

pure or dilute, for a long or a short period, effected but little change, excepting to render the tint after a time lighter, without altering its character; but that, in some cases, a bluish tint was observable immediately on the application of the acid, which was evidently due to the deposition of iodine in a molecular form."

The alterations in colour above related are so different from those described by Professor Virchow, and from those which I have myself witnessed, that I am induced to publish the following case.

As, however, many members of our profession have neither the leisure nor the opportunity for making themselves acquainted with the recent discoveries of pathological science, I may, perhaps, be pardoned for intruding a slight sketch of the history of amyloid degeneration previously to relating the case which I have recently met with.

As early as the year 1854, Virchow published a paper on a substance found in the human brain and spinal cord which had the chemical reactions of cellulose.\* In this, he showed that there existed in many parts of the cerebro-spinal centre, especially in the lining membranes of the ventricles, small solid bodies, apparently composed of concentric layers, much resembling starch; and that, on the application of an aqueous solution of iodine, these bodies exhibited a pale-blue tint, which, on the addition of sulphuric acid, became a beautiful violet colour, the surrounding structures remaining of a yellow or brownish tinge.

In a subsequent paper in the same year,† he showed that a degeneration of the spleen, commonly known as the waxy or lardaceous spleen, commenced in the Malpighian bodies of that organ, and might without difficulty be recognised by the following characters:—The spleen became somewhat enlarged and indurated, but, at the same time, anæmic; and appeared studded throughout with dull, gelatinous-looking bodies, varying in size from that of a pin's head to a hemp-seed, much resembling granules of boiled sago. These bodies were due to a deposit of round or somewhat angular granules, rather larger than a lymph-cell, within the Malpighian follicles; and as soon as an aqueous solution of iodine was added, they quickly became of a dark yellowish-red colour; and on the further addition of sulphuric acid, changed to a deep violet: but if too much sulphuric acid were employed, the colour quickly passed into a dark red-brown shade. These changes were not only observed under the microscope, but, by means of washing the specimens, a considerable number of the granules were collected, and the reactions shown to the naked eye.

Shortly after this, a dispute arose as to the true nature of these bodies: Donders, on the one hand, maintaining that they were true starch; and Meckel, on the other, that they ought to be considered as formations of cholesterine. Mr. Busk‡ believed that bodies found in the brain were absolutely identical with starch. Virchow,§ in reply to Meckel, indicated the differences between this substance and cholesterine. In the year 1855, Virchow|| pointed out that similar changes occurred in the kidney, liver, lymph glands, cartilages, and intestinal canal; that this degeneration was frequently connected with disease of the bones, as caries or necrosis; and that in the liver the liver-cells, and in the kidney the Malpighian bodies, were the seat of this degeneration. The frequent connexion of waxy degeneration of the liver, spleen, and kidney with phthisis, and the characteristic reactions with iodine and sulphuric acid, have been shown by Dr. Bennett.¶

In the "Cellular Pathology," lately published by Virchow,\*\* a chapter is devoted to this degeneration, in which all its leading features are concisely summed up. They are briefly as follows:—In parts thus affected, the cut surface is semi-transparent, but dull, the natural colour being lost, but the colour of the neighbouring parts and vessels, being seen through, thus imparts a yellowish or brownish tinge. Almost all parts of the body seem capable of undergoing this process of degeneration. The substance to which these changes are due exists in two forms, which are allied, but not identical. The one where round or oval bodies, more or less resembling starch, are found, as in some prostatic concretions: these, when brought into contact with iodine, exhibit a bluish colour, the shade depending on the purity of the substance; if much albuminous matter be mixed with it, the colour will be greenish, since nitrogenous substances colour yellow with iodine, and this form of amyloid

blue, so that a union of the two substances will necessarily produce a union of the two colours. The other, in which the tissues become impregnated with the amyloid substance, the elements of the tissues, as such, taking it into themselves, and becoming infiltrated with it in a manner similar to the infiltration with lime in the process of calcification. The addition of iodine alone causes this form of the substance to exhibit a yellowish-red colour, but never a blue, occasionally, however, with a violet tinge; but on the further addition of sulphuric acid, a violet or blue is produced if the acid be very cautiously employed. The nature of this substance Professor Virchow believes to be more analogous to cellulose than to starch. From cellulose, however, it differs by its change of colour with iodine alone, cellulose undergoing no change till sulphuric acid is added; in this respect resembling cholesterine.

The coats of the small arteries are the most frequent primary seat of this infiltration, and from this it spreads to the parenchyma of the organs; the walls of the arteries become thickened, and their calibre reduced, and hence the anæmic condition of the organs. The muscular fibres of the middle coat are the parts first affected. In the place of each muscular cell a compact homogeneous body is seen, in which, in the earlier stages, the centre of the nucleus appears as a hole. This afterwards disappears, so that a kind of spindle-shaped cylinder remains, from which all trace of cell-structure has vanished, no distinction remaining between cell-wall, contents, and nucleus. When the infiltration has reached this point, it begins to invade the parenchyma of the organs.

In the liver, the cells in the immediate neighbourhood of the hepatic arteries are first affected. The cells gradually become homogeneous; nucleus and membrane gradually disappear, so that at last nothing is left but an absolutely homogeneous, shining body, and each cell is thus converted into a kind of corpus amylaceum.

Professor Virchow further adds that many cases of chronic Bright's disease are owing to this degeneration. The changes which the kidney has undergone often cannot be recognised at first sight, many kidneys appearing only anæmic and indurated; but when a solution of iodine is applied to the anæmic cortical substance red points appear, corresponding to the glomeruli, and fine red streaks proceeding from them indicate the afferent arteries. Red lines may also sometimes be seen running down into the pyramids. The convolutions of the glomeruli gradually lose their fine tubular appearance, and are converted into compact round bodies.

The disease is constitutional in its nature. One organ alone is rarely affected. The organs thus affected cease to discharge their functions; the patients assume a cachectic appearance, and gradually waste away; dropsy most frequently supervenes, attended by all the complications usual in Bright's disease. Cases also occur where the whole tract of the digestive canal has undergone this change. During life this is marked by a tendency to diarrhoea and deficient powers of absorption; yet on examination after death no change beyond an anæmic condition is perceptible in the intestines, till a solution of iodine is brushed over them, then instantly red dots universally appear. These dots are the villi of the intestine, and under the microscope the small arteries, and even the capillaries of the villi, are found stained of a deep iodine-red colour.

Having given this short summary of Virchow's views, I shall next relate my case.

(To be concluded.)

## ON A CASE OF POISONING BY ATROPINE.

By C. HOLTHOUSE, Esq., F.R.C.S.,  
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As a pendant to the interesting cases of poisoning by belladonna, published in THE LANCET of the 3rd instant, I forward the notes of the following case of poisoning by a solution of atropine, which happened to one of my own children:—

At nine o'clock on Sunday morning, the 17th of last July, my second child, a hearty little boy, three years and eight months old, was brought to my bedroom by the nurse, who said she did not know what was the matter with him, but he seemed very giddy, and could not stand. I had never seen a case of belladonna poisoning before, and, the bedroom blinds being down, I did not at first notice the state of the child's pupils, or recognise the source of the symptoms, while all that

\* Archives für Patholog. Anatom., vol. vi., p. 135.

† Ibid., vol. vi., p. 268.

‡ Quarterly Journal of Microscopical Science, Jan. 1854.

§ Arch. für Patholog. Anatomie, vol. vi., p. 416.

|| Ibid., vol. viii., pp. 140, 364.

¶ Principles and Practice of Medicine. Edinburgh, 1858. 2nd edit., p. 760.

\*\* Die Cellular Pathologie, Berlin, 1858, p. 331, 1st edit.

could be gathered from the nurse was, that hearing what she supposed to be quarrelling between him and his brother in the breakfast-room, awaiting our assembling at breakfast, she took him into the kitchen, and on setting him on his feet he fell down. She lifted him up, and told him to run along; but he again fell, and appeared to have no power of standing. On observing this, she immediately brought him up to me.

The child's face was at this time flushed and mottled with white, his eyes brilliant, and his manner and appearance altogether very strange and excited, while the expression of his countenance was quite maniacal. He was evidently unconscious and very irritable, striking his mother when she took him from the nurse. On placing him on the bed, he immediately began to pick at the bedclothes, and to grasp at imaginary objects. About five minutes afterwards the nurse returned with two bottles, which my eldest boy told her his brother had been playing with. One of these, a half-ounce stoppered bottle, which was quite empty, I immediately recognised as the one in which I kept a solution of atropine, of the strength of two grains to the ounce, and which the day before had contained from a drachm and a half to two drachms of the solution, the bottle being not quite half full.

The cause of the symptoms was now but too apparent. I rushed with the child to the window, and the fully dilated pupils at once confirmed my suspicions. Dr. Fincham was now sent for; but long before his arrival, and in about five minutes after the discovery, I administered twenty grains of the sulphate of zinc, and on the arrival of the doctor some mustard-and-water was also given; but three-quarters of an hour elapsed from the giving of the sulphate of zinc before vomiting took place. The quantity of fluid expelled did not exceed that given with the zinc, which was ejected by one effort, and no subsequent retching could be produced by the mustard-and-water. It deserves mention that a little of the fluid he vomited, too small to excite notice at the time, accidentally entered my eye, which within an hour of the time had fully dilated the pupil.

As no more vomiting could be excited, and it seemed probable that all the poison which was not absorbed had been ejected, stimulants were administered—namely, brandy-and-water, ether, and ammonia, one or other of which was given every quarter of an hour. There was, however, great difficulty in getting the child to swallow, each attempt to do so producing paroxysms of suffocation, which appeared to threaten his life; a good deal of what was put in his mouth was thus wasted.

During the whole of this time till one o'clock P.M., the child was insensible, the pupils were widely dilated and immovable, the eyes open, and the lids not winking on passing the finger in front of them; there was occasional jactitation; the skin was pungently hot and dry, and covered with a rash, closely resembling that of scarlatina, which the child was frequently scratching; the pulse was 170, and somewhat feeble.

One to two P.M.—Brandy-and-milk was given him from time to time; an enema of two drachms of spirit of turpentine, an equal quantity of castor oil, and six ounces of gruel, was also administered, and brought away a small quantity of fæces. He vomited once during this period, and was evidently becoming more conscious. He made efforts to speak, and said "Papa." His face was less red, and the expression more natural.

Two to five P.M.—The symptoms during this period exactly resembled those of delirium tremens: there was incessant rambling delirium, great restlessness, a grasping at imaginary objects, and occasional screaming from fright. The character of the delirium varied. Sometimes the child saw objects which frightened him, and the utmost terror was depicted on his countenance, and he clung to his nurse's neck, or threw himself violently in different directions as if to escape them. This kind of delirium prevailed chiefly at the beginning of this period. Towards the latter half, the delusions were of a more pleasurable kind; his talking was more intelligible; he mentioned the names of his brothers, his nurse, and mamma, and grasped at his toys, especially his whistle, which he blew in imagination; he drew imaginary sketches with his pencil, and was very busy two or three times in putting into his mouth and eating imaginary currants. A mixture of egg and brandy with milk and sugar was given him at short intervals; and just before five he was sick for the third time, (a portion of the fluid so ejected was saved for analysis;) after this, he fell into a quiet sleep, and so remained till six P.M., his pulse having fallen to 144, his skin being still hot, but not so red.

Six to seven P.M.—Great restlessness and returning consciousness characterized this period. He recognised me by my voice and kissed me, and jumped out of bed, and said he

wanted to ride on my shoulders—an amusement he was occasionally indulged in. The skin was less hot and red, and there was very little delirium. He refused to take any kind of food or drink.

Seven to eight P.M.—There was less restlessness, and when quiet he sucked his thumb—a habit he always indulged in when well. He sneezed and rubbed his nose frequently. Consciousness increasing, but *intermittent*. He recognised my watch, put it to his ear, and remarked, "It's ticking;" but on giving it him again a minute afterwards it was not recognised, and he put it in his mouth.

Eight to ten P.M.—There was more restlessness than for the last hour or two, and a constant motion of the hands to the mouth, as though eating something. Taking advantage of this action, a small piece of bread-and-butter was put in his hand, which he ate greedily; but there was a difficulty in getting him to drink. He talked frequently about persons and things which he fancied were before him. At a quarter to ten his bowels were moved, the evacuations smelling strongly of turpentine; he also passed urine for the first time. A powder which was ordered by Dr. Fincham, containing two grains of colomel and five grains of jalap, was now given him.

Ten to twelve P.M.—He lay on the bed tolerably quiet; he winked a little when the candle was put close to his face, but saw nothing clearly; and he remarked at this time, "I can't see, mamma." At a quarter past eleven, he took, with some difficulty, a saline mixture ordered by Dr. Fincham, after which the bowels acted to a greater extent than before; he also passed urine again (both saved for analysis). When his mother lay down on the bed beside him, he raised himself voluntarily and kissed her twice. At midnight he took a little milk-and-brandy, and fell into a quiet sleep.

July 18th.—Twelve to two A.M.: He slept quietly till a quarter past one, when he awoke, and before he could be raised he had a violent and somewhat copious motion of a watery character; after this, he took a small quantity of milk and a teaspoonful of brandy with some resistance, put his thumb in his mouth, and again went to sleep.

Two to four A.M.—He slept quietly till four, when his bowels were again moved slightly, and he passed urine also (saved for analysis). Though his pupils were as much dilated as ever, he could now distinguish objects; for he told his mother he could see her, and he also took a cup of milk from her hand and a little bread-and-butter. A dose of the saline mixture was also given him, which he would not take without the usual resistance.

Four to eight A.M.—He slept peacefully the whole of this time, lying on his back, with his eyes and lips a little apart, and awoke well. He remarked that he could "see grand-mamma" over the chimney (a photograph of his grandmother), and he ate with evident relish a basinful of bread-and-milk. As the morning advanced, he said more than once that he wanted to have his "clothes" on, and before he was dressed he was running about the room in his nightgown, playing with his toys. His difficulty in seeing small objects which were near him was now the most prominent feature remaining of his illness, and his attempts to make out the letters of a newspaper which happened to be in the room, putting the paper first in one position and then in another, and eventually throwing it from him in disgust, were highly amusing. The dilatation of the pupils gave his face a singular expression, and they did not recover their normal size and movements for nearly a week.

It will be seen by the above notes that some of the fluid vomited just before five P.M., which was the third and last time the child was sick, and also some of the alvine dejections and urine voided at half-past eleven P.M. and at four A.M. (mixed together) were saved for analysis. Having submitted the same to Dr. Marcet, that gentleman very kindly furnished me with the following report:—

"Laboratory, Westminster Hospital, 22nd July, 1859.

"MY DEAR HOLTHOUSE,—I received from you on the 18th instant—

"1st, A six-ounce bottle, containing five ounces and a half of a mixture of urine and nearly liquid fæces.

"2ndly. A second bottle, smaller than the last, and containing about a drachm and a half of a colourless fluid, which you stated to have been vomited.

"3rdly and 4thly. Bottles containing matter not connected with the case.

"The result of the examination of these various substances was as follows:—

"1st. The mixture of urine and fæces yielded to analysis a fluid which, by direct contact with the eyeball, dilated con-

siderably the pupils of a white mouse, without, however, exerting on the animal any other physiological action. It contained, therefore, a very small quantity of atropine.

"2ndly. The vomited fluid yielded to analysis, by the same physiological test, the presence of a trace of atropine, inasmuch as it also dilated the pupils of a white mouse, although not so readily as in the preceding case.

"Yours very truly,

"W. MARCET."

Storey's-gate, December, 1859.

## ON A RECENT CASE OF RESECTION OF THE KNEE-JOINT IN THE LIVERPOOL NORTHERN HOSPITAL.

By H. GRANGER EARNSHAW, Esq., M.R.C.S.E.,  
SENIOR HOUSE-SURGEON TO THE HOSPITAL.

MY reluctance to publish an unsuccessful case of resection of the knee-joint has been overcome by the appearance of Mr. Price's interesting paper, and by the general belief here entertained, by those who have studied the points of the case, that notwithstanding its fatal result much encouragement is offered by it to the more frequent practice of the operation. This belief has been arrived at by the man's stout endurance of the operation, notwithstanding his unfavourable age; by the rapid advance which the parts immediately operated on had made towards cure at the time of death; by the large fatality that attends its only alternative; and by other considerations not in my province to put forward. I beg, therefore, to contribute this account of a case of resection of the knee-joint, which has but lately occurred in this hospital.

Thomas K—, an Irishman, forty-four years of age, and of by no means a robust or well-nourished frame, was admitted on Thursday morning, the 13th of October, 1859, a few minutes after his accident. He was a labourer in the docks, and had been prevailed on by his fellows to attempt a hazardous climb up the side of a ship. He let slip his handhold, and dropped a depth of ten or twelve feet, having his right knee bent at a right angle beneath his body, and either alighted upon it so, or else struck some square-edged object in his descent.

The immediate consequences of the fall to the knee were—1, a semi-elliptical wound, almost as if incised, commencing at the tubercle of the tibia, and continued upwards and backwards to corresponding points on the lateral surfaces of the joint, somewhere about its centre; 2, a jagged and total division of the ligamentum patellæ; 3, comminution of the lower part of the patella; and, 4, when the limb was purposely flexed, exposure of the whole interior of the joint.

At a consultation held three hours afterwards, preference was unanimously given to resection of the joint, rather than to amputation above it. Mr. Chalmers, who had charge of the case, accordingly operated at once. The flap was already half formed, and only required lengthening backwards. About an inch was removed from the extremity of the femur, and a very thin slice was sawn off the apposed surface of the tibia; the patella, with its fragments, was dissected out, and the slightly-lacerated edges of the flap pared. The ends of the bones were then applied to one another, and the limb was laid and secured in a straight, hollow splint (Liston's Macintyre's); and after the flap had been united to the integument below by a single metallic suture, simple wet lint was placed over the knee-part, and the man was then carried to bed, and carefully adjusted on air- and water-pillows.

Chloroform was administered for the operation. Very little blood was lost, and only three small arteries required tying. The shock of the operation was of the very slightest amount. A little while after the operation, the patient had a forty-minim dose of Battley's solution, and this was repeated in the course of the afternoon, and again during the night. Water was constantly dripped on the lint, and milk-and-water only allowed for drink.

Oct. 14th.—He has slept well during the night. Complains but little of pain, most of occasional startings of the limb. Pulse 88, slightly irregular; tongue white, moist, and tremulous.

His condition scarcely varied from this time until the 16th—

i. e., until the third day from the operation. During this interval, half-drachm and forty-minim doses of Battley's solution were given, as often as occasion seemed to require, in separate ounces of the solution of acetate of ammonia. About three such doses were given in each twenty-four hours. The lint upon the part was never permitted to become dry, and he was not allowed anything more than milk-and-water, and an egg, if he chose, night and morning.

16th.—Pulse 92; tongue moist and furred; vomiting of bile. Two bottles of soda-water ordered daily.

17th.—Vomiting has disappeared.

18th.—Pulse 100, strong and full; tongue thickly furred in centre, white round the margins.

19th.—Same in most respects; stomach slightly irritable. To have an enema of water-gruel.

20th.—Bowels relieved; pulse 88, good; tongue moist and furred.

During this critical period of the first week no bad symptom arose or remained sufficiently urgent to create apprehension. Beef-tea had been added to his diet. The knee had been dressed with wet lint and gutta-percha, and this dressing succeeded by poultices laid over the part, and, above all, Battley's solution had been given continually but observantly.

21st.—The opiates have been gradually moderated during the last two days, and (perhaps because suppuration seemed to be long in setting in) it is thought best to-day to suspend them altogether. To-day also, for the first time, there is a noticeable discharge of pus, about a teacupful of healthy matter having come away from the outer angle of the flap. The flap is soundly adherent, by first intention, for three inches along its lowest border. Another egg added to his diet night and morning, and an allowance of six ounces of sherry night and morning.

22nd.—It is reported that he has had no sleep during the previous day and night; throughout the night he has been talking incoherently, flinging off the bed-clothes, and, but for his night attendant, would have torn off the dressings; is now (this morning) wandering in his mind; bowels have been purged three times. Ordered to have at once, one fluid drachm of the tincture of opium; the regular use of the opiates to be resumed.

23rd.—Has slept well during the night; is calm in mind and body; not purged; pulse 92, tolerably strong; tongue almost clean, moist. Wine changed to port, and increased from twelve to sixteen ounces. A chop allowed.

Until the 27th, (the fourteenth day from the operation,) he went on admirably, with the accidental exception of the 22nd; and without any change in treatment, or in his condition, save that of a moderate increase in quantity of the healthy discharge. This day, for the first time, the bandages surrounding the splint and limb were cut off for the sake of cleanliness, but without disturbing the limb, and were replaced by the many-tailed form.

28th.—Well.

29th.—Well. Another chop daily. Wine reduced to twelve ounces.

30th.—Took half an ounce of castor oil; bowels relieved the same night.

31st.—Bowels again relieved; pulse 88, weak; tongue clean, moist, but pinkish; appetite hitherto excellent, but to-day complains of having no relish for his chops. Ordered quinine and acid mixture.

Nov. 1st.—Seems not so well, but makes no particular complaint; his countenance is less bright, and there is a sensible alteration in its expression—from what cause cannot be made out; the discharge from the wound continues unabated.

From this time until the following Tuesday (the 8th) he gradually changed for the worse. About the 4th, it was suspected, in consequence of the change, and of slight fluctuation thereabouts, that matter was accumulating in the upper third of the thigh; still, there was no swelling or tension, and no heat or pain.

8th.—There is now no doubt about pus being collected in the upper part of the thigh. A deep opening was made, and a pint and a half of thick yellow matter, containing lumps of disorganized cellular tissue, let out; and it is fully anticipated that there is a direct communication between this cavity and the knee.

Between the 8th November and the 20th, the man's condition and prospect of recovery varied a good deal. At one time he was better in spirits and appetite; at another, he was worse again. All the time, the amount of discharge from the opening in the thigh diminished, while the amount and healthiness of that at the knee remained the same. On the 18th, the limb