The last group of cases of acute heart failure with which I shall deal includes those in which there is an increase of pressure in the chest. The heart, as you are aware, has very little suction power and is filled with blood mainly because the pressure in the veins is higher than the pressure in the pericardial sac, in which the pressure is continually negative, this negative pressure being markedly increased during inspiration. An increase of pressure in the pericardium is therefore accompanied by deficient filling of the heart and hence the great danger of acute heart failure. Two conditions with which we have to deal are pericardial effusion and pericardial hæmorrhage. The pericardium readily stretches as the result of pericarditis and will hold a considerable quantity of fluid without its tension being raised to the dangerous limit; the fluid is, moreover, poured out comparatively slowly and hence time is allowed for the stretching of the pericardium. However, if a high pressure occurs the patient will certainly die from acute heart failure unless tapping is resorted to, the needle being introduced into the fourth or fifth left intercostal space near the left edge of the sternum. Pericardial hæmorrhage is much more dangerous because the blood is poured out at a high pressure and rapidly distends the pericardium, which has not time to stretch. The patient dies not from the loss of blood but from the rapid rise of intrapericardial pressure. Tapping is, of course, useless and the patient always dies unless operation is resorted to within about 14 hours. The results of operation are certainly encouraging, as 41 per cent. recover,⁷ cases of injury to the heart, of course, being more favourable than rupture of that organ due to disease.

Practically speaking, rupture of the heart due to fatty degeneration, acute abscess, and so on, always leads to death. The same may be said of a ruptured aneurysm. If the wall of the ventricle or a coronary artery be ruptured as a result of injury the pericardium must be at once opened and the artery tied or the wall of the ventricle sutured. It is advisable to introduce interrupted sutures not involving the endocardium and placed close together. They should be tied during diastole.

Finally, pleural effusion is liable to be accompanied by acute heart failure, and in the days when Trousseau⁸ advocated tapping sudden death was of frequent occurrence. In addition to causing a rise of intrathoracic pressure, pleural effusion obstructs the circulation through the lung and displaces the heart. Whenever the dulness reaches up to the apex of the lung, whether symptoms of respiratory distress are present or not, the patient is in danger of acute heart failure. He may die suddenly from syncope or a slower heart failure may occur, resulting in intravascular thrombosis or œdema of the sound lung. The only treatment for this condition is tapping and the chief indication for tapping is the amount of the effusion.

Devonshire-street, W.

CEREBRO-SPINAL FEVER.

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THE somewhat sudden and alarming epidemics of cerebro-spinal fever in Glasgow, Belfast, and other large centres of the United Kingdom have served to direct special attention to this most extraordinary and obscure disease. Isolated or sporadic cases of typical cerebro-spinal fever are constantly occurring in the practice of any large hospital, and I have during the last ten years observed several cases which cropped up in a most mysterious manner, some of them recovering and others rapidly progressing to a fatal termination. Why it is that these sporadic cases should not become epidemic is difficult to understand, and it is still more difficult to understand how the disease is spread with such rapidity amongst the children of a populous centre. The general impression is that the special germ or micro-organism known as the meningococcus of Weichselbaum is conveyed through the air passages directly to the base of the brain. The resemblance in the symptoms of this disease to many other forms of meningitis

renders it extremely difficult of classification and the definition given by the late Mr. Radcliffe is, in my opinion, the most accurate. He describes cerebro-spinal fever as "an acute, epidemic disease, characterised by profound disturbance of the central nervous system, indicated at the onset chiefly by shivering, intense headache or vertigo, or both, and persistent vomiting; subsequently by delirium, often violent, alternating with somnolence or a state of apathy or stupor; an acutely painful condition with spasm—sometimes tetanoid—of certain groups of muscles, especially the posterior muscles of the neck, occasioning retraction of the head; and an increased sensitiveness of the surface of the body. Throughout the disease there is marked depression of the vital powers, not unfrequently collapse; and in its course an eruption of vesicles, petechial, or purpuric spots, or mottling of the skin is apt to occur. If the disease tend to recovery, the symptoms gradually subside without any critical phenomena and convalescence is protracted; if to a fatal termination, death is almost invariably preceded by coma. After death the enveloping membranes of the brain and spinal cord are found in a morbid state, of which the most notable signs are engorgement of the blood vessels, usually excessive, and an effusion of sero-purulent matter into the meshes of the pia mater and beneath the arachnoid. To the clinical manifestations of the disease indicated in this definition may be added the presence of Kernig's sign and of tache cérébrale."

From my own personal experience of a great many forms of inflammatory disease involving the brain and spinal cord I would say that the presence in the exudate of the meningococcus of Weichselbaum removed by lumbar puncture is the only absolute indication that we are dealing with true cerebro-spinal meningitis. If this particular organism is discovered and corresponds to the well-defined tests, then we are dealing with a case of epidemic cerebro-spinal meningitis. In a few instances it is impossible to discover the particular organism, but that alone will not negative the true nature of the disease. The full and excellent report of Dr. Gordon made to the Local Government Board is well worthy of careful study, hence it is not necessary to refer to the special characteristics of the micro-organism. The two cases which I record are of profound interest in demonstrating the difficulty, I might say impossibility, of differentiating between this disease and another form of meningitis with similar symptoms during life.

CASE 1.—The patient, a boy, aged ten years, was admitted into Mill-road Infirmary on Feb. 1st, 1907. His mother stated that he had been quite well until a week previous to admission (Jan. 24th), when he came home from school complaining of pain in the head—across the forehead and at the back of the head. He had also complained of pain in the abdomen and had vomited once on the morning before admission. The child had been very quiet and drowsy but irritable and not caring to be touched at all. On the night of Jan. 31st he had screamed out at intervals and had been restless and delirious. The mother said that the child had stated on Jan. 21st that he had been hurt by a football hitting him in the abdomen. He had complained of pain since then and had a slight cough. The bowels were regular.

On admission the patient was unconscious, delirious, and very irritable. The temperature was 103° F., the pulse was 110, and the respirations were 40. When left alone he was quiet but he breathed noisily. When being examined he struggled and was resistive. He did not understand questions and made no attempt to speak. He was not emaciated but there were several petechial spots about the skin. The patient assumed a lateral decubitus. Both knee-jerks were present and were somewhat exaggerated. Kernig's sign was not marked. There was no retraction of the head but there was some stiffness on passive movement. The pupils were dilated equally and there was no squint or nystagmus. There was a discharge from the ear on the right side. The abdomen was not distended, was soft, and moved with respiration. The tongue was dirty and dry and the bowels were constipated. The cardiac rhythm was rapid and regular in time and force. Râles and rhonchi were audible all over the upper and lower lobes of the left lung. There was no loss of percussion resonance. Over the right lower lobe there was loss of resonance. The breathing was bronchial and there were fine crepitation and bronchophony, which were also audible over the back of the right upper lobe. One and a quarter grains of sulphate of quinine were given every four hours and a drachm of brandy at like intervals. A "pneumonia jacket" was applied and seven and a half

⁷ Hill: THE LANCET, Feb. 16th, 1901, p. 491.

⁸ Trousseau: Lectures on Clinical Medicine, vol. iii., p. 221 (New Sydenham Society).

grains of bromide of potassium were directed to be given if required. On the 2nd there was dried purulent discharge in both pinnae. There was dulness of the percussion note and fine and medium râles were heard down the whole of the right side of the chest. A dose of three grains of calomel was given, an ice-bag was applied to the head, and an enema was directed to be administered if required. The patient had a rigor at 7 P.M. and the temperature rose to $104^{\circ}4'$. The pulse was intermittent and the child was unconscious. He was delirious at times and he often cried out. Lumbar puncture was performed at 4.30 P.M. The fluid was clear, serous, and colourless. Cultures were made and the fluid was centrifuged. Under the microscope the deposit was found to contain diplococci of Weichselbaum. On the 3rd the patient was still drowsy and semi-conscious but was not shouting out so frequently and was not so restless. Lumbar puncture was again performed at 12.45 P.M. and the fluid was still found to be clear and colourless. On the 4th the child did not appear to be so comatose as before, was not so restless, and appeared to be able to hear questions. Kernig's sign was marked. There was no distension of the abdomen. There was still some dried pus on the right pinna. The ear was syringed with boric acid lotion, after which a solution of one ounce of perchloride of mercury and three drachms of rectified spirit of wine was dropped in morning and evening. Three grains of calomel were given. On the 5th the patient was deeply comatose. The temperature was $106^{\circ}4'$, the pulse was 160, and the respirations were 56. The pulse was very thready and soft, there were no knee-jerks, and all the limbs were flaccid. The head was still rigid. There was some divergent strabismus. The chest still had râles and rhonchi but these were clearing from the front and were audible in the axillæ and the back. The patient was perspiring freely. A tepid sponging brought the temperature down to 101° . An enema was administered. On the 6th the temperature, which on the previous evening had been $100^{\circ}2'$, rose at 2 A.M. to 105° . The patient was rather irritable and tried to rub his eyes and ears. The abdomen was slightly retracted still but was soft. The pulse was very rapid and feeble. Coffee was given. At 4.30 P.M. the patient was much worse, the pulse being very rapid and more feeble (120 per minute). There were marked subsultus tendinum and floccillation with occasional cough. The respirations were 60 and the temperature was $105^{\circ}4'$. A drachm of glycerine as an enema was administered with good result and tepid sponging was ordered when the temperature rose above $103^{\circ}6'$. On the 7th the patient was still unconscious and the pulse was very feeble and rapid. The temperature was $104^{\circ}4'$ at 10 A.M. At 1 P.M. a tepid sponging brought the temperature down to 101° and the patient's condition was much improved. Lumbar puncture was performed. The fluid was still clear and was not running so freely as before. A petechial rash was marked on the legs and the body. There was optic neuritis in both eyes. *Mistura digitalis cum strychninæ* (two drachms every four hours) was ordered. At 8 P.M. the patient appeared to be much more comfortable and seemed to understand questions and to take notice of affairs. There were slight sweating and increased diuresis. The colour had improved. On the 8th the improvement was not maintained. The pulse was very rapid and feeble and the temperature kept high. The bowels were still constipated. The glycerine enema was repeated. On the 9th the patient remained in the same condition as on the previous day. There were loud creaking râles and rhonchi audible over the entire chest, back and front. Bronchial breathing was present over the right lower lobe only and nowhere else. A tepid sponging was applied twice during the night with good effect. The pulse was very feeble and rapid (140 per minute) and the respirations were 44 per minute. There was a small septic blister over the sacrum. Dry gauze and xeroform powder were used. There was slight purulent, very offensive, discharge from both ears. A soap-and-water enema was administered and two drachms of glycerine per rectum were ordered to be repeated if required. The ear drops and the syringing were continued. On the 11th the patient became comatose and died.

A post-mortem examination was made 12 hours after death. No gross macroscopic lesions were seen on the brain or on the spinal cord. The lungs were in a state of broncho-pneumonia. There were several old calcareous glands and enlarged glands in the omentum. There was no ulceration of the intestine. The kidneys, the spleen, the heart, and the liver were healthy. Post-mortem appearances were, in fact, almost negative.

CASE 2.—The patient, a child, aged eight years, was admitted to Mill-road Infirmary on Feb. 13th, 1907. His mother stated that on Feb. 10th the child had complained of severe pain in the head and had vomited. On the 12th he had become very drowsy and had not been roused since. He had taken but little nourishment. The bowels had been opened on the 11th after an aperient but not since.

On admission the temperature was found to be 100° F., the pulse was 104, and the respirations were 26. The patient was lying on his back in a comatose state, the limbs being all flexed and rigid but they could be straightened by continued pressure. There was no rigidity of the neck nor was there retraction. The pupils were equal. There was no paralysis of the eye muscles. The lungs were clear and the abdomen was flat. There was no discharge from the ears. Two grains of calomel and an ounce of white mixture were given in the morning and half an ounce of diaphoretic mixture was ordered to be given every four hours. On the morning of the 14th there were rigidity and retraction of the neck. The patient ground his teeth, the limbs were all flexed and rigid, the knee-jerks were very sluggish, and *tache cérébrale* was well marked. The child uttered no cry. The tongue was furred but moist and there were sordes on the lips. Urine and faeces were passed involuntarily and the patient took no notice of anything. He was not irritable when touched. There were no petechial spots. At 3.15 P.M. lumbar puncture was performed when about 30 cubic centimetres of slightly opalescent fluid ran out. At 11 P.M. the patient was perspiring. The neck was very rigid but not very retracted. The patient was not so listless. There were variable squints (slight). Ten cubic centimetres of cerebro-spinal fluid were centrifuged. It was slightly opalescent. There was a fair amount of whitish yellow deposit but no red deposit. Microscopical examination showed a large excess of leucocytes, multinuclear and lymphocytes, a very few red blood corpuscles, and no organisms. On the 15th the patient still perspired profusely. Miliaria appeared all over the upper chest. The neck was rigid and the child could not put his chin on his chest. The arms were folded across the chest and were rather rigid. The legs were straight now but Kernig's sign was present. The knee-jerks were slight and there was slight Babinski's sign. There was incontinence of urine and faeces and the patient would not respond to speech. The pupils were dilated but they reacted to light. There was paresis of the external rectus of the left eye. The patient was taking nourishment fairly well. The bowels were rather relaxed; the abdomen was flat. There was no vomiting. There had been no shouting out since admission. Sulphate of quinine mixture, one drachm, was given every four hours. The patient spoke a little when spoken to. He said "What" and "Well." On the 16th he would not speak. The tongue was moist but furred. Kernig's sign was present. There were no spots but some subcuticular mottling was observable on the thighs. The squint was still present. There were some large moist râles to be heard at the left base and some rhonchi at the front chest. At 5.30 P.M. lumbar puncture was performed and about 20 cubic centimetres of fluid ran out, at first in a stream, not drops. Ten cubic centimetres of the fluid were centrifuged. Numerous lymphocytes and multinuclears were in the field but no organisms were present. At 9 P.M. the patient recognised his father and talked in a delirious way. On the morning of the 17th he again talked a little but was delirious. The head was still very rigid and the arms were folded on the chest. The legs were straight but Kernig's sign was present. The patient did not shout out at all, but he was restless. He had not passed urine for 12 hours. The tongue was moist but was covered with dirty white fur. A quarter of a grain of calomel was given every two hours. On the 18th two drachms of brandy were ordered to be given every three hours. There was slight ptosis on the right side and the right pupil was larger than the left one. There was no vomiting. The patient had uttered no cry since admission. He had tremor of the limbs (upper) again on this day. There was a profuse crop of miliaria on the chest. At 8 P.M. lumbar puncture was performed when about 15 cubic centimetres of fluid were withdrawn; at first it ran out, not in drops; it was slightly turbid. Microscopical examination showed an excess of cells as before, but no organisms. On the 19th the patient was rather worse. He was restless and he uttered sighing noises. The head was not retracted, but the neck was rigid. The back also was rigid. At 10 P.M. as the patient

had not passed urine since 1 A.M., a soft rubber catheter was passed. The urine was acid and clear and its specific gravity was 1010. At midnight on the 20th a catheter was passed. On the 21st the patient was in a dying state. There were no fresh focal symptoms.

A post-mortem examination was made 16 hours after death. Pus was found in the interpeduncular space and over the upper surface of the cerebellum in the middle line. The vertex of the brain was normal. Miliary tubercles (early) were discovered in both lungs and in the spleen and liver. There was a caseating patch in the spleen of about the size of the head of a bonnet-pin, as well as some caseating material about the glands round the head of the pancreas. The mesenteric glands were normal. The bronchial glands were not noticeable. On Feb. 25th some smears from the caseating patch in the spleen and the caseous glands about the head of the pancreas showed numerous tubercle bacilli.

The above two cases show the impossibility of making an accurate diagnosis between cerebro-spinal and acute tuberculous meningitis, especially in time of epidemic when attention is turned in that direction. The absence of tubercle bacilli from the lumbar puncture exudate is, of course, no reason for negating tubercle, as they are only recovered in a small percentage from such exudations. The rapid onset of the tuberculous case is unusual, whilst in both cases there were skin rashes of a petechial character. I felt quite certain that I had to deal with a case of genuine cerebro-spinal meningitis and it was only at the post-mortem examination that that opinion was reversed. Had there not been the presence of an epidemic we would probably have looked upon the case as one of acute tuberculous meningitis. The withdrawal of quantities of cerebro-spinal fluid by lumbar puncture was followed in every instance by marked amelioration of the symptoms and even rapid improvement for a time, due evidently to the relief of pressure, but so soon as the fluid re-accumulated the symptoms seemed to arise with even greater severity than before. As a therapeutic measure, however, I would strongly urge repeated lumbar puncture and injections of lysol or some of the silver salts, or even permanent drainage of the spinal canal. No other treatment with which I am acquainted seemed to have the slightest curative effect on the disease, although the symptoms, of course, were immensely relieved. I have had no experience of the special meningococcic serum, but it is well worthy of trial. In fact, everything possible ought to be tried in such a malignant and fatal disease.

For the careful and accurate observations on these cases I am indebted to my colleagues, Dr. Arthur Hendry and Dr. R. G. Wills, resident medical officers in the hospital.

Liverpool.

A SERIES OF CASES OF PUERPERAL SEPTICÆMIA;

WITH COMMENTS.

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DURING the year 1906 there have been discharged from Monsall Hospital 49 completed cases of puerperal fever and it has occurred to me that some particulars of their condition may be interesting to others besides myself if only for the reason that clinical observations of this class of disease have not hitherto been reported with any degree of frequency in this country. Moreover, as the cases have all been treated by the same medical and nursing staff it is perhaps rather more possible than usual to compare them with each other.

I would call attention, in the first place, to the annexed table, in which the details of each case are briefly set forth. It is not pretended that this is in any sense complete, but it is, I think, useful inasmuch as it shows the type of case that is admitted to the isolation hospital of a large city. These details I propose to analyse and to comment upon briefly.

The results.—There is a gross mortality of 12 cases, or 24 per cent. Of these, four were obviously moribund on admission, and, in fact, died within a few hours of their arrival. It is, I think, greatly to be regretted that isolation hospitals are treated so badly in this respect by the general

practitioner. When it must be obvious that the patient has but a few hours to live it can serve no good purpose, as far as his illness is concerned, to have him removed to hospital—usually it accelerates his end. It is often convenient, no doubt, that a death shall not occur in the particular house, or in the practice of the certifying medical man, but, on the other hand, the procedure adopted at the hospital, be it medical or surgical, is often debited with the patient's death, and the progress of science and the good that the hospital can do in other cases are thereby considerably hindered. In this series if the moribund cases could be deducted the death-rate would be reduced to 16 per cent. Of the remaining eight, one died from an attack of pneumonia which began six weeks after admission, when the patient was apparently convalescent, and had no apparent connexion with the original illness.

Another point is that in only two instances was the patient not obviously in danger of her life when admitted. This series does not, therefore, include those mild cases of septic intoxication, which yield to gentle local treatment, or, it may be, to purgatives alone, which may occur in private practice or in the clinique of the maternity hospitals. If these are included, the statistical fatality of any series may be very low indeed. Such cases have, as a matter of fact, never been sent to Monsall Hospital at all.

That the cases have, as a rule, not been admitted until the treatment adopted has been obviously useless, is shown by the fact that the average interval elapsing between the calling in of the medical man by the midwife, or (in the cases where he has been in attendance all along) from the onset of the signs of sepsis to the notification of the case was a period of four and a half days. In other words, what must be admitted to be the most important period in the disease from the therapeutical point of view has been spent in the application of ineffective—often futile—measures. As a matter of fact, this series, as far as it goes, is not a bad record of the uselessness of such measures as vaginal and intra-uterine douches with a little quinine internally in cases of severe septic infection.

With regard to those discharged as cured it is necessary to observe that the patients have not been sent home until they have had sufficient rest in hospital to enable them to perform ordinary house work without pelvic pain or inconvenience, and have resumed their normal weight. In the great majority the uterus had recovered its mobility. As will be seen from the record their stay in hospital has on this account been frequently prolonged, the average detention of all cases being 40 days, and of those that recovered 60 days. The only exception to this is case No. 29, where the patient was discharged to the workhouse infirmary in a somewhat weak state owing to the pressure on our accommodation that existed at the time. As far as possible lacerations of the vagina and perineum and adhesions in the pelvis have been treated before the patient left hospital.

The cause of the illness.—In every case a detailed account of the circumstances that preceded the removal of the patient has been furnished me by the courtesy of the medical officer of health (Dr. J. Niven) and the medical officer to the midwives supervising committee (Dr. M. Merry Smith), to whom I am much indebted. It is possible, therefore, to divide the cases into those attended at the confinement by a medical man and those where a midwife only was present. There were some cases also where the woman was confined in solitude or attended by a neighbour only. The "practitioners'" cases are 28 in number, the "midwives'" are 16. It does not, however, follow that the medical man was responsible for the infection of the patient in all cases where he was present at the confinement, for in many a midwife or trained nurse was there also and may well have made internal examinations, and it is, moreover, probable in some instances that infection took place during the puerperium from contact with dirty clothes or the unskilful administration of vaginal injections. Evidence of the responsibility of the medical attendant is seen more clearly when an inquiry is made into the degree of interference that took place at the confinement. In 11 of these 28 cases there is a history of the use of forceps combined with a variety of laceration of the parts (seen on admission) that could not have resulted from natural causes only. There were other instances also in which the hand had been introduced into the uterus for the removal of the placenta in which infection by this means is at least probable, but it is not possible to put this statistically.

The length of the incubation period gives some clue to the