

in a child in whom I had secured the carotid artery. I could see the branches of the temporal and occipital underneath the delicate integument enlarging, and thus actively acquiring great additional vigour immediately after the operation."

There is thus accumulated a fair amount of experience to show that the principle of *withholding* blood from an inflamed structure, under certain conditions, is immediately beneficial. As to the means to this end, let them be as innocent as may be consistent with success. I would not for a moment insist on the application of a ligature in all cases where the principle is to be tried, provided that a simpler method will suffice, whether by compression with a tourniquet, by acupressure needle, or by hand. But it must not be forgotten that it is one thing to suggest a mode of treatment and another thing to carry it out efficiently. The ligature once applied, all anxiety as regards the passage of blood ceases; but less decided measures above mentioned require such care and attention to details as can rarely be given. Having witnessed the value of the principle, I do not hesitate to urge upon the profession a trial of it when practicable. It may appear strange that I have not tied an artery oftener for inflammation; but I did not wish to ride my hobby to death, nor to bring the principle into discredit.

Facts and Conclusions.

That ligature of the superficial femoral artery has arrested acute inflammation consequent on wound of the knee-joint.

That ligature of a main artery will quickly diminish profuse suppuration, and prevent death by exhaustion.

That, while it arrests profuse suppuration, it will, by allowing the patient to gain strength, afford an opportunity for amputation at a future time.

That gangrene and secondary hæmorrhage, as the result of ligature, should not be anticipated in the healthy subject.

That the dread of these has arisen from our knowledge of the consequences of the ligature in instances of known diseased vessels—aneurism, for example.

That a slough on the heel, caused by the pressure of a splint, was quickly detached, and the wound soon closed, although the superficial femoral had been tied a few days previously.

That symptoms of inflamed bone ("starting pains") quickly disappeared.

That the arterial tension of the rest of the body will be increased beneficially by the ligature.

Such, Mr. President, are the conclusions at which I have arrived from a review of the above subject; but seeing that this operation was originated in America long before I was born, while I thought it had been first suggested by me in 1866, I may well say "there is nothing new under the sun."

I have now come to the end of my Lettsomian Lectures, and, in doing so, beg once more to thank the Council of the Medical Society of London for having nominated me to the honourable office, and my audience for having listened patiently to my discourses.

ON THE CURE OF LEUKHÆMIA SPLENICA BY MEANS OF PHOSPHORUS.

BY WILSON FOX, M.D., F.R.S.,

HOLME PROFESSOR OF CLINICAL MEDICINE, UNIV. COLL. LOND.

I DESIRE to take an early opportunity of corroborating an observation by Dr. Broadbent* on the influence of phosphorus in this disease, and I hope that the experience of others may be found as favourable as his and my own have proved to be.

The patient, E. C. U—, a male, aged thirty-seven, was admitted into University College Hospital Dec. 30th, 1874. Born in Devonshire, he has resided for the last twelve years in London. By trade a baker; for eight years he worked in the bakehouse, for the past four he has been in the shop. He has never even stayed in a known malarial climate. His father lived to an advanced age; cause of

death unknown. His mother before her death (age unknown) was very pallid, and suffered from severe pain in the "body" and shortness of breath. One sister living, aged forty, suffers from pain in the body and limbs, and from shortness of breath. Patient has been married nine years. Lost the only child born alive soon after its birth. His wife has had one miscarriage; no subsequent pregnancy.

Previous illnesses.—Has had scarlatina and measles, the latter severely; neither rheumatism nor syphilis. Some years ago, soon after joining the baking trade, he became very weak and ill, but recovered completely. Six years ago he became very blanched, owing to bleeding piles. He recovered completely from this, and though he states that he has occasionally observed himself looking yellow, yet up to his present illness he was a very strong, vigorous man, weighing 12st. 6lb., and able to lift and carry a sack of flour. Height, 5ft. 6in. His present illness commenced in January, 1873 (nearly two years before admission). First suffered from severe pain in his right side after lifting a heavy weight. He kept his bed a fortnight, and remained well for three months. He then began to feel a "dull, heavy" pain in his left side, which varied in intensity, but did not become severe until 1874. During this period, however, he noticed some enlargement of the abdomen. In 1874 he suffered from at least twelve attacks of very severe pain in the left side. They were preceded by feelings of chilliness, and were attended by night perspirations and by urine loaded with lithates. In October, 1874, he had an excessively severe attack of this nature, attended by violent vomiting. The pain extended to the hip and groin to such an extent as to give rise to the diagnosis of a renal calculus. The pain gradually diminished, but returned on the 21st of December, extending to the hip and knee. At this time he passed half an ounce of dark blood by the rectum. He had no other hæmorrhage. His breath had become short since October.

On admission he was intensely pallid, with extremely marked anæmia of the mucous surfaces and of the nails; markedly emaciated; no eruption of skin; very feeble, hardly able to stand without assistance; no œdema. He had frequent slight rigors; was pyrexial, and sweated profusely. The urine was high-coloured, sp. gr. varied from 1010 to 1025; it deposited lithates, but contained neither albumen nor sugar. The lungs were healthy. The heart's apex (displaced by the abdominal tumour) was in the fourth interspace; there was a faint basic systolic murmur with its maximum at the second left cartilage; venous hum was heard in the neck, and arterial murmurs were present.

His appetite was bad, his bowels were costive, though previously diarrhœa had alternated with the constipation; the stools presented no special abnormal appearance. He suffered much from flatulence. He had constant thirst; mouth dry, tongue broad, flabby, and covered with a thin white fur. The sight was unimpaired. He occasionally suffered from severe headache. Anæsthesia existed over the outer part of the left thigh. Some hyperæsthesia was also observed in the course of the last dorsal nerve.

The abdomen was distended chiefly in the left flank in the splenic region, where there was felt a hard resistant mass pushing outwards the cartilages of the tenth and eleventh ribs, and reaching backwards nearly to the spine, though the intestinal note could be elicited posteriorly between its posterior border and the spine. It was smooth, without any nodulation; movable from behind forwards, and movable on deep respiration. The anterior border was distinct, slightly rounded, and in its middle the splenic notch could be distinguished on deep pressure. The whole mass was absolutely dull on percussion, and without fluctuation. The dulness superiorly extended to the sixth rib in the axilla, between the eighth and ninth ribs in the back. By palpation and percussion the tumour was traced extending across the abdomen to within 1½ in. to 2 in. to the left of the umbilicus; thence it extended transversely backwards until it touched Poupart's ligament, about 1 in. anterior to the crest of the ilium, below which bone it passed posteriorly. The tumour was intensely painful on deep pressure. Between it and the diaphragm friction could be heard. The patient was unable to lie on his right side owing to the aggravation which this caused of the pain felt in the thigh and knee, and to pain in the left scapular region.

No enlarged veins were seen on the surface of the abdo-

* Practitioner, Jan. 1875.

men. There was no ascites. The liver was not enlarged. There was no enlargement of any of the superficial lymphatics, nor could any be felt in the abdomen, with the exception of a few slightly in excess of the normal size in the inguinal regions.

The blood* drawn by pricking the finger looked much paler than natural. The corpuscles were nearly twenty times their usual number, from thirty to forty-five being seen in the field. This proportion remained constant during the greater part if not the whole of the period before he began to take the phosphorus. The white corpuscles were of two kinds, large and small, the former about twice the natural size; some were binucleated; most were granular. There was, in addition, a large number of molecules, which were aggregated into irregular masses. There was no alteration in the shape or appearance of the red corpuscles.

Until Jan. 20th, when the treatment by phosphorus was commenced, his state varied but little. He had more or less continuous severe pain in the tumour, which at times was aggravated by sharp paroxysmal attacks, relieved occasionally by blisterings and endermic application of morphia, or by the hypodermic injection of morphia.

Until Jan. 20th he was almost constantly pyrexial, and slight febrile movements, not exceeding 99°9', also occasionally persisted until Feb. 8th (nineteen days after the treatment by phosphorus had been commenced). On a few days the evening temperature was not taken. On three occasions only within the first twenty-one days the temperature during twenty-four hours did not exceed 98°5'. The pyrexia, prior to Jan. 20th, was irregular in its diurnal manifestations. The maximum observed was 101°2', and it tended to a post-meridial exacerbation, the morning temperatures being normal, but never subnormal. This regular course was, however, only maintained on six out of twenty days, and many variations occurred; thus, in some instances, ante-meridial pyrexia was observed, sometimes equalling, in others less than that of the evening. On other days the evening temperature being high, continued so through the early part of the night. The temperature was also observed to be high in the morning, to fall towards midday, and rise again in the evening. After Jan. 11th and before the phosphorus was given, the temperature did not exceed 99°9'.

The pulse up to Jan. 20th varied from 96 to 132, only once falling to 88; the respiration varied from 16 to 22.

Before the date at which the phosphorus was first given the treatment consisted of the administration of iodide of iron. Sulpho-carbolate of soda was also given with some relief for the flatulence. Full diet, wine, and lemons were also given.

Until this date no material improvement had taken place in the general condition of the patient. He was still febrile, though slightly less so than on admission; his blood was in about the same state, and the attacks of pain in the region of the splenic tumour were severe. Having just met with Dr. Broadbent's paper, I determined to try the effect of phosphorus, and ordered one-fiftieth of a grain three times a day, which on Feb. 23rd was increased to one-thirtieth of a grain three times a day. All other treatment beyond rest and nourishing food was discontinued. No ill effects were observed from the phosphorus throughout. At first but little appreciable influence was noticed on his general condition, except that the pulse had diminished in frequency, varying up to Feb. 8th from 88 to 96, after which it gradually fell, rarely ever reaching 90, and varying from 76 to 62. The pyrexia also, as before stated, subsided, and after Feb. 8th it only reached 99° on two occasions (Feb. 25th and March 5th). Subnormal temperatures, occurring almost exclusively in the morning, but not falling below 97°, were occasional throughout the months of February and March, but almost ceased, though not entirely, during the month of April. On the 25th March he contracted a bronchial catarrh without any pyrexia, which only lasted a few days, and was not treated except by a few doses of chloral hydrate at night, to allay cough.

By the 8th Feb. there was a marked improvement in the appetite, which continued, and the bowels became regular.

By the early part of March the aspect of the patient had begun to improve, and on March 2nd examination of the blood with the microscope showed only about eight white corpuscles in the field of a quarter of an inch, still being divisible into those of large and small-sized, besides a number of molecules.

By March 14th he could walk with help.

By April 6th he was much better; the anæmic look had disappeared, and there was some diminution in the size of the spleen, which no longer passed below the crest of the ilium, while the dulness superiorly reached to the eighth interspace in the axilla.

April 9th.—Five to nine white corpuscles were seen in the field of the microscope.

20th.—They had diminished to five or seven.

May 5th.—There was no apparent excess whatever of the white corpuscles. The patient was able to walk a mile without fatigue. The anterior border of the spleen, instead of reaching nearly to the umbilicus, was five inches to the left of the middle line, and about two fingers' breadth from the crest of the ilium, while the dulness superiorly only reached the seventh rib in the axilla. It was no longer painful.

On the 7th he was discharged for Eastbourne, discontinuing medicine; and in June he returned, looking the picture of health, but without any further appreciable diminution of the size of the spleen. His blood, tested against that of a healthy man, showed no increase of the white corpuscles, but these were nearly double the natural size.*

I subjoin his weighings during the latter part of his treatment by phosphorus. I very much regret that these were not ascertained during the first part of his stay in the hospital:—Weight two years ago in perfect health,† 159 and 174 lb.; March 12th, 124 lb.; 22nd, 127 lb.; 30th, 130 lb.; April 6th, 132 lb.; 16th, 133½ lb.; 23rd, 135 lb.; 29th, 140 lb.; May 6th, 142 lb.; middle of June, having returned from Eastbourne, 147 lb.

Remarks.—It hardly appears necessary to comment on the diagnosis of this case as being one of genuine leukhæmia. The change in the blood was certainly not so far advanced as is sometimes observed, when the white corpuscles may be to the red as 2:3. This condition is, however, only noticed as a rule in the final stages of the disease, and even in these the proportion of white to red may by no means be excessive, and, as I have myself observed, they may even diminish from the amount seen in the earlier periods. It appears, also, from Mosler's‡ observations, that splenic enlargement may exist during a considerable period before any marked increase of the white corpuscles is perceptible, during which time other characteristic symptoms of the disease may nevertheless be present, and also that as many as sixteen corpuscles counted in the field may, together with splenic enlargement and slight pyrexia, be sufficient to characterise the disease. Dr. Broadbent doubted whether the case observed by him was an absolutely characteristic one of leukhæmia, on account of the want of correspondence between the degree of anæmia observed and the number of white corpuscles found. I am disposed, however, to believe from observations on other cases, that this want of correspondence is not unfrequent in true leukhæmia, and that the red corpuscles suffer in their nutrition in this disease as well as in the anæmia splenica or lymphatica of Hodgkin,§ from which a moderate excess of white corpuscles in the blood is sufficient to distinguish it. In this case, however, the increase in their number was sufficiently great fully to characterise the disease. The absence of the severer hæmorrhagic symptoms was certainly a point in the patient's favour; but in other respects, as regards his emaciation and great loss of strength, his prospects were most unfavourable; and before the good effects of the phosphorus were observed I only anticipated for him the melancholy and painful termination which is almost constantly, if not invariably, observed in this disease. I say almost constantly because Mosler anticipates for quinine, if used in the earlier stages, a somewhat hopeful influence on the cure of leukhæmia, and has quoted four cases of cure by this agent; I must, however, confess that even in very large doses, of ten to twenty grains daily, continued

* The report on the blood is the result of my own observations, collated with those made within the first three weeks after admission by Messrs. Rogers and Voelcker, Fellowes clinical prize essayists. I am also indebted to the latter gentleman for a few addenda to the general history.

* Observation by my clinical assistant, Mr. Pepper.

† Differently stated by patient.

‡ Pathologie et Therapie du Leukhæmie. Berlin, 1872.

§ See Dr. Wilks, Guy's Hospital Reports, 1856.

during a long period, quinine has always failed in my hands to exercise the slightest influence, either on the fatal progress of the disease or on the pyrexia. Iron also has appeared to me to be equally inefficacious, and the experience of the majority of observers seems to have been as unfavourable as my own.*

It may be noticed that neither in Dr. Broadbent's case nor in mine did the spleen return to its natural size, though in mine there has been a not inconsiderable diminution of its dimensions. Dr. Broadbent is indeed under some fears, owing to not hearing again from his patient, that some unfavourable change may have taken place in his state. It is impossible as yet to speculate what effect the still enlarged spleen may have on the general health, but the hope that this may be slight or *nil* does not appear to me to be ill-founded. In the cases of cure reported by Mosler under the influence of quinine, the spleen is stated to have returned to its normal dimensions; but one of these, by Dr. Hewson, of Pennsylvania, was distinctly a case of malarial origin, in which paroxysms of intermittent fever still persisted, and in which the administration of the quinine appeared to exert a beneficial effect, while in the others the splenic enlargement was less than in the present instance.

As far as is yet known, no case of spontaneous cure of leukaemia has been reported, or of recovery under indifferent treatment.† The fact that some amelioration had from time to time taken place in this patient's state during the earlier period of his illness affords no ground for the belief that this explanation is valid for the rapid improvement observed after he had commenced to take the phosphorus. Such alternations of improvement and exacerbation are common during the early periods; but when once the splenic tumour has attained a considerable size and the increase of the white corpuscles in the blood is marked, any change for the better, except slight and transient modifications of the pyrexia, are rarely observed.

I believe, therefore, that in this case, as well as in Dr. Broadbent's, the cure is exclusively attributable to the use of the phosphorus, and he is warmly to be congratulated on the successful verification of an induction, and on the discovery of a cure for at least some cases of a disease so painful, distressing, and hopeless as this almost invariably proves to be. It may be found to be more beneficial in the earlier rather than in the later stages of the disease. What its influence may be when the vast excess of white corpuscles sometimes observed has been attained, can only be verified by further observation, but I trust that it will soon receive a more extended trial in all phases of the disorder, and that it may be shown that one more disease has been thus rescued from the category of the almost hopelessly irremediable.

In conclusion, I would allude to the observations by Prof. Botkin, of St. Petersburg,‡ on the reduction capable of being effected in the size of the spleen and lymphatic glands, and also of the proportion of the white corpuscles in the blood, by the application of the induced current to the enlarged spleen and glands. These are very distinct and remarkable, and may yet prove to be an important adjuvant to treatment. In this case I was, however, desirous to give the phosphorus an uncomplicated trial, and did not, therefore, adopt Prof. Botkin's method.

* A remarkable case is reported by Dr. Lloyd Roberts (Brit. Med. Jour., 1869, ii., 585), where, in a case of great anæmia, the white corpuscles were increased in the proportion of one to two of the red, without any enlargement of the spleen or of the lymphatic glands, and where in the course of fifteen days the excess of white corpuscles had almost entirely disappeared. This case, as far as I know, is quite unique, and cannot be considered one of true leukaemia.

† One is alluded to by Dr. Willoughby Wade (Brit. Med. Journ., 1869, ii., 644), in an infant fifteen months old, where a splenic tumour disappeared within fifteen months; but no other details are given respecting the state of the blood or the treatment adopted.

‡ Die Kontraktilität der Miltz. Berlin, 1874.

DR. PETER, of St. Antoine Hospital, mentions having seen the use of a bath produce most mischievous effects in pelvi-peritonitis. He explains the fact in the following way:—On entering the bath, and in order to stride over the edge of it, the woman makes a violent movement, which destroys some of the adhesions established around the internal genital organs, and this rupture becomes the starting-point of a new onset of peritonitis.

HEALING OF WOUNDS BY BLOOD-TISSUE.

By JOHN CHIENE,

ASSISTANT-SURGEON, EDINBURGH ROYAL INFIRMARY.

"The blood being alive, this uniting medium becomes immediately a part of ourselves, and the parts not being offended by it, no irritation is produced."—JOHN HUNTER (chapter on Union by the First Intention).

THE organisation of an accidental blood-clot in open antiseptic wounds in Mr. Lister's practice and in cases under my own care, first suggested to my mind the propriety of trying to heal a recent open wound by filling, at the time of the operation, the cavity with blood, which would coagulate, become organised, and which in time would become covered with epithelium. The expectation was that less contraction would follow if the wound healed by blood-tissue than if it was allowed to granulate and heal by cicatrisation.

A young man suffering from a horn on the point of the heel was admitted into the surgical clinical wards in the Edinburgh Royal Infirmary in April last. The case appeared a suitable one for the experiment, because the situation and nature of the wound which would require to be made in order to remove the horny projection was such that union by the first intention was unattainable, and if the wound was allowed to granulate and heal by cicatrisation and contraction, like an ulcer, the result would be drawing up of the heel and deformity and lameness in walking. The horn had been removed twice previously, but had again grown. At one of these operations the healing of the wound was assisted by the organisation of an accidental blood-clot. The horn now projected from the surface to the extent of the third of an inch, consisting of layers of horny epithelium, and had a circular base nearly the size of a shilling.

On the 18th of April, 1875, a tourniquet was applied, and the horn removed; the resulting wound was triangular in shape, each side of the triangle being an inch and a quarter in length. The soft tissues down to the bone were removed, and the surface of the os calcis scraped with a periosteum scraper. The cavity was half an inch in depth. No vessels were tied. A piece of protective was placed over the opening in order to close it, and the usual antiseptic dressing applied. The tourniquet was then removed. The expectation was that blood pouring from the sides and floor would fill the cavity. The operation was performed under a spray of carbolic acid. On the following day the wound was dressed, and it was found that, with the exception of a shallow depression at one corner, the entire cavity was filled with dark clot. This was not disturbed, and the dressing carefully reapplied. On the sixth day the clot was of jelly-like consistence, and still of a dark colour. On the twelfth day the clot was of firmer consistence, and of a dark-brown colour. The clot did not bleed when scratched. On the sixteenth day the superficial portion of the clot, which corresponded to the depth of the thickened horny epithelium of the heel, liquefied, and came away in the discharges. The surface of the clot was now on a level with the deepest layer of horny epithelium. It bled when scratched at its centre, and the escaping blood filled a slight groove on the surface of the original clot. On the twenty-sixth day the original clot was distinctly vascular, and on its surface the secondary clot (the result of the scratching of the original clot on the sixteenth day) was observed of a dark colour, and adherent to the original clot. This secondary clot passed through the same changes as the original clot; the changes were, however, more rapid, in consequence, I presume, of its smaller size. On the thirtieth day the sharp-defined edges of the original wound in the horny epithelium had disappeared, and an epidermic formation was observed on the surface of the clot at its edges. On the thirty-fourth day the wound was healed, the blood-clot being entirely covered with epithelium. The triangular wound was still distinctly marked, and no contraction had taken place. No attempt was made by bandaging or splints to prevent contraction during the cure.

The patient was shown at the June meeting of the Medico-Chirurgical Society of this city. It has yet to be seen whether contraction will take place. The practical value of this method of healing wounds by blood-tissue has