posterior, at other times the anterior. Pavy found that section of the cord between the second and third cervical vertebrae soon gave rise to sugar in the urine; but below this point section was ineffectual. As regards the cervical region, we may surmise that the presence of glycosuria is an indication of disease affecting the grey matter, and therefore deeply seated. Pavy's experiment further shows that it must be above the third cervical vertebra. We may, therefore, expect to have, in association with glycosuria coming on in cases of spinal disease, other symptoms resulting from destructive disease of the grey matter of the upper cervical cord and the nuclei of the medulla oblongata. It may, accordingly, be suspected that other and perhaps more serious symptoms will shortly follow the appearance of glycosuria in cases of spinal disease.

DR. SAUNDBY (Birmingham) said that, to his mind, the evidence in favour of the acetonæmia theory was very far from being conclusive; but he believed that the symptoms were most probably due to some form of toxæmia, though it was not at present possible to identify the poison. The only other suggestion that commended itself to him, was that of Teschemacher, which drew attention to the resemblance of the phenomena to those of traumatic shock. He was not able to regard the theory of fat-embolism, suggested by the late Professor Sanders and by Professor D. J. Hamilton, as at all adequate. The blood in by far the largest number of cases of diabetic coma was not milky, and when it was, it certainly did not usually give rise to embola. In a paper by Dr. Barling and himself, in the July number of the *Journal of Anatomy and Physiology*, they had pointed out that the vessels of a patient, who died recently in diabetic coma with milky blood, contained no true embola, but merely fat-globules embedded in the blood-clots. So far as he had seen, the fat existed in the blood in the form of a fine emulsion, which could not cause embolism; and he believed it was only after death that the granules of the emulsion ran together to form large globules, which simulated the appearance of fat-embolisms. It was, moreover, important to remember that fat-embolisms were apparently the rule in all cases of fracture or severe contusions of soft parts; yet it was only in exceptional cases, where the embola were very numerous, that any symptoms were produced.—DR. MACKENZIE said that, whilst differences in the circulatory organs in the aged and the young accounted for certain differences, yet some cases, terminating by coma, did occur in aged persons. As regarded Dr. Pavy's suggestion, that diabetic coma was due to some disease of the respiratory and vascular centres in the medulla itself, whilst as an hypothesis it was entitled to respectful consideration, it must be remembered that this was the point to which the attention of microscopical investigators had been directed. Dr. Saundby's remarks interested him very much, and confirmed the assertions of other observers, that fatty embolisms, when present, had not the importance that had been attached to them by some.

DONATIONS AND BEQUESTS.—Mr. George Henry Strutt, of Bridge Hill, Belper, has given £1,000 to the endowment fund, and promised £50 *per annum* for three years, to the Derbyshire Hospital for Sick Children.—Miss Caroline Hutton, of Lincoln, bequeathed £300 to the Earswood Asylum for Idiots, £200 to the Samaritan Free Hospital for Women and Children, £500 in trust for building a fever ward at the County Hospital, or for maintaining it if already built, and £500 out of the proceeds of the sale of her dwelling-house in Eastgate to the Lincoln General Dispensary, and the remainder to the Lincoln County Hospital.—Mr. Henry Matcham, of Ramsgate, bequeathed £500 to the Ramsgate and St. Lawrence Royal Dispensary.—The Lowestoft Convalescent Home has received £300 under the will of Mrs. Cann, of Wramplingham.—Mr. B. J. Hudson has given fifty guineas to the Middlesex Hospital.—Mr. G. W. P. Bentinck, M.P., has given £50 to St. Peter's Hospital for Stone, and £50 to the Middlesex Hospital.—“E. T.” has given £50 to the Hospital for Women.

PRESENTATION.—Dr. Edgar Flinn, on the occasion of his leaving Brownhills, Staffordshire (where he had been in practice for over seven years), was presented with an illuminated address and very valuable time-piece, subscribed to by the employes of the Brownhills and Conduit collieries. The inhabitants of the district also presented him with a superior case of surgical instruments, accompanied by a neatly-illuminated album, containing a complimentary address and the names of the subscribers. Dr. Flinn, previous to his departure, was entertained at dinner at the Station Hotel by his fellow-townsmen, when many expressions of regret were made at his removal to Kingstown to undertake the appointment of surgeon to St. Michael's Hospital.

NOTES OF CASES OF DILATED STOMACH: WITH REMARKS.

By T. SANCTUARY, M.D., Hale, Cornwall.

(Continued from page 614.)

CASE IV.—A machinist, aged 37, complained of heartburn after eating, followed in a short time by nausea, pain in the stomach, retching, and vomiting. She was pale, emaciated, with bad teeth, and looked much out of health. Besides her food, she vomited a brownish sticky liquid, which varied in quantity from one to two teacupfuls. Her family history was unimportant. The present illness had come on gradually with flatulence and distension after food, and a feeling of fulness. Her tongue was pale and moist, her bowels constipated, urine and menstruation scanty. On examination, I found the stomach extending an inch below the navel, and the cutaneous veins well marked, though the skin of the abdomen was not tense, but rugged and withered. The amount of gastric distension varied, but not apparently inversely as the amount of eructation, and was never constant for more than five minutes at a time. She told me that (some years ago) she had suffered a good deal of pain after food, and had also occasionally vomited blood. I could not define the pain more exactly than over the whole area of the stomach; and from this fact, as well as the knowledge that no blood had been vomited for several years, I was inclined to think that I had to deal with a case of simple dilatation, caused, perhaps, by previous ulceration and cicatrization. Happily, there has been no opportunity of verifying this diagnosis by *post mortem* examination. She consented to let me try the siphon-tube, and feed her by the bowel, without any previous course of medicine except a dose of Carlsbad salt every morning for ten days; and I used the tube once a day for three days, and afterwards twice daily. Perfect toleration did not ensue in her case for a week; but she was able to use the tube herself at the end of a fortnight, when I discontinued the enemata, and recommended that she should take some liquid food in small quantities frequently during the day, choosing such things as cocoa, milk (with or without soda and lime-water), and farinaceous foods; and entirely avoiding tea, coffee, and alcoholic beverages. The progress of her case was uneventful. After two months' treatment, she was able to dispense with the tube and take ordinary food without pain or trouble, though only in small quantities at a time.

NOTE I.—For this operation, I use (a) a soft œsophageal tube two feet in length; (b) three or four feet of stout India-rubber tubing, three-eighths of an inch in diameter, weighted at one end with half an inch of leaden pipe. At first, I employed the ordinary red composition stomach-tube; but, finding that this became sodden and liable to crack with much wear, I substituted for it one made of blackish-green French composition, after the style of the French *cathèbres coulés*, as being more pliable, safer for the patient's own use, and of greater durability.

The patient sits on a chair, under a shelf a foot and a half above his head; on the shelf I place a pint glass graduated measure of solution, and immerse in it nearly the whole of the India-rubber tubing, coiling it inside the glass. To one end of the tubing is attached the lead-weight, to the other the œsophageal tube. Then in a couple of minutes withdraw the coiled tubing, allowing the lead-weight to retain the end of it inside the solution at the bottom of the measure, and simultaneously introduce the œsophageal tube into the patient's stomach. The solution being thus set in action by the siphon, soon finds its way into the stomach, until the glass measure is empty. Then at once, pinching the tube tightly just above the lead, I take the glass measure from the shelf and place it on the floor; then release my grasp on the tube, and the liquid returns by reversed action into the glass again, bringing with it any fermenting material that the stomach may contain. The operation may be performed once, twice, or three times at each sitting, until the solution returns clear and neutral. I use various solutions, the principal of which are:—1. Half an ounce of dilute sulphuric acid: 2. Two drachms of liquor potassæ permanganatis: 3. Two drachms of dilute nitric acid: or 4. Two drachms of salicylic acid—in either case, made up to a pint with pure water. The sitting is completed with a pint of good spring water. As a rule, after the first few sittings, the operation is performed without any nausea or inconvenience on the part of the patient.

NOTE II.—It has been questioned whether the siphon-tube is sufficient to remove the whole of the contents of the stomach, both solid and liquid. Some of the German writers maintain that liquids only are

removable by these means, and that the stronger suction-power of the stomach-pump is necessary for solids and thick viscous liquids. I have never tried any mechanical means except the siphon-tube, and have found hitherto that free irrigation will break down lumps of bread, potato, etc., which are then brought back through the tube, or sticking in one or other of its eyes. I have brought up many pieces thus from patients' stomachs, and have never noticed any splashing in that organ after the operation has been carefully performed.

NOTE III.—The quantity of vomit varies from two ounces to three pints, and contains one or more kinds of fungoid growth, together with lactic, butyric, and acetic acids, mixed in the gastric juice. In all four cases I found abundance of "sarcina ventriculi;" in Cases I, III, IV, the "torula cerevisiae," and in Case III alone a species of fungus resembling mould (*ascophora mucedo*), with this difference, that whereas in the latter the fructiferous stalk which bears the sac or cystidium is single, in the growth I found in the stomach it was generally branched. The sarcinous growth was composed of small square bodies, heaped together in square masses, consisting of cubic cells (*gonidia*) in multiples of four, with rounded corners, each cell being marked by cross lines and depressions.

The general appearance of the vomited fluid was of a grumous brown colour, or watery acid mucus, or coffee-ground substance, which was sometimes in a state of fermentation, with a frothy yeast-like surface.

Dr. Clifford Allbutt, who has studied this subject carefully, and to whose kindness in giving me many valuable hints in 1874 and 1875 I am greatly indebted, informs us that the existence of simple and primary dilatation of the stomach as a substantial malady, is said to have been recognised early in the seventeenth century by Spigelius, and it has cropped up from time to time till our own day, when Oppolzer and Kussmaul, in 1869, drew attention to it. It appears to be essentially a chronic disease of the stomach, consisting in distension of that viscus, the muscular coat becoming attenuated and fibrous, and the mucous membrane smooth and thin, with loss, if the case be of long duration, of many or few of the gastric tubes, thereby interfering with the proper secretion of gastric juice and the power of digestion, as well as with the normal movements of the organ by the weakening of its muscular coat.* Among the chief characteristics of this disease is the constant heart-burn patients experience after food, which continues until they are relieved by an attack of vomiting. They suffer a good deal of pain, but it is not so localised as in ulceration, and there is not usually any hæmatemesis. The whole abdomen feels sore, and vomiting is present throughout the twenty-four hours in a greater or less degree. The vomited matters vary in amount from two to sixty fluid ounces, and are of the nature described in Note III, plus any food that happens to be in the stomach at the time. If there be any complication—e.g. ulceration, simple or cancerous, then there may be blood, cancer-cells, shreds of the gastric tissues, and other matters among the ejecta. The stomach is probably seldom entirely emptied at each act of vomiting; for, if the patient be shaken afterwards, or the abdomen percussed and auscultated simultaneously, a splashing sound will be elicited. We generally find the stomach distended with gas, and there are many and sour-smelling eructations. Patients complain of feeling fullness and distension in the abdomen, and there is an evident enlargement of the stomach as made out by percussion.† The patient is generally feeble, pasty-coloured, and emaciated, tongue moist and clean, or slightly furred; appetite variable; inclination for food usually fair, sometimes inordinate, but there is a dread of satisfying it from fear of the consequences. According to Dr. Allbutt we often find the appetite good, or even large, where the dilatation is of local causation, and defective rather in those cases where the dilatation is a marked local result of a general cause, such as continued fever or anæmic debility. Defect of appetite may, in many cases, be simulated, the patient's desire for food being subordinate to this fear of the discomfort which food creates. Thirst is usually present, sometimes excessive. The urine is as often normal as not, in quality, but diminished in quantity, as in all cases of vomiting. Muscular debility is extreme, and cramps in the limbs and trunk are common. Occasionally we observe the abdomen much distended at a parti-

cular point corresponding to the greatest vertical distension of the stomach when the patient is lying on his back: the skin of the abdomen is withered and gathered into folds, which surround the visible bag of the stomach. If the trunk of the patient be sharply moved, or the stomach itself shaken by the hand, we hear the characteristic splashing very plainly; in some cases too, the stomach-tube may be felt through the abdominal wall, lower down than the limits of an ordinary stomach would allow. Sometimes we see the superficial veins of the abdomen large and prominent; and if the abdominal walls be thin, the movements of the stomach may actually be followed by the eye.

The causes may be variously classified, but all depend upon one of the two following:—1, obstruction to the onward passage of food through the pylorus; 2, excessive distension, positive or relative, of the stomach. The former may be brought about by cancerous stricture of the pyloric orifice with hypertrophy of sub-mucous tissue; by non-malignant thickening of the pylorus by enormous hypertrophy of muscular fibre; by cicatrization of an ulcer, and this may lead to ulceration anew, on account of even small hard things not being able to pass; by contraction of an ulcer and consequent pyloric obstruction; by external pressure of tumours; by the action of corrosive substances; and probably by spasm of the pyloric outlet.

Positive excessive distension is produced in an ordinarily healthy stomach by the ingestion of large quantities of indigestible food, such as suddenly give rise to a large amount of gas. (I believe I have seen dilatation produced in a schoolboy by giving him alternately, dissolved in water, powders of bicarbonate of soda and tartaric acid, and closing his mouth whilst the unpleasant evolution of carbonic acid was going on inside!)

Relative excessive distension, on the other hand, occurs only in an already weakened stomach, where the patient is in a state of great exhaustion, hysteria, and, perhaps, long-continued vomiting, phthisis, and chronic gastric catarrh produced by heart disease. Here we can easily understand, why even a small amount of food should produce as serious a result as an enormous meal might do to a healthy stomach. In some of these cases, the pylorus after death has been found quite open, even more so than normal; so that probably paralysis of nerve power, degeneration of gastric muscle, and spasm of pyloric orifice, were all associated in producing the dilatation. Sometimes, also, it has seemed not unlikely that fever, the great degenerator of muscle, may have weakened permanently the contractile power of the organ; and, lastly, peritonitic adhesions are supposed by some to be a fertile cause of dilatation. The disease occurs in both sexes—usually after the twenty-fifth year, but cases have been known much earlier in life.

Treatment.—We have to deal with an organ upon the healthy action of which, the functions of digestion and nutrition to a great extent depend; an organ which when dilated always contains some decomposing and irritating material which prevents the due secretion of gastric juice, and absorption of nutriment, besides causing pain and vomiting. Could we only give the stomach a lengthened period of entire rest, our way would be rendered comparatively easy; but we are met at the outset by the necessity of constantly using it, unless we have recourse to enemata, to which many patients have an insuperable objection, and even if this be overcome, we cannot go on for ever feeding by the rectum. We must be very careful in our choice of suitable diet, suitable medicines, and suitable hygienic conditions, but when we have exhausted all these, there is but little certainty of relief, and in the end we are generally obliged to fall back upon gastric catheterism, which, if patients would more often allow us, is the best treatment to adopt *ab initio*. The tube should be used once a day for the first day or two, then twice a day, once after rising, and again about 5 P.M. In cases of malignant disease, we cannot, of course, hope for a cure, and in ulceration we are not justified in giving a positively favourable prognosis; but even in these we may promise relief, and in simple primary dilatation at an early stage we may confidently look forward to a successful and permanent result. With regard to diet, if the patient be able to tolerate any food in the stomach, we may recommend butter, cocoa, milk, raw eggs, and thick soups, and Brand's essence of meat in small quantities frequently administered, with ice to suck or lemonade, to relieve the thirst; but if, as is often the case, vomiting persist after each meal, we must rely almost exclusively for the time on strong enemata of beef-tea and the like. The medicinal remedies may be divided into three classes: (1.) tonic; (2.) disinfectant; (3.) sedative. These are exemplified by (1.) strychnia, quinine, quassia, hydrochloric and nitric acids, etc.; (2.) sulphurous, carbolic, salicylic and nitric acids, the hyposulphites, sulphites, and permanganate of potash; (3.) bismuth, hydrocyanic acid,

* In most hollow muscular organs, excess of work calls for increased muscular growth, where the demand is continuous, as in cardiac hypertrophy from valvular disease. Here, when the distension is sudden, occasional, and excessive, the muscle cannot accommodate itself to the strain, and gives way; hence the dilatation.

† It requires a little practise to distinguish between the stomach-note and that of the intestines, when distended. I do not see how this difference can be realistically described in words, though it is quite appreciable to the careful observer.

and opium. Galvanism has also been recommended. I can only say, that I have never tried it myself, or seen it tried by others.

Prognosis.—This will vary with the cause of the disease: if it be of malignant origin, it is hopeless, unless, indeed, we venture to excise the stomach; but if it arise from irregularities of diet, or from weakening of nervous or muscular power by fever, we may hope for recovery proportionate to the thoroughness with which we remove the cause.

SOME REMARKS ON THE DELIGATION OF LARGE ARTERIES BY THE APPLICATION OF TWO LIGATURES AND THE DIVISION OF THE VESSEL BETWEEN THEM.

By W. J. WALSHAM, F.R.C.S.,

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DURING the past autumn, whilst in charge of Mr. Willett's wards, it fell to my lot to tie the femoral artery three times for popliteal aneurysm. In each instance, two ligatures were applied, a little less than half an inch apart, and the artery completely divided between them. The ligatures used were kangaroo-tail tendon; the wounds did well; the operations were performed strictly antiseptically; and in each instance the patient made a good recovery. The cases presented several features of much interest, which, however, it is not my intention to recount here, it being my aim rather to again call attention to a method of ligaturing large arteries in their continuity, which, I venture to think, is by far the safest as yet known. I say again, because no novelty can be claimed for it, as it is the method that was advocated and practised by the elder Bell, among others, and in the long past by the Arabian physicians. In recent times, as far as I know, Mr. Thomas Smith has been the first to once more resort to it; and at St. Bartholomew's Hospital, upwards of eight large vessels have been successfully tied in this way.

In the discussions that have been raised from time to time at the medical societies, and at the last meeting of the British Medical Association, on the value of different kinds of ligature, carbolised and chromicised catgut, ox aorta, whale tendon, carbolised silk, carbolised nerve, kangaroo-tail tendon, etc., it has always seemed to me that a very important point in accounting for failure has been lost sight of. Want of success has nearly always been attributed to the fault of the ligature used, and little or no account has been taken of the way in which it was applied. It is true that different opinions have been expressed as to whether the ligature should be tied tightly or loosely; whether or not it should be our aim to divide the internal and middle coats of the artery; or whether the mere contact of the ligature with the vessel is not sufficient to accomplish our purpose. The point to which I would refer as influencing the result of the operation is the amount of separation of its sheath that the artery has been subjected to in passing the ligature. That failure, in some instances, has been due to the softening or giving way of the material used, there can, of course, be no question; but I cannot help thinking that too free a separation of the sheath in passing the ligature may have had, in many instances, more to do with the want of success than the kind of ligature chosen. As the vitality of an artery depends in great measure upon the blood-supply that it receives from its sheath, it is easily conceivable how very little more or less separation may determine the success or failure of the ligature. No point, I suppose, is more strongly insisted upon in the works of surgery than the necessity of exposing as little of the vessel in its long axis as possible. I doubt, however, if in practice we are always sufficiently careful of this rule.

Mr. Savory, in an article in a recent number of the *Lancet*, calls attention to the danger with which, he thinks, is fraught the modern practice of separating the sheath of the artery by means of the director. He says: "It has happened in more than a single instance to me to see the artery injured, both in the dead and the living, by operating in this way;" and, to avoid the danger, he strongly advocates the opening of the sheath with the knife. It must have happened to all to have seen varying amounts of sheath separated from the artery by different operators, and even by the same operator at different times; and I believe that, whether the director or the knife be used, a certain amount of risk must always be run of too free an exposure of the vessel. There must always be a portion of the artery, however small, on each side of the ligature, the blood-supply of

which has been more or less interfered with; and, as the vessels of the sheath run principally in a direction from the proximal towards the distal end of the artery, it is but reasonable to suppose that the blood-supply on the distal side of the ligature will be the more affected, a circumstance which may have more to do than is generally supposed with the fact that, in secondary bleeding, the blood more often comes from the lower than from the upper end of the vessel. A slightly extra separation of the sheath must render the exposed portion of the artery liable to slough, or to die and be cast off. Such would appear to have occurred in the very interesting case reported by Mr. Bartleet at the last meeting of the British Medical Association.

"On the seventh day after ligature, alarming hæmorrhage ensued. On opening the wound, the artery-forceps brought up, with the slightest pull possible, what proved to be the catgut ligature. On examining this, the catgut was found to be not at all softened, but firmly knotted, slightly surrounding a small piece of artery which had come away with it. It did not appear to have ulcerated through the artery at all. The artery had separated about one-tenth of an inch above, and the same distance below, the ligature." Here the ligature had evidently no share in causing the secondary hæmorrhage, as it came away intact; and it seems difficult to explain how the death of the portion of the artery which came away with it was caused, other than by loss of vitality in consequence of the disturbance of the blood-supply that it receives from its sheath. It is not stated in the report how the sheath was opened. It would be instructive to know, in cases in which secondary hæmorrhage has occurred, in what way the vessel was freed from its sheath.

If two ligatures be applied, and the vessel divided between them, all risk of too free a separation of the sheath is absolutely avoided, as one ligature can be applied at the spot where the sheath is separated above, and the other where the sheath is separated below. After the vessel is divided, each cut end retracts, drawing the respective ligatures well into the sheath, thus leaving the blood-supply of no portion of the vessel on the proximal and distal side of the upper and lower ligatures respectively in any way interfered with. The artery is thus placed under very nearly the same conditions as one which has been ligatured in a stump, and exactly under the conditions as one the ends of which have been secured in a wound, and from such secondary hæmorrhage is very rare. Indeed, I am not aware that, after the two ends of a divided vessel have thus been tied in a wound, hæmorrhage, except from the slipping of a ligature, has ever occurred.

The normal longitudinal tension of the vessels constitutes another, and I believe not inconsiderable, source of danger in ligaturing an artery in its continuity. A transverse wound of an artery, as first pointed out by Mr. Savory, in consequence of this elastic tension, assumes a diamond shape. Should any part of the ligature cut through the vessel before it has become permanently occluded, this tension, by causing such a cut in the vessel to gape, thereby disturbing the connection of any internal clot that may have formed, or adhesions of the coats that may have taken place, must tend to the production of secondary bleeding. In a case of secondary hæmorrhage under the late Mr. Callender, on cutting down at the seat of ligature to secure the bleeding points, the hæmorrhage was clearly seen to be due to such a cause. The vessel, which had been secured by a catgut ligature, had given way opposite the knot (which itself was intact), and a gaping wound one-tenth of an inch wide existed in the walls of the vessel. By applying two ligatures, and dividing the vessel between them, all tension is taken off, and both ends are placed in a state of rest—the most favourable condition for healing.

It may be objected by those who teach that the internal and middle coats need not be divided, that the method here advocated is at the present day a retrograde step. Space does not permit me to discuss in this paper the question as to the desirability of dividing the internal and middle coats. For my own part, my mind is fully made up that such a division is most desirable; and, holding this view, the objection with me can have no weight. It has also been objected, that the application of a second ligature and division of the artery detracts from the simplicity of the operation—a point, I suppose, other things being equal, always to be aimed at in surgery. In this instance, such an objection appears to me to be a mere question of sentiment, and, as such, I venture to think, is of little moment, if, as I believe, it is a fact that, by using two ligatures and dividing the artery between them, greater safety is obtained.

MEDICAL MAGISTRATE.—The Lord Chancellor has added the name of Dr. Josiah Oliver to the Commission of the Peace for the borough of Maidstone.