its posterior surface is very slightly increased. With this alteration of its figure, the axis is lengthened and the transverse diameter shortened. The pupillary region of the iris approaches the cornea, and the circumference of the iris retreats from it. The lens with its capsule is elastic, but without contractile irritability; its rôle is passive. When the suspensory ligament is tight, it must exert traction on both surfaces of the lens (chiefly on the front, by reason of the greater stoutness of the fibres and of their attachment to the lens advancing rather further from the edge of the lens), tending to compress the lens in the direction of its axis and to flatten it—the shape of the lens in looking at a distant object, which is a passive act, not requiring accommodation.

When the radial or longitudinal bundles of the ciliary muscle contract, and the distance between their extreme points of attachment is lessened, the previously tense suspensory ligament is relaxed; and the lens, no longer compressed by it, becomes more convex by virtue of its own elasticity. If at the same time the circular bundles of the muscle were to shorten, this would tend to contract the circle of the ciliary processes, by which the suspensory ligament would be still more slackened. I doubt, however, whether they can act as a compressor of the edge of the lens.

The ciliary muscle derives its nerves from the lenticular ganglion. They pierce the sclerotic not far from the optic nerve; and, gaining the inner surface of this coat, they run forwards between it and the choroid till they reach the ciliary muscle, on the outer surface of which they break up and recombine in the well-known beautiful plexus, a large portion of which is, however, destined for the innervation of the iris. From this coarse plexus, bundles of nerve-fibres dip into the muscle, in which they form a finer net, from which single fibres of extreme tenuity are traceable for long distances amongst the muscular bundles; but I have not yet discovered the actual nature of their ultimate connection with the muscular fibre. In my last course of lectures, I adverted to the occurrence of ganglion-cells in this plexus. They first became known to me by the beautiful preparations of Schweigger, and are not the coarser gangliform swellings recognisable under slight enlargement described by Dr. R. Lee, jun. The arteries of the ciliary muscle are drawn from the *circulus arteriosus major iridis*, which distributes many recurrent twigs to it. These are not infrequently offsets of the arterioles which this arterial circle sends to the ciliary processes. The venous blood escapes in two directions—posteriorly, through veinlets which join those of the ciliary processes and lead to the *venæ vorticosæ*; and in front, through veinlets which empty their contents into the *circulus venosus* in Schlemm's canal.

ON THE TREATMENT OF ACUTE AND CHRONIC BRIGHT'S DISEASE.*

By GEORGE JOHNSON, M.D., F.R.C.P.,

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GENTLEMEN,—On the invitation of your President (Dr. Andrew Clark), I have undertaken to read a short paper "On the Principles which should regulate the Treatment of Acute and Chronic Bright's Disease." What is Bright's disease? I adopt the definition given in the *Nomenclature of Disease* published by the Royal College of Physicians: "Bright's disease is a generic term, including several forms of acute and chronic disease of the kidney, usually associated with albumen in the urine, and frequently with dropsy, and with various secondary diseases resulting from deterioration of the blood." The term Bright's disease is nearly, but not quite, synonymous with renal albuminuria.

The causes of renal albuminuria arrange themselves in two main divisions.

1. A mechanical impediment to the escape of the venous blood from the kidney, as from disease of the heart or lungs; the pressure of dropsical fluid in the abdomen; sometimes probably the pressure of the gravid uterus.

2. An abnormal condition of blood is by far the most frequent cause of albuminuria. Thus albuminuria occurs not infrequently as a result of scarlatina, diphtheria, erysipelas, typhus and enteric fever, pyæmia, cholera, measles, purpura, gout, etc. The albuminuria which sometimes occurs during the early stage of pregnancy is probably a consequence of blood-changes associated with that condition; while that which occasionally follows parturition is, in all likelihood, a result of absorption of septic materials from the uterus.

Thus albuminuria may result from a primary mechanical hindrance to the movement of blood, or from a primary change in the quality of the blood. On the present occasion I shall exclude from consideration that class of cases in which albuminuria is a result of a mechanical impediment to the circulation and consequent passive congestion of the kidney. My remarks will have reference only to the more numerous second class of cases—cases of albuminuria the result of abnormal states of blood. I shall endeavour to make my remarks as practical as possible, with only so much of reference to pathological theory as may serve to guide or to explain practice.

The extreme frequency of renal disease is a physiological result of the kidney forming one of the main channels by which effete and noxious materials are cast out of the circulation. During the process of excretion, the kidney-tissues—primarily the gland-cells, secondarily the blood-vessels—undergo structural change. A leading principle of treatment is to lessen as much as possible the excretory work of the kidney, more especially in cases of acute Bright's disease. The main points are—rest in bed in a room of moderate uniform temperature; a carefully regulated and a somewhat scanty diet; the adoption of means to promote a free action of the skin and bowels.

In all cases of acute Bright's disease, rest in bed is an essential part of the treatment. In a large proportion of cases, this with a scanty diet will suffice for the cure. The diet may consist of milk alone if it suits the patient's stomach, or milk with an egg or two in the course of the day, or with the addition of beef-tea or other animal broth. Under this regimen the urine soon becomes copious, while the albumen diminishes and gradually disappears.

The copious flow of urine which usually occurs during convalescence from acute Bright's disease is thus explained. During the acute and congestive stage of the renal disease, the constituents of the urine—both solids and liquids—have accumulated in the blood, and have thence been effused into the areolar tissue and into the serous cavities. Now, urea is a most powerful diuretic. When injected into the veins of a dog, it quickly excites a copious flow of urine; and no sooner is the inflammatory congestion of the kidney removed, and thus the freedom of the renal circulation restored, than the urea retained in the blood begins to exert its natural diuretic action upon the kidney. The copious flow of urine thus induced speedily removes the accumulated urinary solids and water from the blood, the areolar tissue, and the serous cavities, into which they had been effused, and thus the dropsy is cured.

This abundant flow of urine occurs without aid from diuretics or drugs of any kind. I have seen it occur while a bread-pill or coloured water was given as a placebo. Stimulating diuretics, such as squills, or cantharides, or turpentine, would be injurious, by increasing congestion of the kidney. The best diuretics in such cases are those means which tend to lessen renal congestion—dry cupping or hot fomentations over the loins, hot air or water baths, purgatives, and a scanty diet, with a free use of diluent drinks—one of the best and pleasantest drinks being the "imperial drink", made with cream-of-tartar and lemon.

When the renal congestion is extreme, as shown by the scanty secretion of highly albuminous urine, local bleeding by leeches or cupping on the loins is often extremely useful. If by the abstraction of a few ounces of blood from the loins we relieve the renal congestion, we shall check the rapid destruction of blood-constituents which results from uræmia; moderate local bleeding, therefore, tends to economise blood, and to prevent its waste.

It has been asserted that cupping or leeching the loins can help an inflamed kidney no more "than if the blood had been taken from the arm or from the nape of the neck". But this, surely, is a mistake. The lumbar arteries, which supply the integuments of the loins, arise from the abdominal aorta, close by the origin of the renal arteries; and when leeches or cupping-glasses draw blood through the skin of the back, it is certain that the diminished pressure within the lumbar arteries will divert a certain quantity of blood from the neighbouring renal arteries. The same principle explains the good effects of leeching in cases of pericarditis. The internal mammary artery sends deep branches to the pericardium, and superficial branches to the intercostal spaces and the skin. By the application of leeches over the heart, we abstract blood from the integumentary branches of the internal mammary artery, and thus divert a portion of blood from the deeper pericardial branches. The blood will as surely take the course indicated by diminished pressure within the vessels as the water in a pump will, up to a certain height, follow the rising piston. It may be thought that the quantity of blood thus diverted is very small: so, in the case of venesection being practised in the arm or neck, how scanty is the stream of blood which escapes from the opening in the vein compared with the torrents of blood rushing through the *venæ cavæ* into the right side of the heart; and yet in a case of obstructed circulation through the heart or lungs, how promptly and decidedly does this small diverted current

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lessen the distension of the whole venous system. Hot fomentations or poultices on the loins act by relaxing the superficial arteries. The skin, therefore, receives a larger supply of blood, and thus a portion of blood is diverted from the renal arteries. Then, too, there is some degree of depletion from the full cutaneous capillaries by the free local sweating which the warmth occasions.

Dry cupping acts in a somewhat similar way to hot fomentations. It draws an abundance of blood through the arteries into the subcutaneous capillaries, which, when the cups are removed, returns through the veins to the heart. In order that dry cupping may be most effectual, each cup should be removed as soon as the vessels beneath are well filled, and then it should be reapplied. The object is first to draw the blood through the arteries into the capillaries; then to allow it quickly to return by the veins, and not to keep it stagnating in the capillaries, which will happen if the glass be retained long on one spot. Another point is not to draw the blood into the skin with sufficient force to cause extravasation, the effect of which will be to impede the circulation through the skin, and so to divert more blood into the inflamed tissues beneath. The sole object of dry cupping, be it remembered, is not to irritate the skin, but to draw blood rapidly from the arteries, and as rapidly to transmit it through the capillaries to the veins, in its backward course to the heart.

As a rule, it is well to give no alcoholic stimulants; or, if need be, to give them very sparingly in cases of acute Bright's disease. The imbibition of alcohol imposes extra work upon the kidney, and so is opposed to the principle of lessening as much as possible the work of the inflamed gland. Excess of alcohol is a not infrequent cause of albuminuria; and a very moderate employment of alcohol may tend to perpetuate and aggravate disease.

Not long since, a man was admitted into King's College Hospital completely narcotised by a surfeit of wine, which was pumped from his stomach in large quantities. The urine drawn off from the bladder contained a large amount of albumen. In a few hours the man recovered consciousness, and the urine became normal. The temporary albuminuria was a result of renal congestion while the excess of alcohol was being excreted by the kidneys.

When acute Bright's disease is making satisfactory progress towards recovery, the dropsy usually disappears for a variable time before the urine ceases to be albuminous. It is very important to impress upon the patient that until the urine has regained its normal characters, he must be extremely careful to avoid cold, fatigue, and errors of diet.

The duration of albuminuria in cases that ultimately recover is very variable. I have seen many cases of recovery after the disease had continued for from three to twelve months; and I have seen some recover after the urine had been albuminous for one, two, three, and in one case four, years.

The more I have seen of the disease, the more hopeful I have become as to the ultimate result, when the history and the symptoms, and above all, the chemical and microscopical characters of the urine, do not indicate extensive and irremediable degeneration of the kidney. In all the cases of recovery from long-continued albuminuria, the preparations of iron have entered largely into the medicinal treatment of the disease, and have apparently contributed much to the favourable result. There are two preparations which I believe to be especially useful: these are the tincture of the perchloride and the syrup of the phosphate. I believe that they are best taken with the food. I have frequently combined with each dose of the perchloride of iron ten grains of hydrochlorate of ammonia; and I believe that this ammonio-chloride of iron is a useful combination.

Amongst other remedial agencies, when acute renal disease is prolonged and threatens to become chronic, change of air and scene is often highly beneficial; and I have seen some most remarkable recoveries effected under the influence of a long sea-voyage.

There are few diseases which, during their progress, cause more varied and severe suffering than confirmed chronic Bright's disease in its various forms. As the symptoms vary in the different forms of chronic renal disease, so a varied treatment is required in the different classes of cases. Without entering into minute pathological distinctions, for which we have now no time, I purpose to say a few words on the treatment of some of the more frequent and distressing symptoms.

In one class of cases—cases of large white kidney, with a scanty secretion of highly albuminous urine—dropsy is usually a prominent symptom. The tendency to dropsy is without doubt increased by the dry and inactive state of the skin; and this condition of skin seems to be mainly due to the hypertrophy of the muscular walls of the minute subcutaneous arteries. This excessive muscularity of the small arteries enables them to resist the relaxing effect of external warmth, so that a hot-air bath often fails to excite diaphoresis. Patients who do not perspire under the influence of a hot-air bath, usually complain of painful

throbbing in the head, difficulty of breathing, and other distressing sensations. So frequently is this the case, that in cases of chronic renal disease I am now in the habit of substituting for the hot-air bath a prolonged packing in a wet sheet, surrounded by blankets. Patients often remain packed for periods varying from one to three or four hours, not only without distress but with comfort and decided relief.

Diuretics are notoriously uncertain in their action. I have often obtained good results from the imperial drink, in doses of from one to three pints in the twenty-four hours. A very efficient diuretic is a strong infusion of fresh broom-tops, taken in sufficient quantity to act as a purgative. The free action of a hydrogogue purgative, elaterium, compound jalap-powder, or compound gamboge-pill, is very commonly followed by a copious flow of urine. The escape of water by the bowels lessens the distension of the systemic veins, the circulation becomes more free, and therefore the secretion of urine more copious.

When other means fail to remove anasarca, acupuncture of the legs, or an incision with a lancet, often affords prompt and decided, and sometimes permanent, relief. I have seen a considerable number of cases in which life has been prolonged, and some in which complete recovery resulted, from the operation, after other means had failed to afford relief. It is very interesting to note the phenomena which follow upon acupuncture or incision of the legs in cases of anasarca. There is, first, a copious drain of liquid through the skin; then there is a further exudation of liquid from the over-distended blood-vessels; this liquid also escapes through the punctures, and its escape is often associated with temporary symptoms of exhaustion, a rapid and feeble pulse, and pallor of the face. Lastly, there often occurs a more copious secretion of urine, in consequence of the greater freedom of the circulation through the kidneys.

Dropsical accumulation tends to cause a secondary impediment to the circulation by the pressure of the effused liquid from without upon the blood-vessels, especially the veins. Again, the capillary circulation becomes more and more impeded in proportion to the increasing watery distension of the veins. The drain of liquid from the areolar tissue through the punctured skin, allowing a further exudation from the distended capillaries, thus removes or lessens the obstruction which results from over-fulness of the veins. The general circulation, therefore, becomes more free, and the greater freedom of the circulation through the kidney is attended, as we have seen, by a more copious secretion of urine. But it may be objected that incisions and punctures in anasarca legs are apt to excite destructive inflammation. It is true that inflammation and sloughing may follow the operation; but this may also occur from over-distension of the skin or the pressure of the heavy dropsical legs upon the bed. The result of my experience is, that inflammation of anasarca legs has been as often subdued as provoked by acupuncture or incision; that inflammation is less likely to follow punctures in cases of renal than cardiac dropsy; and that the risk of inflammation after an incision about a third of an inch long in each leg, or after several acupuncture, is so nearly equal that I would in any case give the patient or the surgeon the choice of the operation. If I were the patient, I should choose the incision as being on the whole less painful and more rapidly and surely efficacious.

Dyspnoea is one of the most frequent and distressing symptoms associated with Bright's disease. It has various causes, and requires various remedies. When it results from oedema of the lungs, or dropsical hydrothorax, it is best treated by the remedies for dropsy. In some cases, anæmia appears to be the chief cause of dyspnoea. The red blood-corpuscles are the oxygen-carriers. When the blood—whether in cases of chlorosis or of Bright's disease—contains an excess of water with a corresponding deficiency of red corpuscles, the defective oxidation of the tissues—the demand for air—expresses itself in hurried and laborious breathing. The remedy for this form of dyspnoea is to be sought for in the elimination of water, a carefully regulated nutritious diet, and iron as a restorative tonic.

Paroxysmal dyspnoea in some cases appears to be of cardiac origin. The heart's action is rapid and feeble, or slow and feeble, the breathing distressed and hurried, with loud puerile respiration over the lungs. The dyspnoea in these cases seems to be due to the influence of deteriorated blood upon the pulmonary and cardiac nerves. It is not improbable that the cardiac weakness in some cases results from excessive contraction of the minute branches of the coronary arteries, and consequent anæmia of the muscular walls of the heart.

These distressing symptoms are often relieved for a time by ether or by brandy; and lately I have found that an occasional small dose (ten grains) of hydrate of chloral has done good. The cardiac and pulmonary symptoms to which I have referred are almost certainly made worse by opium in any form. There seems good reason to believe that in the hydrate of chloral we have a remedy, by the cautious use of which we may for a time mitigate some of the nervous symptoms which occur

in the advanced stages of incurable Bright's disease. I refer particularly to the cramps and muscular twitchings, which are frequent precursors of convulsions, and the distressing restlessness which, associated as it is in a greater or less degree with uræmia, is generally aggravated by opiates.

The sufferers from Bright's disease are always dyspeptics, and the gastric symptoms are often very obstinate and distressing. When in consequence of renal degeneration the blood is contaminated by retained urinary excreta, there is often a vicarious excretion of these impurities by the mucous membrane of the stomach and bowels. The gastric secretions are mingled with the ammoniacal products of decomposing urea; digestion is consequently impaired; there is flatulent distension of the stomach and bowels, nausea, vomiting, and diarrhoea. Relief is to be sought by a carefully regulated diet, and by giving with the food from ten to twenty drops of dilute hydrochloric acid with a vegetable bitter. A small dose of strychnia, or the tincture of nux vomica, with a mineral acid, is sometimes especially efficacious. Pepsine may sometimes be given with advantage.

In some cases of advanced renal degeneration, the vomiting is so incessant that the patient has to be sustained by nutritive enemata, while iced water only is taken by the stomach. In some instances that have come under my observation, the straining and exhausting efforts of vomiting have been checked only by frequent whiffs of chloroform-vapour.

In conclusion, I have only to add that I shall be happy, so far as I am able, to answer any questions upon the various points which I have passed in review. I shall also be glad to receive practical hints from those who by their experience are enabled to give them.

CASE OF HYSTERICAL VOMITING AND SLEEPLESSNESS.

By F. W. PARSONS, L.R.C.P.Lond., etc., Wimbledon.

MISS L. C., aged 22, single, regular, health always good, had had much trouble recently in waiting upon her mother in her last illness. She had been almost entirely deprived of her rest night and day for three months, during which time she had frequently vomited her food. She had not had pain in the chest. Her bowels have always been irregular. Up to the present time she had had no treatment other than an occasional aperient pill. The family are all healthy. She applied to me on April 12th, suffering from severe diarrhoea and sickness of three days' duration. The pulse was good; the tongue thinly coated with creamy fur. There was some pain in the epigastrium; no headache. The patient was a well nourished full-blooded-looking girl, but with a decidedly "hysterical aspect". She felt very weak and trembling. I ordered ten minims of dilute sulphuric acid and fifteen minims of liquor opii sedativus every four hours.

April 13th, 9 A.M. The diarrhoea ceased after the second dose, but the sickness and nausea remained incessant. The vomited matter consisted of stringy mucus floating in a glairy acid liquid. The skin was moist; the temperature 97.6 deg. The sounds of the heart and lungs were normal. There was a good deal of hyperæsthesia over the whole chest and bowels, but there was no particular tenderness over either the uterus or ovaries. The urine was profuse and very limpid. Everything, even weak brandy and water, was returned. I ordered effervescent citrate of potass, with thirty-minim doses of liquor morphiæ.—8 P.M. The only thing retained was a small quantity of thin milk and water arrowroot, and the medicine. I ordered the following.

R Tincturæ valerian. ammon. ℥xxx; spiritûs æther. ℥xx; tincturæ bellad. ℥xv; acid. hydrocyan. dil. ℥iij; mist. camph. ʒi. To be taken every four hours.

April 14th, 9 A.M. She had no sleep. The medicine only was retained.—8 P.M. She had a very bad day. The following draught was ordered to be taken every two hours.

R Manganis oxyd. gr. x; acid. hydrocyan. diluti ℥iij; aquæ ʒi.

April 15th, 9 A.M. No sleep. Sickness incessant, and nausea intolerable.—8 P.M. She had returned the last two doses of the medicine. She was ordered to take the valerian again.

April 20th. She had had no sleep yet, although she had been carefully watched. Sickness occurred several times in an hour. The urine was very excessive, of specific gravity 1002. I ordered the following to be taken every four hours.

R Bismuth. albi gr. v; magnesiae carbon. gr. xx.; acid. carbolicus miss; aquæ ʒi.

April 21st. She was not quite so sick, but had had no sleep. At 10 P.M., I injected five-twelfths of a grain of acetate of morphia under the

skin. There being no result in two hours, I repeated it. This produced extreme contraction of the pupil and stupor, but no sleep until 9 A.M., when she fell asleep, and slept soundly till 7 A.M. the next morning. She then awoke much refreshed and not nearly so sick. The medicine was continued.

April 22nd, 9 P.M. I injected eight-twelfths of a grain of acetate of morphia, which, however, gave very little sleep.

April 23rd. The following was ordered to be taken every two hours.

R Potassii bromidi gr. x; acid. carbolicus gr. i; acid. hydrocyan. diluti ℥iij; aquæ ʒi.

8 P.M. She dozed about six hours, and was sick once only.

April 26th. There had been no sleep since the 23rd, though the bromide had been increased up to forty-grain doses; but the sickness had been less. I injected half a grain of acetate of morphia at night, and omitted all medicines.

April 27th. She slept well; had slight sickness. The injection was repeated at night.

April 28th. She slept four hours. I ordered a grain of sulphate of quinine every four hours, with four minims of dilute hydrocyanic acid; and repeated the injection at night.

April 29th. She slept four hours, but felt sick and depressed. The bowels had not been open for nearly a week, and there was tympanitis. The skin and conjunctivæ were slightly yellow. Calomel (gr. iv) was ordered to be taken every four hours, and at night the injection was repeated.

April 30th. She dozed a little, but was more sick. The bowels were not moved; so I gave an aperient saline draught, which brought away an immense quantity of dark-green foetid motion. The morphia injection was repeated at night.

May 1st. The patient had no sleep, and was very sick. She had an attack of "spasms" in the night. Pulse weaker. The following was ordered to be taken every three hours.

R Tincturæ cannab. Indicæ ℥xx; spirit. ammoniæ comp. ℥xx; acid. hydrocyan. diluti ℥iij; aquæ ʒi.

May 2nd. She had no sleep, and no sickness; looked composed, and said she felt better. A grain and a half of disulphate of quina was added to each dose. Seven-twelfths of a grain of morphia were injected in the evening.

May 3rd. The patient did not sleep till 7 A.M.; she then slept till 6.30 P.M., and awoke much refreshed, and took a little claret. There was no sickness.

May 4th. She slept comfortably from 3 to 10 A.M., having previously taken a little beef-tea and sago; but awoke much agitated by a distressing dream, in which she saw her own name on a tombstone, with the date of her death. Two-thirds of a grain of morphia were injected at night.

May 6th. She had two-thirds of a grain of morphia injected last night, which only gave a few hours' sleep. There had been no sickness. She was ordered to take no medicine, and to have twenty grains of chloral hydrate in syrup and water every hour till sleep was obtained. She took three doses, and then slept only four hours. When she awoke, she felt very low and "muddled". Pulse 80, very feeble; skin clammy; and tongue dry. She begged not to have any more chloral. In the evening she had several fainting fits. Half a grain of morphia was injected.

May 9th. The last two days she had been more sick, and had little or no sleep. She retained a little whiskey and water. She had a peculiar attack, characterised by a sort of spasmodic action of the muscles of the face and neck. I ordered liquor strychniæ in five-minim doses, and one-third of a grain of nitrate of silver in a pill, alternately, every second hour.

May 31st. She had gone on just the same for the last fortnight, and had several attacks every day and night up to the 15th. Since then, she had had none. The nitrate of silver was discontinued on the 16th. She had two-thirds of a grain of morphia injected every night, which gave only very little sleep. She had brought up nearly everything except her medicine. I tried the chloral hydrate in forty-grain doses, with exactly similar results to those of the previous trial.

June 1st. A beef-tea enema was given yesterday, and again to-day; but she was unable to retain them. There was much pain over the epigastrium. I applied a blister, which gave relief; and injected three-fourths of a grain of morphia; and also ordered citrate of ammonia in effervescence, with chloric ether. This afforded much relief to the sickness.

July 16th. From the last date to the 1st of this month, she had been able to retain two pints of beef-tea and four eggs made into two enemata daily, and nearly every night had three-fourths of a grain of morphia injected into the arm. She had not been allowed to take a single thing by the mouth, except the medicine, which she very rarely