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ON DILATATION OF THE URETERS

IN

EXTROVERSION OF THE BLADDER.

BY

FRANCIS HENRY CHAMPNEYS, M.B.

The subject of this communication is suggested by a valuable paper by Dr. Alexander James¹ on hydronephrosis and dilatation of the ureters, in connection with incontinence of urine. The paper concerns three boys afflicted with enuresis, who died, and in two of whom (no autopsy being obtainable in the third) double hydronephrosis and dilatation of both ureters was found.

The cases are briefly the following:—

J. G., aged 8, had an injury when aged 3, resulting in phimosis, soon followed by diurnal and nocturnal enuresis. Circumcision gave slight temporary relief, but death followed an attack of coma after diarrhœa. The amount of urine passed in the 24 hours was not ascertained, but it was pale and of a low sp. gr. 1010, containing pus and renal cells, with a trace of albumen.

At the autopsy, the bladder was found contracted, the muscular coat thickened, and forming ribs projecting into its cavity, the walls when distended being $\frac{1}{4}$ inch thick; no cystitis, no stricture of urethra or ureters; both ureters and pelves of kidneys greatly dilated—double hydronephrosis.

Two other boys died similarly after enuresis produced by some abnormal state of the prepuce, and in the only one of them in whom an autopsy could be held, the post-mortem appearances were similar. Also their urine was pale, of a low specific gravity, and contained some pus and albumen.

Dr. James's explanation is the following: Irritation at the prepuce irritates the bladder, *i.e.*, causes it to contract frequently and violently, damming up the urine in the ureters, and this may amount to serious obstruction, dilatation, and hydronephrosis.

¹ Edinburgh Medical Journal, 1878, p. 135.

The obstruction is not situated in the urethra, because the bladder is contracted rather than dilated. A parallel exists in the case of surgical kidney associated with stone in the bladder; here the case is the same, except that the irritation exists in the bladder, and not in the prepuce. Dr. James remarks that in children with incontinence the specific gravity is low; when it is cured the specific gravity rises. This point of the specific gravity is important. Unfortunately it is almost impossible to collect all the urine in the twenty-four hours in cases of enuresis, and various circumstances may combine to lower the specific gravity on any separate occasions. Still it is a matter of common observation that whenever the urine of these patients is examined it is usually of low specific gravity. Hermann and Ludwig found that though in moderate obstruction the watery part of the urine is more diminished than the solids, yet in considerable obstruction the salts sink very considerably, and the sodium chloride nearly disappears, the urea being almost entirely replaced by creatin. In other words, a lower pressure suffices to stop the secretion of the solids than is required to stop the excretion of the water.

Heidenhain¹ found that ligature of an ureter hinders the excretion of indigo injected into the blood. Löbell² (whom I quote from Wundt's "*Lehrb. der Phys.*," 4 Auflage, Stuttgart, 1878) found that when the pressure in the ureter equalled 7 to 10 mm. of mercury, the secretion of urine ceased; and that if the ureter is connected with a manometer, the mercury soon reaches this height, and there remains.

But Hermann³ found that if the ureter be closed for two hours or more, the pressure continues to rise, and eventually reaches 40 to 60 mm. of mercury; but the fluid secreted under these circumstances is not like urine, for it contains hardly any common salt or urea, but much creatin. At a considerably lower pressure the salts ceased to be secreted, the water, however, still being excreted. It is a well-known clinical fact, that urine secreted under mechanical obstruction is of very low specific gravity⁴ (as in cases of calculus in the ureter of a solitary or functionally solitary kidney).

Dilatation of the ureters and kidneys is a sign of gradual and incomplete obstruction,⁵ life not being sufficiently long maintained in cases of absolute obstruction to permit of their gradual dilatation and growth. Dr. James's conclusions are—(1.) That increased frequency of micturition is capable of damming up the

¹ Pflüger's Arch., Band ix., 1874, p. 10.

² De Conditionibus Quibusdam, &c., Marzburg, 1849, p. 30.

³ Henle and Pfeuffer's Zeitschrift, 1863, S. 1, Band xvii.

⁴ Roberts, U. and R. Diseases, 2d ed. p. 27.

⁵ Roberts, p. 36.

urine in the ureters and kidneys, such obstruction being marked by the pale colour and low specific gravity of the urine; and (2.) that this obstruction may cause dilatation of the ureters and hydronephrosis.

This view receives remarkable confirmation from the state of the ureters in cases of extroversion of the bladder.

I will not here cite a long list of cases, but will refer to my paper in the thirteenth volume of these Reports, and to the statement there made (p. 92)—“The ureters are nearly always dilated, and with them the pelves of the kidneys; they are also lengthened, and, instead of running straight to the bladder, descend into the pelvis, and ascend again towards the bladder. In one case they were two inches wide (Petit); in Sir Astley Cooper's they were larger than the rectum; in another case the right measured nine and a half Paris inches in length, the left fourteen (Mörgelin); in Schneider's Case 10, one kidney had two ureters. In Bartels' case the right ureter (the left kidney and ureter being absent) was convoluted, its calibre varying from that of a fine bristle to that of a pencil, and opened into the right half of a double vagina. In cases in which the ureters open abnormally, they are sometimes dilated, sometimes not. For instance, in Saviard's Obs. 94, the common ureter, which opened into the rectum, was not dilated; in Bousquet's case, in which both ureters opened at the orifice of a cloaca, they were not dilated; but in Thilow's case, in which both ureters ended in the urethra, they were much dilated; in this case, however, they were not specially examined as to the existence of an obstruction; in Blasius' case, where they ended in a similar manner, they were much dilated.” In my own case, “both ureters are much dilated at various points, especially at their lower end, the diameter of their largest parts being more than a quarter of an inch. No obstruction anywhere. Right ureter = six and a half inches long, left = five inches long.” “The kidneys have often dilated pelves.” In my own case “both pelves markedly dilated.”

The conditions in the two sets of cases show a remarkable resemblance; in both, in spite of apparently unusual facilities for getting rid of the urine, the pathological conditions are those of obstruction. In the case of extroversion, dilatation is the rule, any structural obstruction is the exception. In the case of incontinence there is no obstruction below the bladder; the bladder itself shows no signs of dilatation, but rather of contraction. In both cases the signs of obstruction begin at the orifices of the ureters. In the case of incontinence, the cause of the irritation of the bladder may be in the bladder or remote from it. In the case of extroversion, the obstruction cannot be higher or lower

than the orifices of the ureters. In this case the possibility of irritation is not far to seek; we need only recall the red and easily bleeding surface of the extroverted bladder. That this is the cause of the dilatation is rendered more probable by the fact that ureters ending elsewhere than in the bladder are by no means so often dilated.

In dealing with the problem of dilatation in connection with enuresis, nature has, as it were, helped us to a solution by eliminating in extroversion all the non-essential parts of the organs concerned. I therefore adopt Dr. James's theory of the dilatation of the ureters and kidneys in incontinence for the same conditions in extroversion of the bladder; and would remark, that this association of symptoms and pathological conditions is, after all, but an unexpected rider to the well-known axiom, "Dribbling of urine is often a symptom of retention of urine."

It may be objected that there is no evidence to show that dilatation is anything but a very exceptional concomitant or consequence of incontinence. It is, of course, true that children rarely die with enuresis; but, on the other hand, enuresis is of various degrees, and again it is usually temporary; and there is some evidence of obstruction to the ureters in the low specific gravity of the urine, which is usually observed during incontinence, though this evidence is not secure from error. The difficulties of collecting the urine are still greater in extroversion than in incontinence, and no trustworthy observations on its specific gravity have, so far as I know, been yet made.

It is probable that contraction of the bladder, at least if strong, closes the orifices of the ureters, and dams up the urine in them. The question whether this shall produce dilatation above depends on the length of time during which the closure of the ureters lasts and the frequency with which it recurs. This applies to cases of both classes.

In the case of enuresis after birth it is, as above said, necessary that the obstruction should not be absolute or too long continued if life is to be maintained; whereas, in the case of the foetus with extroversion, however complete the obstruction, the blood would be kept sufficiently purified by the placenta. After birth this advantage ceases. As is well known, life may be prolonged indefinitely in cases of extroversion; some cases, however, die soon after birth; in my case the child died at a month old after convulsions. It is possible that in such cases the cause of death may be uræmia.

The point is one of great interest in the very practical subject of the treatment of incontinence of urine.