just as much importance as the operation. The secret of success is early and gentle manipulations. They should be sufficient to secure slight increase in the movement after each manipulation without any further access of inflammation; and when the patient can voluntarily carry out what passive manipulation has gained from time to time, then active movements should be commenced. Frequently it is necessary to protect the joint by an apparatus so adjusted as to permit of a few degrees less movement than that of which the joint is actually capable. At this stage the advantage of the use of physical therapeutics is considerable for the absorption of exudation, for improving muscular tone, and increasing local nutrition.

It is not possible within the limits of a paper such as this to go into all the details of surgical treatment connected with arthritis deformans, but there is no doubt that a brighter future awaits the unhappy sufferers from this terrible disease, if the advice of a surgeon accustomed to operate upon joints and familiar in every respect with the somewhat special technique is early sought.

CLINICAL AND POST-MORTEM OBSERVATIONS ON THE STATUS LYMPHATICUS,

WITH DEDUCTIONS, AND A PLEA AGAINST THE MALIGNING OF ETHYL CHLORIDE AS A GENERAL ANÆSTHETIC.

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HAVING within the last two and a half years met with five particularly instructive cases illustrative of this condition, in all of which more or less sudden death took place, I feel tempted to publish a few details concerning the same, especially since so little is written or known of the disease in question. The status lymphaticus (or thymicus) is undoubtedly a very much more common condition than is generally supposed, and in children and young adults probably accounts for nearly all the cases of sudden death in which the cause of death is somewhat obscure. It must further be a particularly important disease to the surgeon, anæsthetist, dental surgeon, and coroner, besides having equally important medico-legal aspects. Despite all these valid points but little attention is drawn to it. The majority of medical students of the present day are not taught anything about it, and probably a big majority of medical practitioners have possibly never heard of the disease, or at all events know so little about it as not to be able to recognise it post mortem. Consequently there probably is quite a large number of deaths, either entirely or mainly due to this morbid condition, that are never recognised at all, and this must be true even at asylums and provincial hospitals where a more thorough necropsy is performed. Further, it is a very easy thing indeed to make a really careful and searching examination and yet miss the condition. The thymus gland is rarely so large as to present itself obtrusively but rather remains hidden at the root of the neck, partly covered by the inner extremities of the clavicles. Hence, unless one is either looking for its presence or methodically considering every viscus seriatim it will easily escape notice, particularly as in asylums and most hospital practice it is not usual to commence the incision at the symphysis mentis, and remove the tongue, trachea, œsophagus, heart, and lungs *en masse*. The glands in the mesentery, too, can easily be concealed by an excess of fat in this situation. I have twice seen the condition missed after quite a careful post-mortem examination had been made. The Germans and Americans seem to have considered the disease more than we have. The thymus is one of the peculiar ductless glands, like the thyroid, concerning the physiology of which but little is known. Clinically, however, there seems quite sufficient evidence to show that disease of the thymus or its presence, after a certain age, constituting, with other morbid changes, the status lymphaticus, should be considered every bit as much an "entity" or separate disease in itself, as are myxœdema and cretinism, from disease or absence of the thyroid. Before going further it will be well, perhaps, to give a few notes of the five cases aforementioned.

CASE 1.—The patient was a boy, aged 14 years, who

looked to be in good health. He was well nourished and had a healthy, rosy complexion. The heart and lungs were normal and no physical signs were discoverable in the abdomen. He did not correspond to either of the tuberculous types of child in facial appearance, and his physique was good. He suffered, however, from slight deafness and dreaming, and was also in the habit of sleeping with his mouth open. On examination of the throat both tonsils were found to be moderately enlarged and the naso-pharynx to contain much adenoid growth. No enlargement of the cervical glands could be felt on either side of the neck. A day was fixed for the removal of the adenoid growth and tonsils, and the boy was prepared for operation in the usual way, both as regards the purge on the night before and only a small quantity of milk on the morning of the operation and four hours previously. The operation was performed in the out-patient theatre at the Victoria Hospital for Children, Chelsea. The patient was quite cheerful on entering the theatre and apparently in no way alarmed. He jumped on to the operating-table himself, and did not seem perturbed by the rubber face-piece, but breathed quietly and without any struggling. Moreover, it is worthy of note that he was the first to come in, hence there was no residuum of ethyl chloride in the bag, and that only two measured cubic centimetres were used, the anæsthetic being shot straight into the bag, which was connected to the face-piece by a large calibre tube, unobstructed by a sponge. The anæsthetist was experienced in the administration of ethyl chloride. After not more than three inspirations it was observed that the corneal reflex was abolished, the mask was removed, and within a second or two of this the breathing stopped and the face became cyanosed. The operation was hurriedly proceeded with, with the hope that the consequent bleeding would help to relieve the condition. This not being so every means of resuscitation was employed. Artificial respiration was performed unremittingly for three hours, till subsequently it had to be relinquished owing to the damage caused by it to the lungs.

Now some may wonder if the patient was dead from the commencement but I feel sure that the most sceptical would quickly have dispelled this idea had they been present. The heart sounds, though at first audible, were rather distant and irregular, and the colour, general appearance, and expression of the face were continually changing. As late as two and a half hours after the commencement of artificial respiration one particularly gross change was noted. The face changed from a blotchy purple and white to a uniform pink colour. The lips lost their lividity and the flabby, purple tongue became red, regained tone, and started bleeding—a bright red blood. When the heart was examined before the operation no dulness was detected behind the manubrium sterni, and post mortem Dr. A. J. Jex-Blake, who made the necropsy, percussed out the region of the thymus before the body was opened but could find no suspicion of dulness.

Necropsy.—At the post-mortem examination numerous subpleural petechial hæmorrhages were found. Enlarged thymus was present, with thin and irregular borders overlapping both auricles of the heart and extending well below the auriculo-ventricular junction on the left side. The weight of the thymus was 1 ounce. Both lungs were rather congested. The heart was not dilated, it contained no blood, and the ventricular walls were moderately firm. The spleen was very slightly enlarged and Malpighian corpuscles were prominent. The mesentery was studded with numerous pink glands, nearly all of which were about the size of a sweet-pea, none being much larger. Possibly there was some thickening of Peyer's patches in the intestine.

CASE 2.—The patient was a male, aged 17 years, well nourished, and the subject of congenital imbecility. This patient, again, was not of the tuberculous type and his general health was apparently good apart from his mental condition. There were no physical signs of disease, though some evidence of old rickets was present. On the morning that he died no change had been observed in his health, but on rising from his midday meal he, without any warning, fell back on the floor, respiration ceasing almost immediately, and death taking place in a comparatively few seconds.

Necropsy.—At the post-mortem examination there were no naked-eye changes in the brain. The thymus gland was present, the longest vertical diameter being quite 2½ inches, and its lower border thin and irregular, and overlapping the

auricles and uppermost part of the ventricles of the heart. It weighed 1 ounce. Both ventricular walls of the heart were a little hypertrophied, more especially the left, the cavity of which ventricle was also slightly dilated but contained only a very small quantity of blood. The right ventricle also was practically empty. Its muscular substance was fairly firm only. It weighed $8\frac{1}{4}$ ounces. Both lungs were slightly congested. The bronchial, tracheal, and mediastinal glands were possibly a very little enlarged. The spleen was normal in appearance, but was slightly undersized, and on section Malpighian corpuscles were a little more evident than usual. It weighed $4\frac{1}{2}$ ounces. The liver was definitely enlarged and fatty; it weighed $59\frac{1}{4}$ ounces. Numerous pink glands were present throughout the mesentery, the size of all closely approximating that of a sweet-pea, with but small range either larger or smaller. The glands were typical of the so-called hæmolymph gland and in no ways resembled those of leucocythæmia. No trace of tubercle could be found and there was no infective disorder of the intestine. The lumbar glands were possibly a little enlarged. The base of the tongue showed some multiplication and hypertrophy of the lymphatic nodules.

CASE 3.—The patient, a male, aged 21 years, was well nourished and his general health was good. His physique was excellent and his facies was not tuberculous. The patient was an epileptic and the subject of both frequent and strong fits, which occurred more or less in bouts. Four days before he died he had 14 fits in the day, three days before he had five in the day, and 11 on the morning of the day he died (death occurring at 1.50 P.M.). It is noteworthy, moreover, that six months previously to this he survived a serious attack of acute lobar pneumonia, when, for two days at least, it did not seem at all likely that he would recover; further, on the morning of the day that he died his general condition was good. He had not passed into the so-called epileptic state, when death may take place from exhaustion, and his pulse was full, strong, well sustained, regular in force and rhythm, and not very fast. However, about half an hour before he died a sudden change for the worse was noticed. The colour of the face changed, the expression became anxious, and the breathing laboured, shallow, irregular, and hurried, but not stridulous. At first the pulse was still good, and though scarcely as strong as previously nevertheless it did not indicate that there was any cause for alarm, as did his breathing and general countenance. Within ten minutes of this observation, however, death unexpectedly took place.

Necropsy.—At the post-mortem examination the pia mater was possibly a little injected. There was slight congestion of the cerebral blood-vessels and a few punctiform hæmorrhages were present; the brain otherwise was normal to the naked eye. The lungs were both dark in colour, with slight uniform congestion. The heart was not flabby, the left ventricle being hypertrophied but not dilated, and the muscular substance firm. The right ventricle was normal. Both ventricles were empty and the auricles contained only a very little blood. (Up to this stage the thymus had not been looked for, and its actual presence was missed. It was only on account of the condition found in the heart and lungs, especially the former, neither of which being compatible with heart failure nor at all resembling the usual picture of things found post mortem after death from exhaustion caused by the status epilepticus, that further causes had to be sought.) The thymus was present, measuring about $2\frac{1}{4}$ inches from above down and $\frac{1}{2}$ inch in its greatest thickness. It weighed 8 drachms. The mesentery contained numerous enlarged glands, the largest of which was about twice the size of an ordinary sweet-pea. The glands on section and *in situ* had a very pale pink colour, so pale that they were almost white. Owing to an abundance of fat in the mesentery the majority of the enlarged mesenteric glands were quite obscured. The bronchial, tracheal, and mediastinal glands were apparently not abnormal, the lumbar possibly being a very little larger than usual. The spleen was rather enlarged and on section corpuscles were prominent; it weighed $7\frac{1}{4}$ ounces.

CASE 4. The patient, a male, aged 29 years, was well nourished, well developed, and of good physique and general health. Nothing abnormal was to be found in the heart, lungs, or abdomen. The patient was a congenital imbecile, and though said to be an epileptic he had not had any fits since he was seven years old. There were no history of any illnesses and no evidence of old rickets. As he was uncleanly

in his habits he frequently had to have as many as four or five baths or more a week. On this occasion he had been walking out of doors and when he came in at 12 midday he was taken to the bathroom. He got into the bath which had only five or six inches of warm water in it—at a temperature of 95° F., previously tested by the thermometer. He had not been in the bath more than one or two minutes when he suddenly slid down from the sitting posture which he was in, and although nothing abnormal had been noticed previously to this it was quite obvious that he was dead. He was not by himself and his head, of course, did not go under water. In this case death was instantaneous, the respirations and the heart's action apparently stopping synchronously. The eyes remained open and the pupils were merely dilated, so that this, together with the sudden cessation of all movements and sudden pallor, alone constituted the dying phase. On this occasion I had no doubt whatever that the patient must have been previously suffering from the status lymphaticus, so now I very carefully percussed out the region of the thymus, but only to feel quite convinced that if there was any difference at all in the percussion note it was very decidedly on the side of hyper-resonance. Percussion and palpation of both the spleen and liver revealed nothing abnormal.

Necropsy.—At the post-mortem examination the thymus was present and situate rather higher than usual with its lower border scarcely reaching the auricles of the heart. Its dimensions were: 2 inches vertically and $\frac{1}{2}$ inch in the thickest part; it weighed 1 ounce. All the papillæ of the tongue were more marked than usual, especially the circumvallate papillæ, between which and the glosso-epiglottic folds posteriorly the root of the tongue was thickly covered with large lymphoid nodules, many of which would measure $\frac{1}{8}$ th to $\frac{3}{8}$ th of an inch in diameter. The lingual tonsils were much hypertrophied; the faucial tonsils only very slightly so. The naso-pharynx was small and contained some slight adenoid growths. The mucous membrane of the œsophagus showed a few scattered lymphoid follicles, while the interior of the stomach presented a complete chain network of lymphoid nodules. The network was very marked indeed in the fundus of the stomach, but became gradually less noticeable as the pyloric extremity was approached. Peyer's patches were thickened and numerous small lymphatic nodules were scattered throughout the colon, and quite visible through the peritoneal coat externally. The mesenteric glands were all considerably enlarged, and the majority of them were quite red, though here and there there were small groups of enlarged mesenteric glands that were almost white in colour. The general appearance conveyed the impression that some of the glands (*viz.*, the white ones) had been enlarged perhaps for many years, whereas the red glands looked as if they had been affected by a superadded acute inflammation of quite recent date. The largest of the glands approximated the size of a kidney bean. The lumbar glands were apparently normal. There was no evidence of tubercle or of any infective disorder of the intestine. The cervical glands were not enlarged. The bronchial and tracheal glands were much pigmented but otherwise not abnormal. The mediastinal glands showed no naked eye change. The heart exhibited some hypertrophy of the left ventricle; on section its muscular substance was a little brown, and broke down under pressure of the thumb much more readily than it should do. Its cavity was not dilated and was nearly empty; the mitral valve flaps and the size of the orifice were normal. The tricuspid, aortic, and pulmonary valves were normal. The right ventricle was not dilated and was empty; the auricles contained some blood but were not dilated. The weight of the heart was $9\frac{1}{2}$ ounces. Both lungs were dark red in colour but were otherwise normal. The right lung weighed 13 ounces and the left $14\frac{1}{2}$ ounces. The spleen in size was on the large side of normal; it weighed $6\frac{1}{2}$ ounces. On section its substance was dark and injected, Malpighian bodies being markedly prominent. The edges of the liver were a little thickened, but the organ possibly was not much, if at all, enlarged; it weighed 43 ounces. Its external surface was dark red. On section its substance was dark red and showed slight uniform injection; lobulation was most indistinct and there was no congestion of the hepatic veins in the centre of the lobules. Both kidneys were dark red in colour. On section there was present a marked uniform injection, the cortex was normal in thickness, and both cortex and pyramids were dark red. The capsules stripped readily, leaving a very finely granular

surface. The condition of both kidneys resembled that of an early stage of acute scarlatinal nephritis, and a post-mortem catheter specimen of the urine gave a neutral reaction to litmus and showed a considerable cloud of albumin as being present (by boiling the top of the column with a drop of dilute acetic acid added and by Heller's nitric acid test). The right kidney weighed $4\frac{1}{2}$ ounces; the left also weighed $4\frac{1}{2}$ ounces. The brain was normal in appearance and weighed 45 ounces.

CASE 5.—I wish to acknowledge my indebtedness to Dr. H. Kerr, medical superintendent of the Bucks County Asylum, for the notes of this case. The patient was a female, aged 28 years, the subject of epilepsy. She was dull and heavy in appearance and took but little notice of questions, which had to be repeated before she replied. She had been addicted to epileptic fits since childhood, which invariably occurred during the night only. Her first symptoms of insanity were two years ago, when she was temporarily violent. Six months ago acute mania developed, with violence, numerous delusions, and hallucinations of sight and hearing. A fortnight later she was again in a fairly rational state, which was maintained up to the time of her death. During the last five months she had had on an average 11 fits a month, all during the night. Her bodily condition was good and she was well nourished. The heart and lungs were normal; the pulse was 80, regular, and full. The pupils were rather large, but equal, and reacted normally. On Sept. 13th last she had a severe fit at 1.40 A.M. and died a few minutes afterwards—lying on her side with her face quite uncovered.

Necropsy.—At the post-mortem examination the skull was found to be thickened. The pia mater and arachnoid-mater were thickened and milky-looking, especially along the blood-vessels, but were not adherent to the convolutions. The brain on section showed slight congestion of the cerebral blood-vessels. It weighed $48\frac{1}{2}$ ounces. As regards the heart, the pericardium contained an excess of fluid. The right auricle and ventricle were both rather thin-walled. The left auricle was normal; the wall of the left ventricle was well developed and firm. The mitral and tricuspid valves and the size of the orifices were normal. The weight of the heart was $10\frac{1}{2}$ ounces. The lungs were normal; the right weighed 13 ounces and the left $14\frac{1}{2}$ ounces. The thymus gland was present, measuring 2 inches long and weighing just over $\frac{3}{4}$ ounce. The mesenteric glands were considerably enlarged and of a pink colour. In the sub-peritoneal coat of the small intestine and in the mesentery the lymphatics appeared as very distinct milk-white vessels. The lumbar glands were enlarged. The liver was enlarged and showed fatty infiltration; it weighed $56\frac{1}{2}$ ounces. The kidneys were congested; the right weighed $4\frac{1}{2}$ ounces and the left 5 ounces. The spleen was much enlarged, congested, and friable. Malpighian corpuscles were prominent; the capsule stripped easily; it weighed $14\frac{1}{2}$ ounces. The stomach and generative organs were normal. The tongue, tonsils, bronchial glands, and Peyer's patches were not examined.

Surely even these five cases clearly teach one several things. In the first place, it seems evident that in deaths from the status lymphaticus it is the respiratory mechanism that is frequently affected first and not the heart, as is generally supposed. Cases 1 and 3 bear strong testimony to this, both before and after death, and Cases 2 and 4 do so post mortem, though both patients expired in less than a minute and were not observed *in articulo mortis*. Many writers say that the disease can be diagnosed, and speak of dulness behind the manubrium, caused by the persistence of the thymus; also dulness behind the body of the sternum from the enlargement of the mediastinal glands. Some say that the spleen is oftentimes palpable, and go so far as to mention that the enlargement of the mesenteric glands may be felt. These points, taken in conjunction with the age, the association of slight anæmia, rickets, a tendency to spasm of the glottis, phlegmatic disposition, anxious expression of the face, &c., appear to constitute the diagnosis. Now it can be seen that not one of these points has any real practical value. The existence of the thymus gland very rarely indeed gives rise to any appreciable dulness to percussion behind the manubrium, apart even from the difficulties of the osteal note. The thymus is seldom, if ever, very large in the disease in question, and its substance is invariably spread out

in a thin layer only, and mostly limited to a region that is normally rather dull. In percussing this region in the resonant chests of children of about four years of age, when the thymus gland should be roughly about at its maximum development, no significant dulness can be detected. If any dulness was found over the situation of the thymus in my opinion it would weigh as a point against the status lymphaticus, and not in favour of it.

There seems to be another disease known as "Thymus-Tod" in which the thymus gland attains a much greater size than it does in the status lymphaticus, but in which the mesenteric glands are not affected in the same way, and in which sudden death is not met with. In this disease death is brought about by direct pressure on the trachea, large blood-vessels, and vagus and recurrent laryngeal nerves—inspiratory dyspnoea, stridulous breathing, and cyanosis preceding death. The dulness might be due to this, to an aneurysm, gumma, or other tumour. The mediastinal glands are often not larger than normal and never more than slightly so; hence it is difficult to understand how these can give rise to dulness behind the body of the sternum—a region that is normally dull to percussion. The spleen appears to be seldom more than slightly enlarged and often not enlarged at all. To be palpable it must be appreciably so, and if the latter it is probably due to some other disorder. The mesenteric glands are usually of about the size of a sweet-pea and cannot often exceed that of a kidney bean, and as their consistence is not very hard, and as also the subjects of the disease are often not emaciated, the cases in which they can be felt through the abdominal walls must be very exceptional.

Age does not make the probability great either one way or another, as although deaths are commonest between the ages of 15 and 18 years, nevertheless they have been known as young as one year or even younger and as old as 50 years. Slight anæmia, tendency to laryngeal spasm, phlegmatic disposition, &c., are frequent enough apart from the disease and by no means always concomitant. Active rickets exists only at a time when deaths from the disease are comparatively rare. With this, in our present state of knowledge, the disease must be undiagnosable, and if this is so it is a pity to disguise the fact, or at "inquests from deaths under anæsthetics" coroners will be asking how it was that we had not previously become cognisant of the condition. It seems probable that there must be some constant change in the blood and it is hoped that modern hæmatology will come to the rescue. Some observers have described a lymphocytosis as being frequently present, but they add that the increase in number of the lymphocytes is neither great nor constant. Others mention a diminution in the percentage of hæmoglobin. The disease appears to affect males more than females and its subjects are said to be peculiarly liable to fright. True, fright may produce even a fatal effect, but are they specially liable to it, particularly as the neurotic and phlegmatic temperaments are more or less incompatible? More than one member of a family has been affected.

The enlarged thymus gland, situate as it is in the superior mediastinum and superficial to the pericardium and large blood-vessels, is bound to press on first the thin-walled left innominate vein and then the innominate and left carotid arteries before it can reach the more deeply placed and most resistant of the structures—namely, the trachea. Yet it is said to have produced dyspnoea by direct pressure on the trachea without affecting the main blood-vessels and nerves. It is difficult to conceive how this could take place, and one would at least expect some cedema of the left arm if nothing else. Stridulous breathing is only found in "Thymus-Tod," and the dyspnoea preceding death in the status lymphaticus seems more likely to be of central nervous origin. The theory I would suggest is, that just as in myxœdema and cretinism from disease or absence of the thyroid gland there must be the absence of "a something circulating in the blood that we cannot do without," so in the status lymphaticus from disease or presence of the thymus gland there is the presence of "a something circulating in the blood that we cannot do with": that this something is a toxin (? a lymphotoxin) and acts in a somewhat analogous way to a narcotic—such as chloroform—paralysing first the respiratory centre in the medulla and then the cardiac centre. We are acquainted with the gross changes that are produced by the extract of a normal thyroid gland on a pathological subject

—viz., a cretin—why should not equally gross changes of a different character be produced by the secretion of a pathological thymus gland on a normal subject? The enlargement of the spleen, lymphoid tissues, and lymphatic glands more or less throughout the body would be compatible with a toxic cause, as are also the effects on the muscular wall of the heart, the apparent effects on the cardiac and respiratory centres in the medulla, besides the effects on the liver and on the kidneys—the last-mentioned possibly even producing an acute nephritis with albuminuria. The different kinds of toxins manufactured in various specific fevers may, to a greater or lesser extent, augment the action of this pre-existing toxin, and hence this may be the reason that deaths are perhaps more frequently met with under these circumstances. The concurrence of diphtheria is said to be particularly fatal; the toxin of diphtheria can produce flaccidity and fatty degeneration of the muscular wall of the heart, a condition that is found often in deaths from the status lymphaticus. It is curious that death is invariably so sudden in the last-mentioned disease, though the interval between the effects on the respiratory and cardiac centres may vary considerably. In some cases both centres seem to be affected almost simultaneously, as if from a large overdose of a narcotic, while in others quite an appreciable time intervenes, as if from a smaller overdose of a narcotic. It is significant of notice, too, that in the former class of cases the mesenteric glands post mortem are much redder than they are in the latter class.

The exciting cause of death also shows such an enormous range of intensity. In Case 2 the patient was merely getting up from dinner, and in Case 4 only sitting in a warm bath, which he was accustomed to, and yet in both instances the cessation of both respiration and heart's action must have been practically simultaneous, while in Case 3 the patient had been having as many as 14 violent epileptic fits in a day, during the few days before he died—besides only six months previously having survived a bad attack of acute lobar pneumonia—and on this occasion respiration was affected some time before the heart. In Cases 1, 2, and 4 the mesenteric glands were small and red, while in Case 3 they were uniformly larger and almost white, suggesting that in the former instances the toxæmia was much more acute and that in the latter instance it was much more chronic. In the former instances, too, although the firing-off causes were most trivial, nevertheless death was almost instantaneous, while in the latter instance the firing-off cause was most serious, and yet death was not nearly so sudden. I have seen a large thymus gland in several necropsies on children between the ages of two and five years, where it was very difficult to say what bearing it had, if any, on the cause of death, and how far the condition was pathological. Microscopic examination of the thymus gland simply shows a hyperplasia.

Ethyl chloride occupies a position that cannot be replaced by any other anæsthetic—i.e., it forms a sort of half-way house between nitrous oxide—or $N_2O + O$ —and chloroform or ether—or C.E. or A.C.E. Although possibly not quite as safe as $N_2O + O$, or nitrous oxide alone, nevertheless it is probably a great deal safer than chloroform or ether, or C.E. or A.C.E. True, vomiting is more frequent after the administration of ethyl chloride than after gas, or gas and oxygen; also, the way in which different people take it varies very considerably. Nevertheless, it is undoubtedly safer than chloroform, ether, or A.C.E. mixtures, and certainly vomiting is very much less frequent after it than after any of the latter, and the possibility of a subsequent ether pneumonia is out of court. Again, the apparatus takes up a great deal less room and is so much lighter than that necessary for the administration of nitrous oxide that a general practitioner in the country can easily take it with him, on a bicycle if he wishes; whereas if he is prejudiced against its administration, and also it is quite likely impracticable to take a gas apparatus with him, then he has no choice left but to give either chloroform, ether, or A.C.E. mixture—and the first-mentioned is the one usually employed—or to do the operation without any anæsthetic at all, a measure that would subject the patient to much unnecessary pain besides a great deal of shock. Now if he decides to use ethyl chloride he not only expends less of his own time but also he is able always to see his patient thoroughly round before leaving the house—a maxim which is, unfortunately, not always quite possible in the

case of chloroform. Lastly, the instances where a general anæsthetic of about 90 seconds' duration is required are very numerous, or cases where the continued administration is practicable an anæsthesia of three, four, or five minutes only is wanted.

The present tendency for ethyl chloride to fall somewhat into disrepute as a general anæsthetic seems to be due to several causes, viz.: 1. The existence of this—for the time being—undiagnosable disease, the status lymphaticus. 2. The operations for which it has most frequently been employed being those in which the disease is more often concomitant—namely, for the removal of such lymphatic growths as adenoids and tonsils. 3. The enormous number of times it was given in comparison with other anæsthetics during recent years and consequently the proportionately larger number of fatalities that occurred while under its influence. 4. The number of incompetent hands which its administration for a while drifted into, since it was at first so generally advertised as being very safe. 5. The various proprietary anæsthetics, sold under different names, that were made a short while ago with ethyl chloride as the active ingredient, and to which the baneful effects of methyl chloride and methyl bromide had been added without any potent reason. 6. The variable action of ethyl chloride on different subjects, and the fact that vomiting and hysterical manifestations were more frequent just after its administration than after that of gas. All these points have so militated against its use that the reaction from its former exalted position is, unfortunately, almost in an equal and opposite direction at the present time. Ethyl chloride seems indicated in nearly all cases where a short general anæsthetic is indispensable, and where it is not possible to give nitrous oxide; also for cases where an anæsthesia of about 90 seconds' duration or a little longer is essential, but it would appear advisable that the previous preparations for its administration were more formidable and were similar to those preceding the giving of chloroform. Apart from the risks of vomiting and other troubles consequent on the presence of food in the stomach, ethyl chloride is better not administered when the splanchnic blood-vessels are engorged and the cerebral blood pressure is lowered. At the commencement of the administration it is important that the patient should breathe regularly and freely and not take one very large and sudden breath after a prolonged period of apnoea with consequent cyanosis. It is also wiser that the patient should be in the recumbent position, or, at all events, that the head and shoulders should be quite low. The face-piece of the inhaler ought to be connected to the bag by a tube of large calibre unobstructed by a sponge.

I contend that deaths under any anæsthetic properly administered are, apart from the status lymphaticus, of extreme rarity. There is no valid evidence to show that either chloroform or ethyl chloride is worse than any other anæsthetics when dealing with subjects of the status lymphaticus. Undoubtedly, if one could previously exclude the existence of this pathological state the deaths under all anæsthetics would be reduced to an infinitesimally small number. Further, if we take for a hypothesis that one is actually cognisant of the disease then I maintain that in these circumstances in the administration of chloroform the proper course would be not to commence the operation until the patient was in the third stage of anæsthesia, as shock in these cases is probably a more important factor than the influence of the narcotic. In subjects of the status lymphaticus many deaths have occurred under local anæsthesia and apart from any anæsthetics at all. Further, in a protracted operation under chloroform where the patient has been kept uniformly all along in the third stage of narcosis with a contracted pupil, although his general condition may have been quite good throughout, nevertheless when he is just commencing to come round, and the last few skin sutures are being inserted, he may suddenly die, or he may even die some five or ten minutes after having recovered from the anæsthetic, in corroboration of which I am quoting a case in point of Dr. W. J. McCardie's. There can be no doubt, too, that subjects of the disease do frequently survive anæsthetics without evidencing any untoward symptoms during their administrations. The ominous cyanosis preceding trouble caused by the lymphatic state while under an anæsthetic is not influenced by oxygen as quickly or to such an extent as is the lividity that may occur during anæsthesia from other causes. In very many instances the respiratory

apparatus is affected prior to, and to a greater extent than, the cardiac, and Dr. McCardie recently reported a case where the alæ nasi continued to work regularly after the respirations had ceased, and in which instance tracheotomy was performed but without avail. Concerning the diagnosis the base of the tongue affords a more constant and the most tangible evidence—i.e., posterior to the circumvallate papillæ and between these and the epiglottis there are very frequently a great multiplication and hypertrophy of the lymphatic nodules. If on examination with a forehead mirror and a laryngoscope mirror, this condition is seen, it, *per se*, would be sufficient to deter me from operating or giving an anæsthetic, and, *a fortiori*, if considered in conjunction with other probabilities. Unfortunately, the negative phase of this peculiarity is worthless.

The association of epilepsy and hereditary neuropathic taints seems scarcely sufficiently emphasised. Some people, in whom unexpected deaths under anæsthetics have taken place and post-mortem examination has subsequently disclosed the status lymphaticus, have previously shown a terrible fear of anæsthetics. Now a marked connexion between this disease and the nervous system is recognised, also the consensus of opinion grants that death can take place in the initial stages of chloroform anæsthesia from fright alone in certain neurotic subjects, and infers that any aromatic vapour believed to be chloroform would have produced the same disaster. Why should not this be another possible explanation of the fatalities, as I particularly notice that the deaths occur only in the lighter stages of anæsthesia, either previously to, or on recovery from, the third stage of narcosis? Even the popular saying is that "Sudden fright takes away one's breath." The status lymphaticus is apparently a disease that has been insidiously at work for an unknown time till some either exceedingly trivial or most serious firing-off cause gives rise to a fulminating termination. The breathing and heart's action more often stop simultaneously, though very frequently the respiratory movements cease first and the heart stops beating secondarily at varying lengths of time subsequent to the stoppage of respiration. The pulse may be perceptible at the wrist just after the cessation of the respiratory movements, but most usually it is not, in which circumstances the heart can often still be heard with a stethoscope over the præcordium to be beating weakly and irregularly. In yet other instances the heart's action must be the first to stop. The cessation apparently takes place during systole, as both ventricular cavities are usually empty post mortem, that of the left side invariably. When the heart stops first, or when both centres appear to be seized at the same time, a sudden and extreme degree of pallor comes over the face; the lips, eyes, and complexion immediately assume an ashen appearance, the pupils dilate, and an obviously cadaverous effect is at once produced, forming what is so-called "the fatal white syncope." When the respiratory centre is affected to a greater extent than the cardiac centre, or prior to it, the face rapidly becomes livid, constituting the so-called "blue syncope." It seems probable that this is not infrequently recovered from, but in many instances the particular kind of lividity must look ominous from the onset, and although the pupils may only dilate to a small extent the lips assume a leaden hue, giving rise to a general appearance that is quasi-moribund. The actual degree of cyanosis does not help one much and, perhaps, the more marked this is the more one can do by artificial respiration, &c.

THE LANCET and the Hyderabad Commission on Chloroform after extensive experimentation on dogs and monkeys conclude that chloroform will not cause sudden death from stoppage of the heart. That it has no power of increasing the tendency to either shock or syncope during operations, and say further that if shock or syncope from any cause does occur, it prevents, rather than aggravates, the dangers of chloroform inhalation. That in fatty degeneration of the heart, which is very frequently found in subjects of the disease in question, chloroform in no ways endangers it, but, on the other hand, is a positive advantage, by virtue of lowering the blood pressure and lessening the work it has to perform (this result also is not theoretical but has been proved experimentally on dogs). In examining the notes, both ante- and post-mortem, of over 700 deaths under anæsthetics collected by THE LANCET and the Hyderabad Commissions during a period of 60 years, in no

one instance is death attributed to the status lymphaticus, although, on reading between the lines of the notes, a very large number of the fatal cases of syncope must surely have been due to this disease.

Reading.

COMPOUND, COMMINUTED, AND DE-PRESSED FRACTURE OF SKULL, WITH LACERATION OF BRAIN AND RUPTURE OF MIDDLE MENINGEAL ARTERY.¹

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A MAN, aged 33 years, a Maltese shipwright, was brought to the Royal Naval Hospital at Malta about midday on Dec. 13th, 1906, with the following history. When working in the rigging of a cruiser in Malta Harbour he fell on to the vertex of his skull, a distance of 12 feet, striking the iron edge of the bridge ladder. He was picked up unconscious and vomited. There was a wound on the top of his head, from which blood and brain matter were escaping, and bleeding from the left ear and nostril.

On examination the patient was seen to be a powerfully built man; he was unconscious but when moved or roused showed reflex irritability. He lay curled up in bed on his left side, with the thighs flexed on the abdomen, the legs on the thighs, the forearms on the arms, and the fists clenched. The pupils were equal and contracted with conjugate deviation of the eyes. There was a jagged wound of the scalp over the anterior part of the left parietal bone near the middle line about one and a half inches long, from which brain matter and blood escaped. There was a distinct depression of the skull at this point. There was no escape of cerebro-spinal fluid from the ear, but there were an extravasation of blood into the left eyelid and dried blood in the left ear and nostril. The temperature was 98° F., the pulse was small and difficult to count, and the respirations were shallow and rapid. There was no paralysis of the limbs. The entire scalp was shaved and thoroughly cleansed.

At 2 P.M. the patient was taken to the operating-room and an incision was made across the vertex from ear to ear, about one and a half inches posterior to the wound, through the whole scalp, and the anterior flap was reflected over the face. The skull over the anterior portion of the left parietal and frontal bones presented the appearance of a cracked walnut, with the fragments completely fractured and impossible to keep in position, and with a portion about 1½ inches by 1 inch, irregular in shape, depressed close to the longitudinal sinus, and from the free hæmorrhage it was feared that this structure must be wounded. Brain substance was also exuding. On attempting to elevate this depressed portion it was found that the inner table was much more extensively fractured than the outer one. By removing two smaller fragments close to it the depressed bone was finally removed, when an immediate improvement in his respiration was noticed. The longitudinal sinus was found intact but the hæmorrhage was very serious and coming from the direction of the middle meningeal artery. By this time the patient was blanched and no pulse could be felt at the wrist. Staff-Surgeon H. C. Whiteside injected two pints of saline solution into the left median basilic vein and one pint was injected per rectum. This had an excellent result; the patient rallied, became a better colour, and the pulse could be counted.

In addition to removing the fractured portions of bone, it was found necessary to remove more bone in the direction of the external angular process with gouge forceps to reach the main trunk of the middle meningeal artery which was found ruptured just before its bifurcation. This vessel was under-run and ligatured. In all five pieces of bone were removed, irregular in shape, but measuring roughly nine square inches. The dura mater, which had been severely lacerated, was brought together and sutured, but it was found impossible

¹ A paper read before the Malta branch of the United Services Medical Society.