from the large and small veins, and even from the thoracic duct itself, he was unable to trace a single lymphatic vessel. These observations are the more noteworthy, as former anatomists, such as Hunter, Cruikshank, Mascagni, and Breschet, looked on the internal lining of the vascular system as presenting copious plexuses of lymphatics. Eberth and Belajeff have succeeded more recently in injecting the lymphatics beneath the endocardium of the calf, and describe them as arranged in irregular networks; but they evidently belong to the muscular tissue rather than to the endocardium itself. They are absent in the chordæ tendineæ, very scanty in the valves, and less numerous in the auricles than in the ventricles.

In the skin the lymphatics take origin from the most superficial layer of the cutis vera, but they vary greatly in number in different parts, and are more numerous the more distant the part is from the heart. The special sites in which they are abundant or scanty will be subsequently referred to. From the superficial network small trunks pass inwards through the interspaces of the true skin and anastomose on the deep surface, thus forming a superficial or subpapillary and a deep or subdermic plexus. From the latter emerge the trunks which run in the cellulo-fatty layer under the true skin. Similar double networks occur in the glans penis, and lymphatics are especially numerous at the junctions of the mucous surfaces with the skin.

Lymphatic networks, composed of vessels whose calibre is larger than that of the blood-capillaries, have been described by Rajewsky around the collections of fat-cells in the adipose tissue.

In the small intestine the radicles of the lymphatic system are specially modified for the absorption of fat. They differ greatly from those in other parts of the body, which only take up the overflow from the blood-capillaries, and hence necessitate a fuller description. They are prolonged into the villi in man as a single vessel, or very rarely two, in the sheep as a copious plexus. They occupy its centre, and are larger than the blood-capillaries which surround them. They present here and there minute contractions and dilatations, and at the base of the villus terminate in a plexus (rete angustum) subjacent to the bases of the crypts of Lieberkühn. From this plexus straight vessels pass to a second one in the submucous tissue, termed the "rete amplum." This is arranged around the sides and base of each solitary gland or lymph-follicle in a Peyerian patch, and from it efferent trunks pass through the muscular coat, and open into a series of still larger vessels, which are found beneath the serous tunic, especially along the attachment of the mesentery. The vessels which emerge from the submucous plexus contain valves, whilst these are absent in the smaller vessels and the plexuses. Where the closed follicles lie deep in the submucous tissue the lymphatic plexus entirely surrounds them, but where they are more superficial it only surrounds the base and sides. The walls of the lymph-capillaries are completely closed towards the glands. At the mesenteric attachment of the intestine the vessels are partly continuous with the large lymphatics of the mesentery, and partly anastomose with the subserous vessels, so that from the central vessel in the villus to the efferent trunks between the layers of the mesentery there is a continuous channel, interrupted only by the networks. The chief intermuscular plexus is between the circular and longitudinal muscular layers, and from this large vessels also proceed to the attachment of the mesentery. There are other subsidiary networks threading the whole extent of the muscular wall, and these also communicate with the submucous group.

The arrangement in the large intestine, and in the mucous membranes generally, is much the same as in the skin. The networks are either single or double, and vary only in the closeness of the meshes and the calibre of the vessels. The largest vessels are found in the urethra. In the filiform papillæ of the tongue, there are small, blind vessels resembling the lacteals, which pass into a network at the base of the papillæ. The papillæ on the mucous surface of the œsophagus contain no lymphatics. The network is single in the mucous membrane of the tongue, ureter, urethra, and œsophagus; but it is double, as in the small intestine, in the trachea, stomach, and large intestine. The deeper network always has wider meshes, and is made up of larger and stronger vessels. Where the network is single, the vessels run parallel to the axis of the tube; in the trachea the superficial plexus is also parallel to the tube, but the deep one is placed at right angles. In the stomach, the superficial plexus is arranged around the blind extremities of the gastric follicles, and the deep one in the submucous tissue. Teichmann stated that there were no lymphatics between the follicles, but the radicles of the system, according to Loven, ascend between the glands, and are dilated in many places into sinuses.

In the connective tissue surrounding the bundles of nerve-fibres, and holding them together, there are numerous characteristic lymph-capillaries, which are in immediate connexion with the interspaces of this tissue, as in ordinary connective tissues. No vessels are found in more intimate relation with the fibres, but in the fine intrafascicular connective tissue there are spaces in which the blood-plasma is received, and these are continuous, through the lacunar system in the lamellar sheath, with the connective-tissue spaces outside. The lymph-capillaries in the sciatic nerve of the dog run along the trunk of the nerve for some distance, and have been followed to the pelvic glands.

In their search after the lymphatics of the brain and spinal cord anatomists, such as Ruysch and Fohmann, would seem to have distended with air or with mercury the connective tissue of the subarachnoid space, and, although they failed to trace any vessels from thence to the glands, they considered the network as a lymphatic one giving origin to vessels which accompanied the pia mater, and were prolonged into the cerebral mass. Efferent vessels ran outwards with the nerves and arteries through the foramina at the base of the skull. Mascagni doubted whether these were true lymphatics, and termed them "vasa æmulantia lymphatica," but he himself described others—viz., some on the outer surface of the dura mater accompanying the middle meningeal vessels, and running through the foramen spinosum into the glands along the internal jugular vein, some on the surface of the brain which he lost near the longitudinal sinus above, and others which left the cranium with the vertebral and internal carotid arteries and the internal jugular vein.

In 1859 Robin described a lymphatic sheath enclosing the bloodvessels of the brain and spinal cord as a structureless membrane, leaving a space which contained a colourless fluid and free nuclei. His pointed out that this space was lined with flat endothelial cells, and termed it the perivascular space. Other observers look on such spaces as pathological, as they were judged to be by Kölliker and Virchow, who had observed them even before Robin, but only in the brains of the insane. Boll thinks that two kinds of perivascular spaces have been confounded, some of which are natural, whilst others are artificial or pathological. Lymphatic sheaths around the arteries can be easily demonstrated in healthy brains, around the vessels of the retina, in the interior of many glands, and in many other situations, so that no doubt can remain of their being normal structures. They envelop the vessels in the same manner as the serous pericardium envelops the heart, and the peritoneum the intestines, and so resemble the serous cavities in miniature.

The lymphatics of muscle are of large size, and form a coarse plexus in the connective tissue between the bundles. They apparently pass only for a short distance between the fibres, for they have never been traced beyond the connective tissue septa of the muscle. Their mode of origin is therefore still obscure, although the large trunks have been seen and described by almost every observer since the time of Rudbeck.

ON CHRONIC BRIGHT'S DISEASE, AND ITS ESSENTIAL SYMPTOMS.

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(Continued from p. 263.)

THE question I have endeavoured to raise in these papers is necessarily a wide one; it includes many collateral subjects, each of which requires to be treated at length, and worked out in detail. At present all that can be done is to sketch the broad outlines of the whole, and leave the details to be filled in more completely hereafter. A short account of the clinical aspect of the disease will therefore first be given; subsequently each group of symptoms - be more fully discussed, and illustrated by cases.

My first and main contention, as I have already stated, is that high pressure exists as a constant condition in the circulation of some individuals, and that this condition is a symptom of a certain constitution or diathesis, and indicates certain well-defined tendencies to disease. For this diathesis no name at present exists; it might perhaps very properly be termed Bright's diathesis, inasmuch as it tends to produce the disease bearing his name. Exception may perhaps be taken to the use of the word diathesis; it is considered by some an inaccurate word, without definite meaning. Perhaps no more exact definition of the nature of a diathesis can be given at present than to say that it implies a certain habit or tendency towards wrong-doing of a particular kind, by either blood, tissues, or organs; and it would appear that if we include blood among the tissues we should be nearly correct in limiting these diseased tendencies to certain tissues. Much confusion appears to exist in the minds of many between *diatheses* and *temperaments*. These two terms have completely distinct meanings, and it is important to distinguish clearly between them. The former may be regarded as a pathological expression implying certain tendencies towards disease; the latter as a physiological one, describing certain habits of the body in health, or modes of nutrition. Unfortunately, some of the former conditions are synonymous with some of the latter, and thus great confusion has arisen. True, *temperaments* are of very old date, and doubtless took origin in old and exploded medical superstitions; yet many think, and I believe rightly, that under the names of certain temperaments may be grouped certain classes among individuals, the individuals of each class having many similarities of development and nutrition, both physical and mental, as well perhaps as certain similar tendencies towards disease. On the other hand, *diatheses* apply wholly to tendencies towards disease in individuals in whom the disease may or may not have manifested itself. A diathesis may be either inherited or acquired; those best known are the gouty, rheumatic, nervous, lymphatic or tubercular, cancerous, and perhaps syphilitic. To these I would add the "high-pressure," or Bright's diathesis. All these diseases are characterised by groups of minor disorders, produced by their local manifestations. They are not diseases with only one set of symptoms, or affecting only one organ, like pneumonia, gastric catarrh, or nephritis, but they imprint their own peculiar features on the local diseases which they produce. That there are such conditions as these I suppose few would deny. Their relations to temperaments it would be out of place to discuss here.

Overwhelming proof of the existence of this high-pressure diathesis can be readily obtained by anyone who cares to investigate the matter with the sphygmograph; all that I ask is that it should not be denied without such an investigation. People who are subjects of this diathesis frequently belong to gouty families, or have themselves suffered from symptoms of that disease; in others it may be acquired, and frequently results from lead- or alcohol-poisoning, or takes its rise in pregnancy or scarlatina. In these cases of acquired poison the disease commences frequently in an acute form. Its tendency to become acute is in direct ratio to the acuteness of the poisoning. In yet other cases there is no distinct poison to be traced; it would rather appear to result from forms of indigestion and mal-assimilation. These individuals often have certain characteristics when in health. The chief are as follows :—Habitual constipation; some forms of dyspepsia; often signs of imperfect circulation, such as cold hands and feet, not unfrequently palpitation, sometimes shortness of breath on exertion. Their skins are often thick, of velvet-like softness, and very white. These characters of the skin appear to me to be frequent, but by no means constant, signs of the diathesis; Cullen's observation on the thick skin of gout is quoted by Sir Thomas Watson. The symptom of high pressure occurs very early in life; I cannot say how early. I may note in passing that the pulse of a healthy child is of higher pressure, on account of better arterial tone, than that of the average adult. It exhibits what may be considered the normal standard of pressure, while the average adult pulse is below the normal standard, which is only seen in particularly healthy individuals, except in those of the high-pressure diathesis, in whom the pressure rises considerably beyond the normal.

Let it be clearly understood, the existence of this abnormally high pressure does not necessarily mean disease, but only a tendency towards disease. It is a *functional*

condition, not necessarily a permanent one, though it is generally more or less so in these individuals. These persons appear to pass on through life pretty much as others do, and generally do not suffer from their high pressure except in their petty ailments upon which it imprints itself; these mostly belong to one type, and are generally very greatly relieved by a purge and a little dieting. In other words, their arterial pressure rises at these periods and calls for treatment. After these little attacks their pressure often falls and remains low for a time; gradually, however, it again commences to rise, attains too great a height, and they have another breakdown. These breakdowns may be of more or less severity and frequency, according as the diathesis is more or less strongly marked; perhaps they consist of only a little " out-of-sortishness," sometimes severe headaches, often hemicranial, menorrhagias in females, epistaxis in males, temporary albuminurias or hæmatinurias, palpitations, breathlessness, sleeplessness, or the reverse, loss of memory, various neurosal or mental disorders, severe dyspepsias, constipation, or some such troubles; if more severe they may take the form of an attack of gout or acute Bright's disease, or of bronchitis. But the attack passes off, and things continue much as before. As age advances the enemy gains accessions of strength; perhaps the mode of life assists him —good living and alcoholic beverages make secure his position, or head work, mental anxiety, hurried meals, constant excitement, inappropriate or badly cooked food, or any other of the common but undesirable circumstances of everyday' life, tend to intensify the existing condition, or, if not previously present, perhaps to produce it. Now under this greatly increased arterial pressure, hearts begin to hypertrophy and arteries to thicken; what has previously been a functional condition tends to become more of the nature of an organic one. Breakdowns are now more dangerous, they happen much as before, but more serious ones begin to appear. The individual has now passed forty, perhaps fifty years of age; his lungs begin to degenerate and become emphysematous; he has a cough in the winter time, and gradually drops into a condition of chronic bronchitis; his right heart dilates, and his condition becomes more or less mixed in the aspect it presents to us; but by his pulse you will know him. Or again his symptoms take another line: his heart fails him, it can no longer perform the high pressure work demanded of it, it therefore fails and dilates; the individual falls into a bad way; a mitral murmur appears; his pulse becomes weak and irregular, though still *persistent,* and so he will remain till he dies or is relieved by a timely reduction of pressure, which allows his heart to recover, and sets him on his legs again. These cases are generally regarded as ordinary cases of mitral (or sometimes aortic) disease, *but no valvular disease is usually present.*

In another case the heart may not dilate severely; its hypertrophy, with some amount of dilatation, causes more or less trouble; perhaps he comes under observation for some functional disorder caused by it—one of those exacerbations previously noticed; a little albumin may now be found in the urine, the hypertrophied heart and thickened vessels may be recognised, perhaps some hæmorrhages seen in his retina, and he is immediately claimed as a case of chronic Bright's disease. The kidney may have a catarrh and the albumin increase in quantity in the urine, and some dropsy may appear. In other cases the whole stress of the disease seems to fall on the kidney, and it presents the aspect of acute Bright's disease. This terminates the life of many, as the table in the previous paper clearly indicated.

Yet another class of individuals fail through the arteries. These, I am inclined to think, are more especially the gouty and syphilitic ones. Atheroma is their great enemy; it may attack their aorta or large vessels so badly that they get aneurism, and fall victims to this disease. More commonly it causes general aortitis deformans, and, creeping from the vessel on to the valves, incapacitates them. The case then appears one of aortic regurgitation, and is regarded usually as such. The pulse will usually show the more skilfully hid enemy, whom it is necessary to attack, if the patient is to be relieved; it is a pulse of high pressure, and is constantly full, although an aortic regurgitant murmur exists, which usually produces an empty or collapsing pulse. On the other hand, perhaps the aorta will more or less escape, while the smaller vessels, especially those of the brain, are the main object of attack. Here we shall have a few warnings—headache, vertigo, epistaxis, a passing paralysis, a more severe apoplectic seizure, and then the final blow.

Take the warning which the pulse offers, reduce the arterial pressure, and the patient's life may be prolonged. Or the attack may be more insidious and more difficult to guard against; the atheromatous vessels may become plugged, or by their rigidity may seriously impede blood-supply, and softening of the brain may result. Amidst the general diffusion of atheroma, the coronary arteries may suffer severely; then the stress falls doubly on the badly-nourished and over-taxed heart. Attacks of angina warn us of the impending danger, which it is difficult indeed to combat, though temporary relief may be obtained. At last on one occasion the arterial spasm or increased resistance is worse than usual, and the overtaxed heart dies paralysed by the distension which its degenerate muscle fails to overcome.

Uræmia, so called, includes another group of cases which are seen in this disease, and sometimes death is produced by it. This more frequently occurs during the acute disease or during an acute attack supervening on the chronic disease; occasionally such symptoms are the only signs of the sudden exacerbation of the malady. These symptoms may be divided into three great groups: those arising from the gastro-intestinal canal, those from the lung, and those from the brain. In the first group are those attacks of vomiting and diarrhœa so common in Bright's disease; they are, doubtless, due to the gastric or gastro-intestinal catarrh which are well known as complications of the disease; it merely means that in these particular cases the stress of the disease has fallen upon these organs. It is well known that the stomach undergoes similar changes to the kidney in Bright's disease, that acute catarrh is found in the stomach when it exists in the kidneys; moreover, as I have before remarked, the disease affects all the mucous membranes and the skin as well as the kidneys, and it may probably make either its main point of attack. The symptoms known as uræmic asthma are rather more difficult of explanation. The theory that they are due to spasm of the branches of the pulmonary artery, caused by the poisoned blood, I cannot very readily accept; others can be suggested which appear to me equally probable. Many cases may be of the nature of ordinary asthma, due to reflex contractions of the muscles of the bronchial tubes, excited by the bronchitis, which is so common, just as the vomiting is excited by the gastric catarrh; other cases, again, appear explicable by a temporary dilatation of the right side of the heart (similar to that which occurs in the left in angina pectoris), due to the high pressure in the right side brought about by the emphysema and bronchitis, which may at any time be suddenly increased by the inhalation of cold air, irritant fumes, or some similar exciting cause.

(To be concluded.)

COMBINED USE OF CUTTING AND SPLITTING IN A SEVERE FORM OF STRICTURE.

BY C. F. MAUNDER,

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M. M——, aged forty-two, had suffered from stricture for a period of fifteen years. During the first five years of this period the stricture had been split three times, and on each occasion a relapse followed. During the last nine years voluntary micturition had been altogether in abeyance, and the bladder had to be periodically emptied with a small catheter. Occasionally retention supervened.

When this gentleman consulted me, about a month or so ago, I found that the meatus would only admit a No. 9 catheter, and the urine contained a quantity of muco-pus.

The first step in the treatment consisted in enlarging the meatus by incision. This I did on February 10th. A week later (the 17th) I divided the stricture anteriorly with Mr. Teevan's urethrotome, and followed it up immediately with Mr. Davy's modification of Holt's instrument, which admits of immediate dilatation up to No. 18. I then emptied the bladder with a full-sized instrument, and the operation was completed. A No. 9 silver catheter was used twice a day, either by myself or by the patient, for two or three days; then Nos. 10, 11, and 12 were gradually substituted to maintain the stricture well dilated. The patient had a tendency to rigors both before and after the operation, but quinine and opium given thrice daily soon checked this.

The most gratifying feature in the case is that on the fourth day subsequent to operation the patient micturated voluntarily, an act which he had not performed for the last nine years.

My own experience of rapid dilatation by Holt's method for the relief of intractable stricture has been highly satisfactory, the annual passage of a full-sized instrument having been in a very large majority of instances alone necessary. But splitting having failed thrice in this instance, I resolved to try internal incision, supplemented, if necessary, by thorough rapid dilatation. By these means I sought to determine the point at which the stricture should be divided, as well as to limit within safe bounds the extent to which it should be cut.

ON
CASES OF PARADOXICAL TEMPERATURES.

BY HORATIO DONKIN, M.B. OXON.,

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(Concluded from p. 369.)

THE next instance I shall quote was published by W. Iliffe, F.R.C.S., in THE LANCET of Nov. 23rd, 1878. In a case of a girl of eighteen, a convalescent from measles, there was for ten days a frequent remarkable variation of temperature from normal to 107°, the high degree being accompanied by rapid pulse, quick respiration, flushed face, nervous manner, dry skin, and coated tongue. In some instances the tongue would become quite clean in half an hour, as the temperature went down. Beyond amenorrhœa, no further abnormal symptoms were discovered; and no other cause was found to which the peculiar features of the case could be ascribed.

In a case published by Dr. Ormerod, in THE LANCET of Nov. 9th, 1878, the temperature appears to have risen to 115·8°. On one occasion it is stated that after a registration of 113° had been taken, and it had been suggested that friction of the arm against the thermometer would cause the index to rise to this height, the patient's arm was taken out of the night-dress about half an hour afterwards, and a thermometer of one of the medical gentlemen present was placed in the axilla with the arm held tight to the side. It then registered 99°. In the "remarks" appended to the case, this occurrence is noted as being suspicious, and militating against the genuineness of the phenomena. But the fact alone of a low temperature following on a high one of half an hour previous to the second registration is quite in accordance with several of the observations taken in my case under strict precautions. It would appear that in this case as well as in mine the high temperatures were evanescent. With regard to the friction theory, a reference to my report in THE LANCET of May 11th puts this possible and apparently plausible solution of the difficulty in my case out of court on many occasions, and therefore inferentially on all. Direct experiment, too, with rubbing a clinical thermometer, will, I think, prove to anyone how difficult it is to raise the index to any considerable height without *perceptible* movement, not only of the arm, but of the body generally. Some effort, difficult to conceal, and several minutes are required, when holding the bulb of the thermometer tightly between thumb and finger and folded in a handkerchief or towel, to raise the index from 98° to even 103°. This friction theory has been advocated as a sufficient cause for paradoxical temperatures by Dr. Sellerbeck among many others, in the *Berlin. Klin. Wochenschrift*, quoted in the *London Medical Record* for April, 1878, when, in a case of the temperature unaccountably rising to 102·9° only, the patient confessed she had used friction with the night-dress. It is further stated by Dr. Sellerbeck (though the assertion certainly requires corroboration) that it is *easy* to raise the index to 114·8° by rapidly rotating the bulb of the thermometer in a fold of linen, or to 108°, in about three minutes, between the bare skin of the arm and thorax. The reporter of my case, in the *Record* of June, 1878, states in a note his opinion that the temperatures recorded by me can apparently be explained in this way—an opinion which could scarcely have been given had he read through