A LECTURE ON THE DIURETIC TREATMENT OF RENAL DROPSY.

Delivered at King's College Hospital.

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WE have recently had under observation in the hospital a case in which we have been able to witness the beneficial influence of the diuretic plan of treatment. The patient, you will remember, is a man, W. C., aged 63, who had been under my care in the Craven Ward since July 7th. He originally came to my out-patient room complaining of shortness of breath and swelling of the hands and legs. This œdema appeared only to have commenced in the previous December, and at that time the swelling started in the legs. The family history was somewhat vague, and the only point of importance was that his father had died of apoplexy. You may remember that at the time of first seeing him I pointed out how frequently in my experience apoplexy and chronic kidney disease were associated in successive generations; in fact, in insurance work, this association is almost as marked as the hereditary character of phthisis. The patient in question appeared not to have suffered from any serious illness previously, and although we endeavoured to extract history of alcoholism from him, he would not make any admissions beyond stating that he did not object to whisky. So far, therefore, with the exception of the possible influence of heredity and the possible influence of alcoholism, the history was extremely vague.

On December 24th, 1895, he got a chill and had to go to bed, and his legs then began to swell. From that time the swelling increased gradually, and he became weaker, and lost weight. About a month before admission he first noticed shortness of breath, which only troubled him on endeavouring to take rapid exercise. At no time in the past had there been any complaint of lumbar pain.

His condition on admission presented the usual features of severe dropsy with advanced kidney disease. He was very anæmic: his eyes had the characteristic watery appearance; when in bed he was obliged to be propped up with pillows, owing to the difficulty of breathing in the recumbent posture; there was considerable œdema of his hands and legs and scrotum; the pulse was of high tension, beating 104 to the minute; there was so much dulness over the left side of the chest that the area of cardiac dulness was obscured. The first sound of the apex of the heart was reduplicated, the second sound over the aortic valves was accentuated; so far as could be made out the heart appeared to be somewhat displaced to the right. With regard to the lungs, on the left side there was absolute dulness at the base of the lung, and the breath sounds over the dull area were very much diminished in intensity, while vocal resonance and vocal fremitus were absent; there were moist sounds to be heard at the right base, and the percussion note over this area was somewhat dull. The thorax presented the characteristic appearance of emphysema, being barrel-shaped, and laterally expanding very little on deep inspiration. The urine contained a considerable amount of albumen, and some blood; microscopically, hyaline, granular and fatty casts were seen. The general evidence, therefore, pointed to dropsy affecting the extremities, to a collection of fluid within the left pleural cavity, and to œdema of the lower part of the right lung; and the problem that we had to consider was to what extent these symptoms could be relieved either by medicine or by operation.

Meanwhile a fresh complication presented itself. On the second night after admission the patient was seized with a sudden attack of dyspnoea. From the very first his breathing had been rapid and difficult, and there had been frequent cough, but this attack of dyspnoea came on so suddenly and was so severe as to suggest the possibility of a form of uræmic asthma. The patient had to lean forward in bed and rest

upon his knees, gasping for breath. The house-physician very rightly determined to relieve the respiration as much as possible by removing fluid from the left side of the thorax, and he aspirated and withdrew 34 ounces. This immediately gave so much relief that some doubt was expressed whether the sudden attack of dyspnoea was really asthmatic, or whether it was an intensified form of dyspnoea due to the pre-existing œdema and hydrothorax. Two nights later another attack of dyspnoea occurred suddenly at 9 o'clock, and the symptoms were then noted to be more typically asthmatic in character; the expirations were prolonged, the inspirations of a gasping nature, and he became almost collapsed, with cold, clammy, and profuse perspiration. During this attack the inhalation of nitrite of amyl was employed, but it had no appreciable effect in diminishing the urgency of the symptoms. At midnight the attack passed off almost as suddenly as it had commenced.

Here, then, we had this new complication to face: the patient, in addition to having the dropsy and other symptoms above enumerated, clearly had attacks of dyspnoea of a spasmodic character, resembling true spasmodic asthma, and these attacks were, in all probability, to be ascribed to uræmia. I may remind you that various forms of treatment were adopted with the view of relieving the asthmatic condition, and that very little benefit was obtained either from nitrite of amyl or bromide of potassium. Breath mixture, containing ether and ammonia, gave slight relief. One thing we considered quite clear in connection with this case, and that was that it had to be treated purely as a case of uræmia; in other words, we had to consider measures calculated to relieve the kidneys of their work, or to increase their eliminative powers, and in the absence of any indication of recent engorgement of the kidney, we determined to follow a diuretic course. During the first three weeks of the patient's stay in the hospital, the amount of water passed ranged from 24 to 34 ounces a day.

It is needless to follow the treatment in detail. He had a pint of imperial drink every three hours, and he also was treated with digitalis. Under the influence of the Imperial drink the amount of water passed increased in quantity up to 60 ounces, and while it ranged between 50 and 60 ounces the patient was free from asthmatic attacks; but the effusion in the pleural cavity and the dropsical condition were not markedly relieved by this form of treatment, and we had several times to remove fluid from the left side of the chest.

On returning to town in September I found that the patient had been aspirated repeatedly, and that he had had trinitrin added to his medicine; but the amount of œdema of the extremities was so great that we discussed the advisability of removing fluid from the legs by operation, and decided against so doing on account of the extremely weak condition of the patient; in fact, he appeared to be quite *in extremis*. At this time, therefore, we employed diuretin in place of any other form of diuretic, giving 20 gr. three times daily, and the relief of the urgent symptoms has been remarkable. The quantity of urine passed has again increased, the œdema of the legs, and more particularly of the hands and arms, has diminished, and the patient has been free from asthmatic attacks.

This case illustrates well the occasional advantage to be derived in renal dropsy from a diuretic line of treatment, yet while laying stress upon the importance of its employment in suitable cases, I would warn you against endeavouring to apply it to all cases; and, further, against drawing conclusions too hastily about the amount of permanent good to be obtained. Even when one has decided to postpone operative measures as far as possible, it is by no means easy to determine what form of treatment should be adopted; in fact, in our selection of remedies for renal dropsy we must be guided by the stage of the disease. In acute renal dropsy far more harm than good would be likely to accrue from any endeavour to follow a diuretic course; while even in renal dropsy from chronic Bright's disease, the line of treatment must vary in accordance with whether we believe that the dropsy is fairly recent, or whether it has been long existent.

You will have noted that in this case, although some good was derived from digitalis, greater benefit resulted from the employment of diuretin, and you will remember that both of

these drugs are diuretics. It may be well to remind you that Manquat classified diuretics as follows:

(1) Mechanical diuretics, with the subdivisions (a) cardio-vascular diuretics; (b) aqueous diuretics.

(2) Renal diuretics, subdividing into (a) functional epithelial diuretics; (b) irritant epithelial diuretics.

You will see from this classification that digitalis and diuretin probably belong to different groups. Digitalis stands as a "cardio-vascular diuretic," which will act partly by increasing the blood pressure generally, and partly by increasing the speed of the flow of blood through the glomeruli; in fact, digitalis is to be grouped together with convallaria, squills, ergot, strophanthus, and caffeine. Of the "aqueous diuretics" in the above classification, we made use both of Imperial drink and of milk; and these act by increasing the volume of the blood, and by thus directly raising an arterial tension. All classifications of remedies are necessarily imperfect. Some of the "aqueous diuretics," notably milk, might with equal propriety fall into the second group of "renal" diuretics, which act directly on the renal epithelium. Huchard has grouped together the indications for diuretic medication as set forth by various authors in the following way: (1) To maintain the action of the kidney; (2) to evacuate fluid effusions; (3) to soothe and diminish irritation of the genito-urinary organs; (4) to modify the urinary excretion, to prevent urinary calculi; (5) to exert a derivative action through the renal passages; (6) to hasten elimination of toxic substances from the organism; (7) to free the blood of morbid matters which are capable of elimination by the kidneys.

With cases of acute dropsy such as occur subsequently to scarlet fever, you well know that our practice is to stimulate the action of the skin so far as possible by the employment of diaphoretics, or by using the hot-air bath or the wet pack; and while we endeavour in this way to relieve strain upon the engorged vessels of the glomeruli, we almost as a matter of routine administer hydragogue purgatives, by means of which we hope, by reducing the volume of blood within the vessels lining the intestine, to exert an absorbent action through the vessels of the remoter tissues. There are few facts in medicine which appear to be more conclusively proved than that the total quantity of fluid circulating within the blood vessels always tends to remain the same, so that when the vessels are depleted at one part of the body, the loss is replaced by absorption from other parts. The truth of this observation you will remember one has often pointed out in out-patient practice, where I have been able to show you the shrivelled, wasted appearance of patients who are the subjects of acute diarrhoea, when the drain from the vessels of the intestine has obviously led to absorption of the fluids in the subcutaneous tissues; in fact, we endeavour by our medication in cases of acute renal dropsy to imitate one of the natural processes in minor deviations from health. By stimulating the action of the skin in these cases we still further tend to diminish the quantity of fluid circulating within the vascular system, and hence in both ways we favour the return of fluid from the subcutaneous tissues, and we diminish the strain upon the engorged capillaries of the kidney. You will see, then, that the whole treatment is intended not to increase the work of the kidney, but to diminish the strain upon the renal vessels, and thus to afford a time of physiological rest during which the kidney may regain its normal condition. Any attempt to diminish dropsy during the acute stage of the disease by the action of diuretics is likely to be attended with disastrous results, since the diuretic necessarily throws work upon an organ which is incapable of bearing any extra strain. In the same way, when we are dealing with chronic Bright's disease which has caused dropsy, the question of diuretic medication is not always one which can be considered. Sometimes patients with renal dropsy are passing a very fair average amount of urine, but more generally the degree of dropsy varies inversely with the degree of urinary excretion. If we find that the vascular system is showing much sign of failure, we may be tempted to employ diuretics which belong to the first group of Manquat's classification. Commonly we use the acid tartrate of potash in some form, either as the Imperial drink, or in the form of the compound jalap powder of the *Pharmacopœia*. Sometimes the purgative action of the latter is increased by the addition of scammony, but mostly the compound jalap powder is employed alone. The number

of diuretics that may be employed is almost endless. Some practitioners recommend digitalis, while others prefer other drugs which act through the vascular system—such as strophanthus, or caffeine, as mentioned above.

In the patient before us you will remember that we employed both digitalis and caffeine in the early stages of the disease. As these appeared not to exert sufficient diuretic effect, our house physician, Mr. Lansdown, wished to compare the results with those obtainable from diuretin. This remedy is the sodio-salicylic compound of theobromine, which has been before the profession for the past seven or eight years without having been generally adopted. The statements that have been made concerning diuretin have been extremely various. Dr. Gram, of Copenhagen, originally stated that theobromine was a diuretic which acted directly on the kidneys, and differed from caffeine in not affecting the central nervous system, and therefore not causing sleeplessness and restlessness. Theoretically, therefore, theobromine should be preferable to caffeine as a diuretic, but in the free state the alkaloid is very sparingly soluble, and gives rise to disturbance of digestion. Diuretin, on the other hand, was credited with producing the beneficial effects of theobromine without the unpleasant symptoms.

In the *Year Book of Treatment* for 1892 attention was drawn to the statements of a physician of St. Petersburg, who concluded that diuretin had no influence on the heart, that it was very unreliable as a diuretic agent, and that it could not be used with advantage as a substitute for digitalis, adonis, strophanthus, and other allied remedies. In the course of the following year the claims of theobromine appeared to have been still further considered, and Dr. Ralfe, in summarising what had been written during the year, stated that as regards the action of diuretin on renal dropsy, the experience of many observers was rather at variance. Thus one spoke of its extraordinary and surprising effect in cases of contracted kidney and its failure in acute nephritis, while another thought that its action was best noted in the latter, though good effects were also noted in the chronic form. One observer stated that the diuretic action of the drug was continued after its administration had been stopped, while even this observation was contradicted. Dr. Ralfe stated that he had been disappointed in its action as far as acute and sub-acute attacks of nephritis were concerned, though in some cases of contracted kidney with dilated heart it had exercised a slight influence in increasing diuresis, but not sufficient to encourage its use. He also stated that while increasing the water it also increased the elimination of urea and salts.

M. Huchard, in the *Journal des Praticiens*, July 6th, 1895, while writing on the beneficial effects to be obtained from the use of theobromine, incidentally observed that diuretin was an uncertain product, and that it was much less active than theobromine.

Askansy, quoted in the *Medical Chronicle* of May, 1896, said that while he found that diuretin had a diuretic action in a certain number of cases, it did not appear materially to influence the amount of albuminuria. In 20 cases of affections of the heart and vessels with oedema it proved efficacious in 17, markedly increasing the diuresis. Diuretin often showed itself efficacious when digitalis had failed, but in the cases observed the action did not continue long after the withdrawal of the drug. This author agrees with Dr. Ralfe in saying that it sometimes produces such inconveniences as vomiting, colic, and weakness. He found that it acted very favourably on attacks of cardiac dyspnoea, and angina, in nephritis, and in valvular lesions; and he believed that in cases of angina the action of diuretin was primarily on the heart, perhaps owing to a stimulation of cardiac energy. In our patient we have not seen any inconvenience from the use of the drug; his digestion has not suffered in any way from the dose that we have employed.

The clinical value of diuretin was considered by Louis Vintras in the *Lancet* of April 25th, 1896, who thought that diuretin was of little value when there was much albumen present, or when employed in cases of acute nephritis; and that it was especially applicable to cases where the kidney trouble was secondary to morbid lesions in other organs, and the epithelial layer of the urinary tubules was the seat of disease. While agreeing with him that diuretin is likely to prove useless in cases of acute nephritis—in fact from what

one has already said, you will see that I consider diuretics contra-indicated in the acute stage—yet I must observe that in our case there was from the first a large amount of albumen present, and that this has not apparently proved prejudicial to the use of the drug.

It is obviously unsafe to draw conclusions from one case, and it is no part of my purpose to-day, gentlemen, to attempt to reconcile these different statements. It must be a sufficient satisfaction to find that in the case before us great relief was obtained after we had used diuretin in place of other remedies, and that this relief of urgent symptoms coincided with the excretion of an increased quantity of fluid. In the early days of our employment of diuretin the asthmatic attacks first yielded, and afterwards we noticed that the amount of dropsy became considerably less. That the benefits obtained from this mode of treatment were not mere coincidences is shown by a slight return of asthma when, the patient having become accustomed to the use of the remedy, the amount of fluid excreted again became reduced; and you will have seen how the asthmatic seizures passed off at first with an increase in the amount of diuretin administered, and subsequently after the employment of digitalis in addition to the diuretin. I do not consider that the treatment is likely to produce any lasting beneficial effect. In all probability we shall have, sooner or later, to relieve the pleura again by aspiration, and perhaps to relieve the tension in the extremities by acupuncture or by Southey's capillary tubes. But these measures we endeavour to postpone as late as possible, since frequently the strength fails rapidly after draining large quantities of fluid from the extremities, and there is always some risk of exciting inflammatory changes in the neighbourhood of the punctures.

LECTURES

ON

DISEASES OF THE GALL BLADDER AND BILE DUCTS.

Delivered at the Royal College of Surgeons of England.

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LECTURE II.

FISTULA.

FISTULÆ in connection with the bile passages are by no means uncommon, and their variety is considerable. They result from operation, or from disease, and in the latter case they are due to ulceration resulting from gall stones or cancer. The fistulous channel may either be direct or indirect. In the latter case the perforation occurs first into an adjoining parenchymatous organ or into a localised abscess, and then into the nearest hollow viscus or on to the surface of the body at some part. A fistula may also arise from a local abscess forming outside the biliary passages around the primary focus of inflammation, and then bursting into the adjoining cavities, which are thus made to communicate.

Although the establishment of a fistula is at times dangerous, and at others excessively annoying or uncomfortable, in many cases it forms one of Nature's methods of cure in certain forms of disease of the gall bladder or bile ducts, and the surgeon in forming a permanent biliary fistula in otherwise incurable jaundice, or in making an anastomosis between the bile passages and the intestine for the like purpose, is taking a leaf from Nature's book.

Many of the fistulæ are mere pathological curiosities, quite undiagnosable, and capable only of being discovered *post mortem*. Many must form and heal, leaving the patient cured, and thus never be discovered; for, contrary to what one might suppose, fistulæ between the bile passages and other hollow viscera in the majority of cases heal spontaneously, leaving only visceral adhesions, so that the fistulæ are comparatively rarely found *post mortem*.

Courvoisier and Naunyn¹ tabulate 384 of these fistulæ; Roth, Schroeder, and Schloth record 43 in 10,866 necropsies. My operations extend to 170 cases, in 12 of which there were

fistulæ following. Several of the fistulæ were inevitable, as the ducts were strictured; in others they were intentional, as in cancerous obstruction, producing jaundice.

Biliary Cutaneous Fistula.—Courvoisier's statistics gathered from reported cases would seem to prove that this is the commonest form of fistula. It may be pathological or post-operative. Pathological surface fistulæ usually open at the umbilicus, the abscess following the course of the remains of the umbilical vein, but they may form at any part of the abdominal wall, even near the pubes or on the left side of the abdomen. Calculi of various sizes—from a single one 3 inches in diameter, reported by Gutteridge,² to multiple small faceted ones the size of shotcorns—may be discharged in this way, leading to recovery and permanent cure, but until all the calculi are discharged the fistula is liable to remain open.

Post-operative fistulæ may be mucous or biliary. Mucous fistulæ are occasionally seen after the operation of cholecystotomy, where the obstruction in the cystic duct has not been overcome or where that duct is the seat of stricture. A mucous fistula, as a matter of fact, causes very little inconvenience, as only about 1 ounce of fluid is discharged daily; but if the opening be allowed to close, the accumulation produces pain, and it is therefore necessary for a patient under these circumstances either to wear a small tube and a pad of absorbent wool or to submit to operation; where there is stricture of the cystic duct the gall bladder should be removed, in other cases clearing out stones may suffice. The operation of cholecystotomy will not be followed by fistula if the bile ducts have been cleared and if the opening in the gall bladder be sutured to the aponeurosis and not to the skin.

Biliary fistula following on operation is quite a different matter from mucous fistula, as although in some cases it is compatible with good health, the inconvenience caused by 30 ounces of bile flowing from the fistula daily produces so much discomfort that in all the cases which have come under my notice the patients have preferred to accept the risks of operation rather than to retain their disability. If the ducts be clear and the fistula be small the application of the actual cautery to the margin of the fistula will frequently result in its closure. That failing, the abdomen may be opened, the gall bladder detached, and the opening sutured. Or the less severe method may be first tried of dissecting the fistula with its peritoneal covering intact away from the skin margin, afterwards doubling in the mucous edges, suturing them accurately, and over this applying one or two layers of buried sutures before bringing together the skin. Where, however, the ducts cannot be cleared, and the gall bladder is large enough to permit of it, the operation of cholecystenterostomy may be performed. If the fistula be dependent on gall stones or fragments in the ducts, the ducts may be syringed through a catheter daily with olive oil or with a 0.5 per cent. solution of *sapo animalis*, as recommended by Dr. Brockbank; or a solution of turpentine in ether may be used.

Biliary intestinal fistulæ, as might be expected from the contiguity of the gall bladder to the duodenum and colon, are the most common, and as a rule they are due to ulceration produced by gall stones. Usually the ulceration proceeds quietly and produces very few symptoms until the gall stone sets up obstruction in its passage down the intestinal canal. But the process is not always accomplished without symptoms, such as pain over the liver, more or less jaundice, and fever of an irregular type, to be subsequently followed by signs of more or less complete obstruction; the frequency of the latter event varies with the height of the fistulous opening into the bowel. Hæmorrhage into the stomach or intestines may occur in these cases.

When a gall stone is impacted in the common duct just before entering the duodenum, ulceration and perforation of the duct are apt to occur, the concretion thus escaping into the duodenum by an enlargement of the ostium of the common bile duct from ulceration or sloughing. Roth, who has paid special attention to this condition, found it 5 times in 25 cases of biliary fistula. These gall stones are usually smaller than those causing gall bladder intestinal fistula, are seldom larger than filberts, and do not often cause intestinal trouble.

I have only one case to advance from my own experience, and in that instance the vomiting of gall stones made the