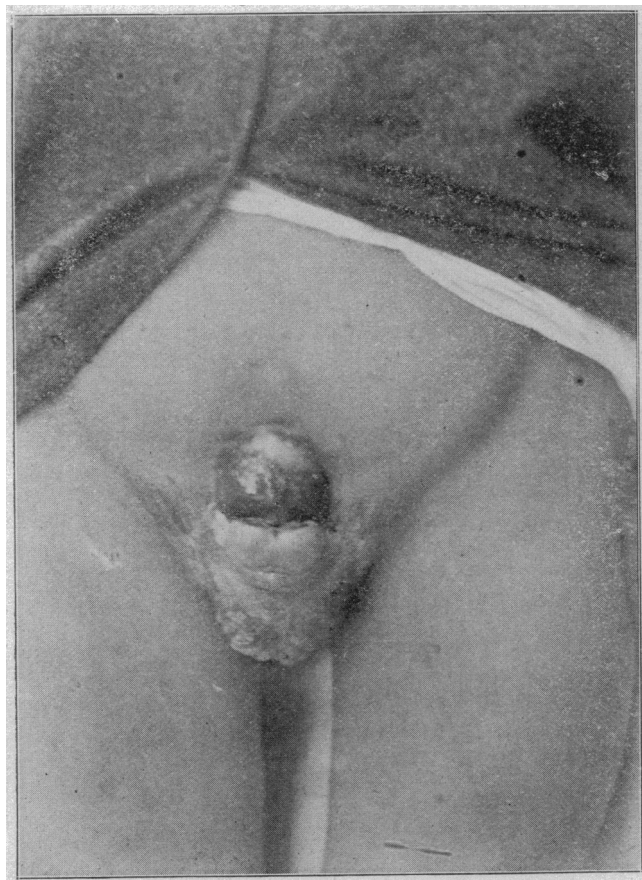
<sup>1</sup> Disease and Injuries of Urethra; Morrow's "Genito-Urinary Diseases," vol. i.

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The case of a Prussian, 23 years old, who presented himself for examination with the hope that I might be able to relieve his hypospadias and correct the incurvation of the rudimentary penis, is of interest. He was of good physique, but with a somewhat effeminate face; just a suggestion of a beard about the cheeks. Stripped, standing erect, with his face covered, he seemed to be a muscular woman. He had a well-developed bust, effeminate shoulders and upper arms. From the navel down, however, he was decidedly masculine. He had masculine hips, masculine thighs and legs; the external genitalia suggested a female vulva, but unusually prominent. When he lay on his back, with thighs separated, I was able to demonstrate a perineal hypospadias; that the structures which resembled the vulva were really the scrotal pouches containing a testis on either side of the median fissure and the urethral opening deep in the

this unusual condition by providing the young man with a mammary development which would be in consonance with his apparent sex. This case, in this light, is unique and worthy of record. I would add that an examination per rectum demonstrated the existence of a prostate and other pelvic structures normally a part of the genito-urinary apparatus.

Another case, a male of 17 years, of American parentage, and fair physical development, came to me for the relief of incontinence, the urine escaping from a penile epispadias of which he had been the unfortunate possessor since birth. The penis presented on its dorsal aspect, from beneath the pubic arch to the glans, a groove lined with mucous membrane which could be followed back beneath the pubic arch so that the finger could be



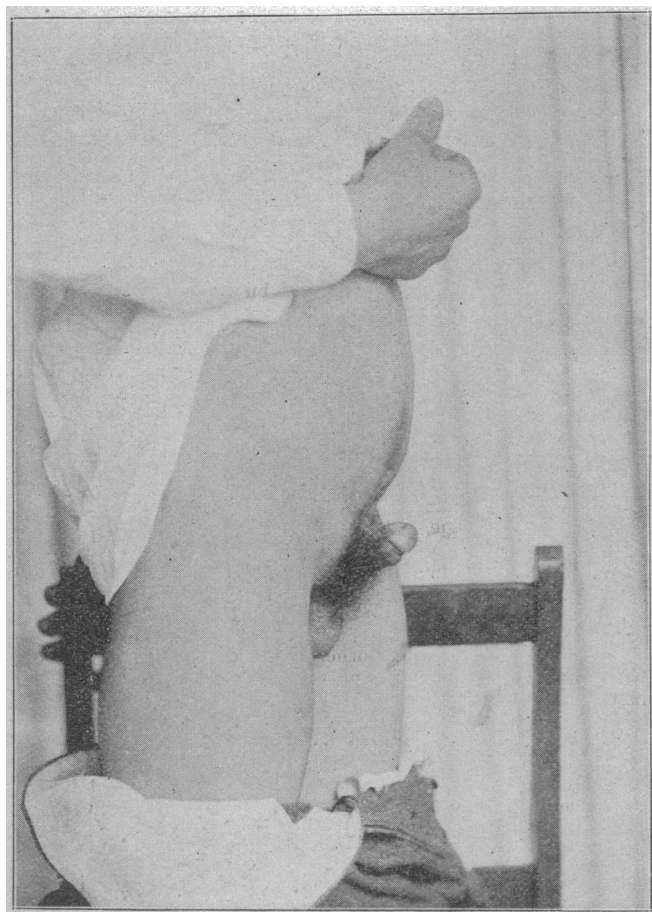
perineum, with a groove running forward to the rudimentary penis, lined with mucous membrane, and which suggested the introitis vaginæ. This young man was masculine in his tastes and voice, and had it not been for the development of the mammæ would have been of no special interest other than that of an aggravated hypospadias. He has no affinities for his own sex, stating that they were entirely confined to the opposite sex. There had never been any suggestion of menstruation; there had never been any periodic bleeding. The mammæ were quite symmetric and the size of those of a girl of ordinary development at the age of 18 years. They were not of unusual size until the age of puberty, and developed at the time when the sexual characteristics became a pronounced feature of the development of the boy. He was then a mixture of the two sexes. It would almost seem that Nature, realizing the imperfection of the congenital development, had supplemented

introduced nearly to the neck of the bladder. The prostate seemed rudimentary, but was normal in shape. He was unable to keep himself dry because of the incontinence of urine.

I did not adopt the operation advised by Thiersch, namely, that of establishing a perineal fistula before attempting to close the epispadias; but made a roof to the urethra by bringing down a flap of skin which occupied the crescent-shaped, hairless surface immediately above the arch of the pubis. A trap-door was dissected down and laid along the dorsum of the penis, its epithelial surface being applied to the roof of the urethral furrow, and its lateral margins being let into slits on either side of the prospective urethra and there fixed by interrupted sutures. A catheter was kept in the bladder for a week and the boy kept sufficiently under the influence of opium to prevent erection. About half of the transplanted flap united, and incontinence has been entirely

overcome. The operation was a failure so far as restoring the canal in its entirety is concerned, and will have to be repeated in order that the organ may be of service for procreation. The physician who attended the accouchment at the birth of this child states that the little rudimentary penis was adherent to the abdominal wall and that he separated it from its adhesion by simple traction. These cases are sufficiently rare to justify their being made a part of the literature of this most interesting deformity.

The third case is one of aggravated epispadias with exstrophy of the bladder. This one I operated on when he was 16 years of age. He suffered, as all such unfortunates do, from eczema of the lower abdomen and thighs; was a constant source of offense to himself and everybody else, in consequence of the exposed surface of the bladder and the constantly leaking ureters. There



was a rudimentary penis and a rudimentary corpora cavernosa attaching to the rudimentary pubic bones on either side, the pubic symphysis being entirely absent. The right testicle was in the inguinal canal; the left undescended and could not be felt. The cutaneous margins of the exstrophy, particularly in the median line, presented a peculiar cicatricial appearance "as though an unsuccessful plastic operation" had been made, as mentioned in the foregoing portion of my paper, but strangest of all in this boy's case, was the absence of a navel. The allantoic structures had evidently failed to be continued to the normal point of attachment for the urachus, and the umbilical cord had emerged from the opening immediately above the exposed bladder. I dissected a quadrangle of skin free, the long axis of which was transverse to the vertical axis of the perineum, leaving both ends attached. I pulled the rudimentary penis

down beneath this bridle and fixed it by sutures. I then turned down a crescent of skin from above the bladder, inverting it, thus turning the epithelial surface inward. Then flaps of sufficient size were brought up from the groins, rotated on their pedicles and brought in contact with the raw surface of the crescent brought down from above. He recovered from the operation, which was made some five years ago, and has been made infinitely more comfortable by it. Of course, he has incontinence, but the urine is discharged only through the one opening, i. e., the urethra which I made, and he is able to direct it into a rubber urinal, which keeps him dry.

All these cases presented, in the immediate vicinity of the defects, the peculiar condition of skin referred to above, suggesting old cicatrization. There was comparatively little hairy development on the surface of the last boy's abdomen at the time I turned the crescent down to make a roof for the bladder. When I saw him a few days ago he told me that he was suffering from the presence of phosphatic deposits in and about the bladder, and on examination I was able to detect the presence of numerous little stalactites which had their origin from the deposits of urine salts on the hairy projections from the bladder roof.

In the case of epispadias without exstrophy of the bladder, the urethra terminated in a funnel-shaped opening beneath the pubic arch. The bladder was continent until the quantity of about eight ounces of urine was overpassed, when the incontinence commenced. The boy, while wet all the time, if asked to urinate, would pass about eight ounces of urine. The urine emerged from beneath the pubic arch in explosive fashion, and there was absolutely no ability to direct it into any receptacle. Since the operation he has been able to direct it with comparative accuracy. This condition of affairs demonstrates that, while the repressive influence of the deep urethra was deficient, it was not entirely wanting, inasmuch as my having been able to extend the urethra about an inch beyond the pubis has done away with incontinence and has put the function of the organ practically within his control.

### EXSTROPHY OF THE BLADDER.\*

BY DUDLEY P. ALLEN, M.D.

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CLEVELAND.

In presenting to this Association a case of exstrophy of the bladder, it is not my purpose to enter on a prolonged discussion nor into a lengthy historic sketch of the various operations which have been proposed for its relief. I wish simply to present a case on which I have operated, that it may be added to others operated on in the same way, and thus bear evidence of the success of this method of treatment. It may be in place, however, in presenting the case, to speak very briefly of the various operations which have been introduced for the relief of the malady, together with some of the objections to them.

All methods which have been introduced for the formation of a covering for the exposed mucous membrane of the bladder have two objections. The first is that, although by covering the exposed mucous membrane they preserve it from external irritation, they do not prevent

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