more rapidly effected; tissue change, and therefore oxidation, are increased, the temperature of the body heightened, and circulation and respiration accelerated. I cannot forbear quoting the terse sentences of Dr. Michael Foster as he sums up the nutritive conditions obtaining in the infant organism. He says: "Metabolism is directed to constructive ends. The food taken represents, undoubtedly, so much potential energy; but before that energy can assume a vital mode the food must be converted into tissue; and in such a conversion, morphological and molecular, a large amount of energy must be expended. The metabolic activities of the infant are more pronounced than those of the adult; for the sake, not so much of energies which are spent on the world without, as of energies which are for a while buried in the increasing mass of flesh. Thus the infant requires, over and above the wants of the man, not only an income corresponding to the energy of the flesh actually laid on, but also an income corresponding to the energy used up in making that living sculptured flesh out of the dead amorphous proteids, fats, carbohydrates, and salts, which serve as food." Thus, then, in the growing organism we have not only a greater instability in the nutritive processes, but also a direct source of expenditure in the very fact of growth itself. In consequence of that instability, we find how comparatively slight causative influences may lead to considerable defects in the blood, reducing it below the physiological standard; and in the fact of growth we see how the tissues may demand more nutriment than the blood can supply, and an anæmia special to the period of childhood and adolescence may readily be provoked.

At the other extremity of the cycle of life, when the demands are lessened, when all tissues and organs more slowly perform their functions towards the close of the long years of activity through which they have passed, when all the nutritive processes take place with a sluggishness in contrast to the period of active growth; the blood (no longer required for the purposes of growth or the renewal of tissues) loses in corpuscular richness and in hæmoglobin, so that one feature of the natural decline of life is the presence of slowly deepening anæmia, which in its turn probably aids in the diminution of the vital powers. It is plain that a very slight derangement, either in the direction of intake or that of undue waste, must readily influence and intensify this senile anæmia and marasmus.

Turning now to the contrast afforded by the sexes, which up to the age of puberty advance almost in parallel lines, we find, in the first place, there is a difference in the precise composition of the blood (see Table I.), that of the female being notably less rich in corpuscles and hæmoglobin than that of the male; and although this difference in health is, doubtless, in precise relation to the amount of work called for in each sex, yet, in consequence of it, the female is rendered more liable to anæmia. She is also subjected to influences special to her sexual function. Ovulation and menstruation go on in health with regularity, and the blood loss they entail is readily renovated. But they are most easily influenced by derangements in health and nutrition; and, on the other hand, when diminished or excessive, may be important factors in the production of anæmia. Pregnancy, the puerperal period, and lactation severally subject the female to anæmiating conditions, and the cessation of the menstrual function is often the period at which anæmia is developed.

I have no doubt that heredity plays some part in disposing the organism to anæmia, but it is not easy to give instances. A tendency to anæmia may certainly be transmitted, just as a tendency to hæmorrhage, in hæmophilia.

The other conditions, which I have included under predisposing causes, frequently co-operate. Occupation may involve deprivation of a due amount of light and air, the exposure to heightened temperature, and a want of due amount of sleep. I need hardly particularise them further: they are influences which are almost as much exciting as predisposing causes of anæmia; they stand, at any rate, on the borderland between the two groups in the etiology of the condition.

The influence of climate is well known as favouring the anæmic state, the subjection to prolonged tropical heat having a direct influence over and above that which is due to the inertia called forth by life under such conditions.

In conclusion, it must be borne in mind that any given anæmia may arise from a multiplicity of causes, each of

which is sufficient of itself to have induced the state; and in the second place the impoverished blood itself reacts on the organism in such a way as to maintain and intensify the anæmic condition. For all the vital processes are influenced by blood defective in the oxygen-carrying substance—hæmoglobin. Hence the capacity of blood for hæmoglobin must be increased, as well as the removal of the primary cause or causes, if any given anæmia is to be remedied. Metabolism must be quickened, and oxygen supplied for that purpose. I should have hesitated, in this hasty survey of the known causes of anæmia, to take you over ground so familiar if this were all that the subject comprised; were that the case, there would have been no need to discuss the subject at all. But when the category of known causes is exhausted, there remain cases of more or less profound and progressive anæmia, to which hitherto no sufficient explanation has been given. It is the existence of such a class of "idiopathic" cases that has induced me to speak to-day of the factors known to operate in producing the anæmic state, before proceeding to the consideration of that class of diseases to which I shall invite your attention in my next lecture.

CASE OF ANEURISM, FIRST OF ONE FEMORAL ARTERY, THEN OF THE OTHER;

LIGATURE OF BOTH WITH CARBOLISED CATGUT, AND
ANTISEPTIC TREATMENT; CURE.

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AT the present time, when we have been hearing so much of cases in which the application of the catgut ligature to an artery in its continuity has been followed by unsatisfactory consequences, it may be well to place the following on record, which, besides its bearing upon this particular question, is one of very considerable clinical interest. I may preface the account of the case by saying that not only was the progress of the patient after both operations quite satisfactory, but there can be no doubt that both of the arteries to which the ligatures were applied have been completely obliterated at the seat of operation.

A. T—, aged thirty-four, was admitted under my care into University College Hospital on Aug. 27th, 1878. By occupation he was a cab-driver, and had been a great beer-drinker, but had not taken much spirits. He had suffered from gout, but there was no history of rheumatic fever, nor could conclusive evidence of venereal disease of any kind be obtained: he was unconscious of having sustained any injury. For a fortnight previously the patient had noticed a slight catch in the knee and some pulsation, and for nearly a week he had suffered some actual pain. His general condition was not good: he had a bloated appearance, with distended cutaneous veins, a furred tongue, and a tendency to fine tremors of the limbs. He was emphysematous, and had scars of old ulcers on the legs. The apex beat was hardly to be felt, except at the epigastrium; but there was no cardiac murmur, and but slight tendency to arterial disease, as shown in the more superficial arteries of moderate size. In the right popliteal space was an aneurism of considerable size and irregular in shape. The pulsation, which was comparatively superficial, and seemed to indicate that the walls of the aneurism were thin, was most marked two inches above the lower border of the internal condyle, but it extended outwards to the outer border of the limb, and upwards to a line three inches above the crease of the ham. The knee was slightly flexed, and the limb, which lay upon its outer side, was considerably cedematous below this joint, the cutaneous veins being markedly full. The posterior tibial pulse was weaker than that on the opposite side.

At 8.30 P.M. on Aug. 27th the limb was bandaged, and after being flexed at an acute angle, was fixed by means of bandages in this position, some cotton-wool having previously been placed in the ham. Half a drachm of bromide of potassium and half a drachm of tincture of opium were administered. There was considerable pain during the night, and the patient slept very little. The following morning the bandages were loosened, but as no change had occurred in the aneurism, they were reapplied till 4 P.M. on

the 28th, making altogether nineteen hours and a half, when beyond the disappearance of the oedema from below the knee no alteration had taken place. On the afternoon of the 29th I had proposed to ligature the superficial femoral, but when taken into the theatre the patient's condition appeared so critical, his pulse becoming very feeble and his countenance cyanotic, while the tremor previously noted had markedly increased, that it was decided to defer the operation for a time. He was accordingly taken back to bed. A low diet was ordered, and a mixture containing ten grains of iodide of potassium and twenty grains of bromide of potassium was given every three hours. On Sept. 2nd compression was begun with Carte's compressor, and continued for four hours and a half without effect. The patient complained of great pain, so that the treatment could not be continued for a longer time. On Sept. 4th digital compression of the common femoral was practised for twelve hours, the pulsation in the aneurism being completely arrested for by far the greatest part of this time. This again caused the patient almost unbearable pain, though hypodermic injections of morphia were freely administered. On Sept 6th, as the patient's general condition had decidedly improved, and as the means adopted for the cure of the aneurism had proved completely ineffectual, I proceeded to tie the superficial femoral artery in the usual way at the apex of Scarpa's triangle. A catgut ligature kindly given me by Mr. Lister was employed, and strict antiseptic precautions were followed throughout the operation. This was performed at 2 P.M.; at 6 P.M. the patient had a shivering fit, and his temperature rose to 103° 6' F., but by 11 P.M. it had fallen to 101° 6'; on the 9th it was 100° 4', and after that kept between 99° and 100°, which indeed appeared to be his normal temperature, as it never sank below 99° except on one occasion. There is little to remark about the progress of the case. I employed a horsehair drain, which did not work perfectly, the result being that a little serum collected in the wound, and at one time there was a drop or two of pus. In consequence of this the progress was rather slow, the wound not being completely healed till four weeks after the operation. A slight pulsation was felt in the aneurism from the 11th to the 15th of September, but this completely disappeared, and by the time the patient left the hospital, on Oct. 14th, there was only a firm tumour of the size of a bantam's egg in the popliteal space. There was some tingling pain about the inner condyle, and occasional shooting pain at the inner and lower part of the thigh. No pulsation in the posterior tibial artery or dorsal artery of the foot could be detected.

I saw the patient from time to time after this, and watched the gradual diminution in size of the aneurism, which, when it had reached a certain point, became stationary, a small, hard, non-pulsating tumour remaining in the ham. In the early part of April, 1879, he began to complain of stiffness and coldness in the left calf, and on examination it was found that he had a small circumscribed aneurism in the ham on this side. His general health was now much better than it had been on the previous occasion, he having observed more temperate habits in the meantime. On Feb. 27th the circulation was completely controlled in the limb by means of an elastic bandage, applied over a flannel bandage, above and below the knee, the joint itself remaining uncovered. This was continued from 10.5 A.M. till 11.5 A.M., one-sixth of a grain of morphia having been given subcutaneously. The pain at last became unbearable, and it was impossible to continue the treatment without administering an anæsthetic; the bandage was accordingly taken off after screwing down a Carte's compressor three inches below Poupart's ligament. At 1.45 it was found that the tourniquet had slipped, and the aneurism was pulsating; it was relaxed for a quarter of an hour and then reapplied at 2.5 P.M., and the pressure was continued till 6.10 P.M., when it was finally removed. No alteration in the tumour had taken place. On the 28th a conical shot-bag was applied to the artery, so as almost completely to stop the circulation. The bag was slung from a bar, which passed over the bed, and the position was regulated by the patient himself. Its employment was begun at 10.45 A.M., and was continued almost without intermission till 7 A.M. on the 29th. After the bag had been applied for eleven hours the tumour seemed decidedly harder, and to be pulsating less, but when finally removed but little, if any, change from the original condition could be perceived. It is, of course, highly probable that the pressure was not efficiently applied during the whole of this period, as so much of the regulating of the position of the pad remained

in the hands of the patient himself. A good deal of redness and tenderness of the skin was caused by the pressure of the shot-bag. On March 6th it was noted that the aneurism was decidedly larger and softer. At 1.48 the elastic bandage was reapplied without the previous application of the flannel bandage, so as completely to stop all circulation. One-third of a grain of morphia was given hypodermically. At 2.45 the pain had become unbearable, and the bandage was accordingly removed, the shot-bag having been previously applied; but as this was not quite in position at first, it was ascertained that the pulsation in the ham still existed. The pressure was continued efficiently till 10.40 P.M., when it was removed, and the pulsation was found to be less. On the 7th the shot-bag was again used for some hours without benefit.

As no effect was produced upon the tumour, which indeed was obviously increasing in size, I determined to ligature the vessel. This was accordingly done in the usual way, and with strict antiseptic precautions, on March 12th. The healing of the case went on very satisfactorily, and was complete, with the exception of a small superficial patch of granulations a quarter of an inch in diameter, by April 2nd. As in the previous operation, the drain did not act perfectly at first, and therefore the healing was not quite so rapid as might have been expected in an aseptic wound. The temperature reached 101° on the 12th, 14th, and 15th. On the 19th the maximum was 99°, and it did not afterwards exceed this limit. From the 20th to the 22nd very slight expansile pulsation in the aneurism was detected, which after this disappeared.

On May 17th the following note was taken:—Left leg: pulsation felt in femoral, below the seat of ligature, when the limb is extended, and sometimes a little in the popliteal space. A little hardness, in the shape of a stout cord, is felt in the ham, and a little pulsation can be detected apparently in this. There is a weak pulse in the posterior tibial. The nutrition of the limb is good. Some stiffness is complained of in the ham. On the right side no pulsation is felt in any part of the limb below the seat of ligature. The thickening in the popliteal space is decidedly less than when the patient was in hospital. The pain and stiffness are more than in the opposite limb.

On February 16th, 1881, two years and a half after the patient first came under notice, I made a very careful examination of the two limbs, and the following note was taken:—In the left leg (the second operated upon) the femoral artery can be felt pulsating as far as the upper part of the scar of the operation wound. Below this it is imperceptible, and, indeed, the only point at which any pulsation lower down in the limb is to be detected is in a vessel of some size which lies close to the inner hamstrings; the posterior and anterior tibial pulses appear quite deficient. Some occasional and indefinite discomfort is felt below the knee on this side, especially in cold weather; but this appears to be diminishing. On the right side, in the same way, the femoral pulse is not to be felt below the upper part of the scar; and here, again, only one vessel was, after a prolonged search, felt to be pulsating. This accompanies the external popliteal nerve to the head of the fibula, and is smaller and more superficial than that felt on the left side. No discomfort or pain remains in the right limb at all. On neither side is any trace to be discovered of the aneurism, the thickened cords mentioned in previous notes having completely disappeared. He says that in very severe weather his limbs feel a little more cold than was the case before the occurrence of the aneurism; but this is not enough to inconvenience him to any extent. His general health is now excellent.

Those who have watched the treatment of aneurisms by the various methods of compression in vogue, or who have read the published accounts of such cases, cannot fail to be struck with the fact that while in many instances the results are brilliant and in every way satisfactory, it not unfrequently happens that after submitting the patient to a prolonged and painful ordeal he is in no way relieved, if indeed his condition be not materially altered for the worse. For it must be remembered that after consolidation of an aneurism as the result of such treatment, gangrene of the limb is not by any means unknown; and not only so, but it is at least possible that the vessels and the surrounding tissues may have been, as the result of the pressure, placed in a less favourable condition for the application of the ligature than they were previously. The surgeon who has, as the result of experience, complete faith in the efficiency of the antiseptic system to prevent the various dangers which are incidental to the existence of the smallest

open septic wound, and who knows that it is a matter of certainty that the small wound involved in the ligature of the femoral can be kept aseptic, would therefore, I think, hardly hesitate to tie the femoral without much delay in a case of popliteal aneurism if he were quite certain that the ligature employed was in every way trustworthy. Up to the present time this has unfortunately not been possible. We have several cases on record in which the ligature has no doubt yielded too soon, with the result of allowing the artery to become again patent; in some of which it may be presumed that the gut employed had not been sufficiently prepared, but in others it appears that the very best material to be had was made use of. The tests to which Mr. Lister has subjected the ligature, the preparation of which he has recently described, seem to show that it may be thoroughly trusted to withstand the softening effect of the tissues until the obliteration of the vessel has been completed, and therefore I, for one, shall feel little disposed to subject a patient to prolonged attempts at cure by compression. It has recently been suggested by Mr. M'Carthy and Mr. Treves that a certain amount of inflammation round the vessel is essential to the formation of a clot strong enough to withstand the force of the circulation. Cases such as mine, and many others which are on record, appear, in my opinion, to dispose at least of the universality of the truth of this position; and those who would argue in favour of allowing putrefaction to occur in the wound in order to ensure the amount of inflammation which is supposed to be necessary, will do well to bear in mind the following facts:—In the first place the existence of putrefaction is certain to accelerate the softening of the catgut ligature; and in the second place, it has been amply proved by the experience of generations that the inflammatory tissue is by no means always strong enough at the time at which secondary hæmorrhage is likely to occur to prevent the occurrence of this disaster. It is notorious that when hempen or silk ligatures were employed the danger of secondary hæmorrhage was real, and always present, but as far as I know it has never yet followed the application of the catgut when the wound has been kept aseptic to the last. It would seem therefore that even with the old imperfect material, a distinct advance had been made in the direction of safety, the inconvenience of the opening up of the vessel having been substituted for the danger of secondary hæmorrhage; it is surely fair to assume that with the improved means at our disposal, both the inconvenience and the danger will have been done away with, and we may now resort to the ligature with greater confidence than at any previous period in the history of surgery.

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THE PATHOGENY AND TREATMENT OF BRONCHOCELE OR GOITRE.

BY EDWARD WOAKES, M.D. LOND.

(Continued from page 450.)

As already stated, the object of conducting the treatment in the present series of cases was to determine whether fluoric acid exercised any curative influence over goitrous diseases. The result—17 recoveries and 3 failures, or 85 per cent. of the former—gives what I think may fairly be considered an affirmative answer to this point. But it will be observed from the details that the treatment extended in most of the cases over a lengthened period of time—time that might not be accorded in other than hospital patients. In endeavouring, therefore, to estimate the position of fluoric acid as an anti-goitrous remedy, I certainly should not regard it for this reason alone, irrespective of its occasional failure, as occupying the position of a specific. It is to be regarded rather as a basis of constitutional treatment, with which iron in anæmic patients may be advantageously combined; while coincidentally with its internal administration recourse may be had to such local proceedings as experience has shown to favour the dispersion of goitre. It is matter of observation that when fluoric acid is adapted to a given case, its effect upon it is often immediate and rapid. As an illustration of this point I may refer to

a young man who came under treatment at my out-patient clinic for the first time on Feb. 8th, 1881. He had a fibrous goitre of two years' duration, which was steadily increasing. Laterally it extended from the clavicles to the level of the hyoid bone on each side, while the isthmus was hard and prominent, the girth at this point being 16½ in. He was given half-drachm doses of the acid three times daily. On his next visit, Feb. 15th, just one week, he volunteered the statement that the tumour had gone down half an inch, which on measurement proved to be the case. Perpendicularly the diminution was greater than this, the lobes now reaching only to the level of the cricoid cartilage. In such a case one would be content with the acid treatment. But there are others in which improvement goes on up to a certain point only, the peripheral portions of the tumour disappear, but its centre remains firm and large as ever. Then I should add the plan which originated with Professor Lücke, formerly of Berne and now of Strasbourg, and which has ever since been extensively practised at the Throat Hospital—viz., that of injecting the substance of the tumour with tincture of iodine. After this absorption recommences, and often it only requires to continue the acid, or a second injection may be necessary. The evidence points with certainty to this fact, that when fluoric acid is administered internally, but is insufficient of itself to cure the disease, the number of injections necessary for this purpose is materially diminished, a point not unworthy of notice by those who are nervous on the subject of injecting bronchoceles. On the other hand, some of the cases indicate that fluoric acid alone has proved efficacious, after injections and every other method had failed. From all these considerations it will, I think, be conceded that we have in this drug a valuable adjunct for treating diseases of the thyroid gland.

A brief recapitulation of the points already insisted upon will serve the purpose of indicating in what the *modus operandi* of fluoric acid and its allies consists regarded from a therapeutic point of view. The vessel area of the thyroid gland has become a part of least resistance, as regards the vascular system at large. This implies a fault not so much in the bloodvessels themselves as in the sympathetic ganglia which furnish the nervi vasorum of these thyroid vessels; the power which maintains them in equilibrium is thus to a great extent lost or exhausted. Hence they exhibit a very slight resistance to the blood pressure originating in the heart; they yield, in fact, to the *vis a tergo* of the blood current, and so receive more blood than normally should be the case. My contention is that the fluorine restores the lost contractile function to the impoverished ganglia, either by acting as a physiological spur to their function or, which is equally admissible, by furnishing a deficient element in their composition, one without which the nerve currents generated in them are reduced to *nil*. The supply of the missing element acts like the recharging of an exhausted galvanic cell.

CASE 1.—F. H—, a female, aged twenty, living at Camden-town, has had goitre for two years. In November, 1876, there was a fibrous enlargement of both lobes and isthmus, the right lobe being firmest and largest. The girth of the neck was 15½ in. Till July, 1877, she was treated with iron and iodide of potassium, with very little result. She was now given fifteen minims of fluoric acid (half per cent. dilution); but she almost immediately took typhoid fever. In March, 1878, she was again put on the acid, and in the three months following received altogether nine injections of tincture of iodine into the substance of the tumour. From June, 1878, the treatment was confined solely to the acid internally, the dose being increased gradually to thirty minims. In March, 1879, she was well, the tumour having disappeared. In February, 1880, she remained free from the disease. The period during which the acid was taken was nine months.

CASE 2.—C. P—, a female aged forty-seven, a governess, living at New Cross, presented on June 14th, 1878, a fibrous enlargement of the left lobe of the gland, of the size of a hen's egg, causing her considerable difficulty in swallowing. She began with twenty minims of the dilute acid three times daily on June 14th. On the 21st the swelling was much larger and softer, but she swallowed better; this enlargement is a good sign. On the 29th the dose was increased to thirty minims; on July 5th to forty minims; and on August 2nd to fifty minims. The tumour became softer and smaller gradually, and in November it had quite gone. The time of treatment by acid was six months.

CASE 3.—A. B—, a female, aged seventeen, a needle-woman living at Clerkenwell. She had soft goitre of the