in the same nutrient fluid. (From diminished nutrient supply the small cells will atrophy sooner than large ones.) The smaller cells will become highly unstable sooner than large ones during morbid nutrition. It certainly is the fact that most epileptiform seizures begin in parts having "small movements," in parts represented by areas of the cortex having most small cells. As I have pointed out, they may begin in the large muscles of the upper arm; it would be begging the question to say that in these cases the smallest cells of the "shoulder centre" are those which first become highly unstable. The size of cells bears also on rates of discharge.

Four hot iron balls will become cold much sooner than the same mass of iron in one ball having the same quantity of heat as the four balls together have. From discharge of four small cells, which are together equal in mass to that of one large cell, there will be, I submit, a liberation of energy in a shorter time than by the large cell, supposing equal quantities liberated in the two cases. Hence another reason for fulmination of the highly unstable cells of discharging lesions if these cells are small. As being somewhat illustrative, I may refer to different sizes of grains of powder used as ammunition; slowly burning (pebble) powder is required for large cannons, quickly burning (fine-grained) powder for firearms.

To repeat the several hypotheses, Epileptiform seizures begin most often in parts of the body having "small movements;" these movements are represented by nervous arrangements having many small cells.²⁷ Small cells present a more extensive surface to nutrient fluid than the small quantity of grey matter in large cells, and will be more quickly nourished than large ones are. Nerve cells become highly unstable from an abnormal nutrition, such that, although their structure and the constitution of their material is unaltered, that material becomes of more nitrogenous composition, and thus more explosive. Small cells become highly unstable more readily than large ones do; thus discharging lesions are supposed to be especially of small cells. A rapid liberation of energy overcomes greater and more numerous resistances than a slower liberation of an equal quantity of energy. Small cells liberate their energy in a shorter time than large ones; hence the currents developed by fulminates of small cells overcome greater and thus more numerous resistances than would fulminates of large cells, and hence produce more convulsion and greater range of convulsion.

We have assumed that the nutrition of the cells of the discharging lesion is continuous, and have supposed in effect that the nutrient fluid is comparatively stagnant. But how is this comparative stagnation brought about? This brings us to pathology, commonly so-called. We have to distinguish between what I may call the coarse pathology of a case and its immediate pathology.

[In the remainder of the lecture the production of discharging lesions by tumours and by arterial occlusion was considered.]²⁸

²⁷ The movements, speaking most generally, represented by the cerebrum are, I suppose, numerous different punctuated movements (many and different "small movements"). Presumably those represented by the cerebellum are, in comparison, few and little different movements, movements as it were gliding into one another (few and similar "large movements"). It is interesting to observe that the structure of the cerebellum is more uniform than that of the cerebrum, and that those of the cells of the cerebellum which are presumably motor are large and of nearly equal size. The movements for bracing up the spine in standing or walking, and the separate movements of the legs and arms in walking, will require comparatively continuous supplies of large quantities of energy. (I believe, however, that the cerebrum and cerebellum are both engaged by contemplation in at least all extensive operations.)

²⁸ See JOURNAL, July 21st, 1888.

AFTER April 1st, Professor Curschmann, of Leipzig, will replace Professor Unverricht, of Dorpat, in the editorship of the *Fortschritte der Medicin*.

At a meeting on February 24th, the Council of Public Health for the department of the Seine had under consideration a report from M. Alexandre, chief of the sanitary service, urging the establishment of a departmental laboratory, in which researches on the contagious diseases of animals could be carried out. It is proposed to ask the departmental authorities for a grant of money for the purpose.

THE Royal Medical Benevolent College has received a legacy of £400 from the late Mrs. Price, of Leamington; and also £250, assigned to it by the trustees of the late Mr. Daniel Procter, of Manchester, who left a large residue at their disposal for charitable purposes.

THE GOULSTONIAN LECTURES ON SOME CEREBRAL LESIONS.

Delivered before the Royal College of Physicians of London.

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LECTURE II.

1. CASES OF MENINGITIS AND TUBERCLE SECONDARY TO EAR DISEASE. 2. CASES OF CEREBRAL ABSCESS AND SINUS THROMBOSIS DUE TO OTHER CAUSES THAN EAR DISEASE.

Meningitis (25 cases).—In patients under 10 this is the most fatal complication of ear disease, 8 out of 11 patients below this age dying from meningitis. The distribution as to age is under 9 years, 9; between 10 and 19 years, 6; between 20 and 29 years, 5—that is, the younger the patient the more frequently does meningitis occur. The meningitis was usually secondary to some other complication.

The following is a list of lesions which had preceded the meningitis: Pus outside the dura mater on either the anterior or the posterior surface of the petrous bone in 5 cases, a sloughing condition of the dura mater in 2, perforation of the dura mater by an extradural abscess in 1, thrombosis of the lateral sinus in 4, of a dura-matral vein in 1, cerebral abscess reaching the surface in 3, bursting into the lateral ventricle in 2, fracture of an abnormally thin petrous bone in 1, and the passage of pus along the internal auditory meatus from the ear in 3. Whereas cerebral abscess only ensues in cases of old ear disease, meningitis may come on within two days of the onset of otorrhoea, and is the probable lesion when there is a complication in the early days of ear trouble, as may be illustrated by two cases (XL and XLIX) of foreign bodies in the ear, in which death ensued within four and eight days respectively.

Another group of cases are those in which (3) suppuration spread through the internal auditory meatus from the internal ear. The exact course which the pus took inside the bone was not made out definitely, although in at least one case a minute dissection was made. Probably the course was not the same in all. These cases are of importance because they show that infection may travel from outside through the internal ear to the posterior fossa; in each instance a fatal meningitis was set up.

The symptoms which were recorded of the 23 cases of meningitis may be grouped as follows, bearing in mind that of 6 there are only a few brief notes, but the remaining 17 are fully reported. The onset was sudden and the course rapid. The temperature was raised in all (19); it averaged about 101°, but in some was towards the end very high. In 15 there was headache, which was not of extreme severity in most cases; earache, in addition, was noted in 8 cases. The patients were listless or lethargic in 9, drowsy in 8, and finally drifted into coma in 11 instances; 8 suffered with vomiting, and 6 were extremely restless. The optic discs were recorded as normal 6 times, while neuritis was only noted in the 3 following cases (XLVI, L, XIV).

Neuritis was found in a child a year old, ten days after a fit. At the inspection four days later there was found a general cerebro-spinal meningitis secondary to the ear disease. This is the only case in which the neuritis was due to the meningitis. In the second case double optic neuritis was found in a girl 12 years old, six days after the onset of the illness. Pus was let out from both surfaces of the petrous bone; the neuritis at first diminished and the girl improved, but she relapsed and ultimately died from meningitis, due to the rupture of an extra-dural abscess into the arachnoid space. The neuritis was probably due to this extra-dural abscess.

The third case was a girl aged 8, who had thrombosis of the lateral sinus, and there was an abscess in the centrum ovale, which burst on to the surface of the brain after an exploratory operation. The neuritis in this case was due to the thrombosis. Optic neuritis is, therefore, rarely due to meningitis, and the reason is not far to seek. Five or six days must elapse before neuritis develops, and still longer when the meningitis is limited

to the posterior fossa, but we have shown that 40 per cent. of the cases of meningitis are fatal in less than that time. Various motor troubles were recorded; convulsions in 4, tremors and twitchings of the limbs in 5, hemiplegia in 3, and paresis of the arms once. Ptosis, facial paralysis, strabismus, and dysphagia were each recorded twice. In several (7) retraction of the neck, with rigidity, was well marked. As occasional symptoms, aphasia, agraphia, impairment of memory, emaciation, and a slow pulse were noted.

The rapid course of the disease, and its association with other lesions, often render it difficult to arrive at a diagnosis before the patient is dying.

In Case XLV the first evidence that there was anything wrong was the development of agraphia, which was found at the inspection to have been due to meningitis.

When the meningitis is once set up, the disease usually runs a very acute course, and this is more frequently the case than with the other lesions. In 13 out of 18, the onset of acute symptoms was followed by death within a week; and in 9 within four days.

It does not seem probable that surgical interference, when meningitis has once thoroughly developed, will ever be of any use, but it is clear that at an earlier stage the lesions which precede the meningitis in almost all cases are such as are capable of treatment by free drainage, which may sometimes be successful. I would suggest that a fatal termination may more often be prevented than it is at present, when it is recognised that it is desirable to operate sooner than we have hitherto done in those cases of ear disease in which there are severe local symptoms.

The conclusions as to the cases of meningitis may be summed up as follows: (1) the onset is sudden, and the duration of life after the commencement of the symptoms is usually under a week; (2) the temperature is always raised, there is generally a headache, and in most cases the patient is lethargic, and often drifts into a comatose state at the end; (3) in a third of the patients the neck is held retracted, and in about the same proportion of cases there are symptoms of motor disturbance, such as tremors, paresis, or convulsions; (4) optic neuritis is very rarely due to meningitis; (5) the meningitis is almost always secondary to some other complication.

There is some evidence that otitis media, when of a tubercular nature, may be the means of infecting the brain with tubercular instead of with simple inflammatory products. I cannot offer a conclusive proof of this, but the following cases may be interpreted in this way (Cases LII, LIII, LIV, LV).

In the first there was a large tubercular mass in the cerebellum, which was adherent to the posterior surface of the carious temporal bone, the interior of which was affected with caries most probably tubercular.

In the second case, the tubercular meningitis was most marked in the region of the left Sylvian fissure, near the ear disease; there were tubercles in the liver and spleen, but the only chronic tubercular source appeared to be the carious left temporal bone.

In the third case, there were no tubercular sources found, except the chronic ear disease; in the last case the mastoid cells were carious, and there had been an abscess behind the left ear for three weeks; the mischief in the brain was almost entirely limited to the region of the left Sylvian fissure, and the adjacent convolutions; here there were numerous tubercles, and the middle cerebral artery had become blocked, so that there was softening together with extensive hæmorrhage. Possibly other cases of a general tubercular meningitis, where there has also been otorrhœa, may have owned this as their source. It is certainly not a common centre of infection, but I would suggest that it is so occasionally.

CASE LII.—A. G., aged 7. Under Mr. Durham. 1881. The child had measles five years ago, which was followed by suppuration in the right hip. She has had left otorrhœa for two years, and right facial paralysis for one year. August 3rd. The leg was amputated below the right knee. Death ensued from secondary hæmorrhage. There was tubercular growth an inch and a quarter across and a quarter thick on the cortex of the cerebellum. This was adherent to the posterior surface of the diseased temporal bone. Five other small growths were found in the brain. Phthisis tubercles in the kidneys.

CASE LIII.—J. B., aged 7. Under Dr. Taylor. 1886. No history of otorrhœa. Two years ago the boy suffered from headache and drowsiness, constipation, and vomiting. March 30th. He was emaciated and purpuric; the pupils were equally dilated; there

was right optic neuritis. He suddenly became comatose, and died the next day. There were caries of the left tympanic region. Tubercular meningitis was found over the left Sylvian fissure. The cerebellum was covered with lymph. The ventricles were dilated. Tubercles were found in the liver and spleen.

CASE LIV.—G. G., aged 4. Under Dr. White. 1887. She had measles and pertussis fifteen months ago; otorrhœa ever since. Symptoms of brain disturbance trephined without result. Died on August 2nd. *Post mortem*: A dumb-bell tubercular mass extended across the fornix into both of the optic thalami. The left tympanum contained thick yellow material. No tubercle elsewhere.

CASE LV.—J. K., aged 6. Under Dr. Pavy. 1888. February 9th. He had measles eight months ago. An abscess formed behind the left ear; has been ill three weeks. Semi-comatose for the last five days. He was admitted with right hemiplegia, and general *râles* in the chest. February 20th. The skull was trephined, and the left lateral sinus wounded. The child died the next morning. The mastoid, which was carious, had been scraped out. There was no otorrhœa. *Post mortem*: The middle ear was healthy. There were numerous minute tubercles in the meninges, and lymph round the vessels in the region of the left angular and supramarginal gyri. There were but very few tubercles, and no lymph at the base of the brain or elsewhere. There was an extensive extravasation of blood in a mass of softened brain tissue in the part of the brain supplied by the left middle cerebral artery, some branches of which were thrombosed. All the sinuses were normal. There was acute tuberculosis of the lungs, the kidneys, and the capsules of the liver and spleen, and the choroid. Some small caseating centres in the bronchial glands, near the bifurcation of the trachea.

The following general conclusions may be drawn from the whole series: Cerebral abscesses occur rather less frequently than meningitis or thrombosis. In two-thirds of the cases the abscesses occur close to the roof of the tympanum; when found elsewhere there is usually thrombosis or some other complication. An agonising headache usually indicates abscess; rigors, thrombosis of a sinus; and pyrexia, either thrombosis or meningitis. Optic neuritis is most frequently found with thrombosis of a lateral sinus. Recent otorrhœa may set up meningitis; abscess only occurs in chronic cases. The more insidious the onset the greater the probability that the complication is an abscess. Abscess and sinus thrombosis, with their associated diseased dura mater, are frequently unaccompanied by other lesions. Such cases are therefore suitable for surgical interference, with a prospect of some success if undertaken early. Meningitis is secondary to other lesions, and is beyond treatment unless it is very local.

The two groups of cases which I discussed in Lecture I were cerebral abscesses and thrombosis of the sinuses, secondary to ear disease. I now propose to examine the remaining cases of these lesions, which have occurred from other causes during the same period.

I have collected 56 cases of cerebral abscess from our records, between the years 1869 and 1888, and although the conclusions to be drawn from them do not differ materially from those generally accepted, yet a continuous series of fatal cases of such a rare lesion contain much that is worthy of being put on record. The cases may be classified as follows: Ear disease, 18; other cranial lesions, 17; pyæmia, 9; lung disease, 8; indeterminate, 4.

Cerebral abscesses occur much more frequently in men than in women, in the proportion of 4 to 1, 44 of the cases having been found in men and 12 in women. This is explicable in the cases due to pyæmia (7 to 1), and in cases due to injuries (9 to 1); but this series of cases throws no light on the cause of the great preponderance which is found in the other groups—in ear disease (11 to 7), in the remaining cranial lesions (6 to 1), and in lung affections (7 to 1). It is difficult to see what difference there can be in the abscesses secondary to pulmonary lesions in the two sexes to account for this great difference which has been noticed by all observers. The cases are distributed among the various ages as follows:—

	Years 0-9	10-19	20-29	30-39	40-49	50-59	60-69	Total.
Ear disease ...	2	7	6	2	1	0	0	18
Traumatic ...	3	2	2	1	1	0	0	9
Other local lesions ...	1	2	1	1	2	1	0	8
Pulmonary ...	0	0	3	3	0	1	1	8
Pyæmia ...	1	1	5	1	0	1	0	9
Indeterminate ...	0	1	0	1	0	2	0	4
Total ...	7	13	17	9	4	5	1	56

Half of all the cases occurred between the ages of 10 and 30. Injury is the most common cause of abscess before the age of 10. In two boys, aged 6 and 12, acute periostitis set up general pyæmia and cerebral suppuration. This is very unusual, for in none of the 232 cases collected by Gowers had pyæmia caused a cerebral abscess in anyone under 20. I have already fully discussed the 18 cases (32 per cent. of all the abscesses) in which the abscess had originated from disease of the ear.

2. *Seventeen Cases of Abscess secondary to Disease of or Injury to the Cranium.*—Ten of these were due to injury (9, 8)—that is, 18 per cent. of all the abscesses. In 9 of these there was a fracture of the vertex of the skull. In several the fracture was a depressed one; trephining was performed six times, and in every case there was inflammation of the bone. All the fractures were compound ones, and in some of them there were fragments of bone, brick, etc., which required removal from the injured brain. None of the abscesses had arisen from uncomplicated bruising of the brain which some authors have occasionally reported. In such cases it is most probable that there was an unrecognised fracture of the base of the skull by which infection was conveyed. The following (Case LXVI) is the one in which the bone was not fractured: A woman, aged 47, was brought in dead. Three weeks previously she received a wound on her forehead from a life preserver, and was comatose for the last week. *Post mortem*: the bone was bare and necrosed, the dura mater inflamed; general meningitis, with a large ragged walled abscess on the left side. This case emphasises the fact that the dura mater must be inflamed, sloughing (2), or adherent (4), or there must be a hernia cerebri (3), or some communication with the outside before an injury of the brain is likely to lead to suppuration. Injuries or disease of the aural, ocular, or nasal cavities may be overlooked very readily, and may furnish an explanation of the source of the abscesses which are looked upon as idiopathic.

The most chronic case was No. LXV. In this a bullet wound gave rise to two cerebral abscesses and death eight months later; the larger abscess was probably of some months' duration, and the chronic course of the abscess marks it off from the other traumatic cases, in which the course was generally rapid. The explanation is found in the fact that in this instance the wound was small and it was soon sealed from the air. The suppuration followed on the presence of a foreign body, which was not very septic, while in all the others there was an infective suppurating source in the inflamed dura mater. It is worthy of note that the only cerebral abscesses secondary to cranial injuries which we have had for the last three years are: this case of bullet wound, in which the bullet or some other foreign body carried in with it, was the septic source; and a compound fracture, in which some fragments of brick were embedded in the fractured bone. There can be little doubt that this cause for abscess will in future be even more infrequent. Meningitis was present in six of the cases as a complication, having usually spread from the seat of inflammation. The abscesses were all seated beneath the injured spot and were in the occipital region once, in the temporal twice, and all the others were in the frontal lobes.

The onset of symptoms in cases of cerebral abscess due to cranial injury or adjacent bone disease (omitting the ear cases, which we have already discussed), was always more or less vague and insidious. Often the wound was suppurating more than it had previously and did not look healthy. Frequently the patients developed headache (5), vomiting (3), and they became dull and drowsy, often restless and sleepless at night. In five there was pyrexia, but it was due to the condition of the wound and dura mater rather than to the abscess. In seven, that is in nearly half of the cases, there were convulsions. The symptoms closely resemble those of meningitis, but differ mainly in the fact that they do not come on till about the second week, or later, after an injury, and the course is not so rapid as that of meningitis. Only once was optic neuritis noticed. Half of the patients became comatose at the end (7).

When there are no adhesions of the meninges around the injured spot the opening of the abscess by the surgeon will seldom be successful, as meningitis is almost certain to ensue, on account of the condition of the dura mater, which is generally septic. The abscesses were solitary, except twice. The abscess which followed the bullet wound was accompanied by a more recent one, with grumous contents close to it. There were also two subsidiary abscesses in another case with hernia cerebri. Four times death seems to have been due to the abscess directly, in the others rup-

ture of the abscess into the ventricle (2), meningitis (3), and pyæmia brought about the fatal result. Seventy per cent. of the patients died within a fortnight after the injury; the only one that died within the week had general pyæmia. On three occasions the cerebral abscesses were drained, but a fatal result was not thereby prevented, death occurring in two of them from meningitis.

In 7 cases the abscesses were due to local disease: periostitis, 3; nasal polypus, 1; congenital frontal tumour, 1; malignant disease, 2. The cases are briefly as follows: A man with pulpy joints had a sinus for a year, which led down to a chronic tubercular periostitis of the parietal bone; this gave rise to a large cerebral abscess beneath, but the man did not die for another three months. Twice periostitis of the frontal bone, after being opened, gave rise to abscesses, in one case multiple and scattered through the brain, and in the other to two, one in the frontal and the other in the occipital lobes. The patient with multiple abscesses died twelve days after the skin was incised, the frontal bone being infiltrated with pus, which had also collected outside the dura mater and in the arachnoid. In a fourth case a large abscess formed in the frontal region of a boy from whom a congenital tumour had been removed from immediately above his nose two months before his death, the mass had recurred again. Only once had nasal disease set up suppuration in the brain, and in this instance a large nasal polypus had absorbed the ethmoidal roof, and was pushing against the dura mater, setting up an abscess in the frontal region. The man was admitted with the polypus in a sloughing state, and he died convulsed directly after its removal. In two patients, aged 58 and 47 respectively, epitheliomatous growths had extended up into the floor of the skull, through the greater wing of the sphenoid, and through the foramen ovale respectively, both setting up diffuse suppurative meningitis and abscesses in the temporo-sphenoidal lobes.

3. *Nine Cases of Abscess due to Pyæmia.*—These had originated with periostitis twice, with dysentery twice, with stricture, thrombosis of the prostatic sinuses, cellulitis of the arm, purpura and ulcerative endocarditis each once.

There can be little doubt that in these cases the abscesses are due to emboli which come from these various sources of infection, yet it is but rarely that this can be proved.

A young man, aged 23, was under Dr. Pavy's care in 1883, on his return from India after an attack of dysentery, with a large hepatic abscess, which was drained through an incision in the abdominal wall. After some weeks he became drowsy, and finally hemiplegic. At the *post-mortem* examination two abscesses were found in the brain, containing grumous chocolate-coloured pus, identical in appearance with that which was found in the hepatic abscess. It is difficult to be certain, however, if this was more than a coincidence.

In several of the ear cases it was noted that a peculiar and offensive odour from the ear was reproduced by the pus in the cerebral abscess. There was more than one abscess six times, and in three they were numerous. The white matter is much more often affected than the grey, hence the symptoms are more vague, and convulsions are rare, while in the traumatic cases they are frequent. The cerebellum is more often affected than any other part of the brain (3), and the explanation may be found in the fact that a minute embolus passing along the vertebral arteries will probably lodge in the cerebellum, while one in the internal carotid may lodge in any part of the cerebrum (8), and is equally common in all parts.

Prima facie it would have appeared very probable that cerebral embolism due to malignant endocarditis would often be followed by suppuration, as this is often the sequence of such emboli in other organs. There is an impression that this is the case, yet we have only had one such instance (Case LXXXII) out of 79 cases of cerebral embolism which have died during the last twenty years. In this instance the dura mater on both sides over the fissure of Rolando was adherent to the brain, where there were small collections of pus, on the right side confined to the cortex, but on the left the pus had extended deeper to the corpus striatum. They were both, however, rather collections of pus beneath the meninges than in the brain.

It is also a question of interest to determine if heart disease is a cause of abscess; the only other instances in which heart disease was present were the two following:—

CASE XCI.—A man, aged 59, who died from carcinoma and ulceration of the stomach, without any cerebral symptoms. At the *post-mortem* examination there was also found a large

temporo-sphenoidal abscess, the aortic valves were thickened, and there was a vegetation on one of them. The gastric ulcer was probably the cause of the abscess, the small vegetation on the valve not being friable.

CASE XCII.—A man, aged 32, who had a frontal headache and fits for a month preceding his death. Finally he died comatose, with right hemiplegia. There was a cerebral frontal abscess, the cardiac valves were thickened. This was the only case in which it was even suggested that the heart disease was the source of the abscess, and its causation is not clear.

4. *Eight Cases of Abscess, secondary to Lung Disease.*—Many years ago it was pointed out by the late Sir William Gull that there was another group of cases in which the source of the abscess could be traced to a distant suppuration usually in the lung. Since this time it has been excessively rare to find an abscess that could not be traced to one of the preceding causes. We have had at least 8 cases secondary to lung disease; in three the lesion was an empyema, in two dilated bronchial tubes with chronic pneumonia, in two a gangrenous cavity, and in one extensive scarring of the bronchi.

The abscesses were multiple in every case except one, in four being limited to one side of the brain. The centrum ovale was the part most frequently affected. The duration of the symptoms vary greatly, in three cases being one, four, and five days respectively, and in other cases varying from three to ten weeks, and in one case ten months. In most of the patients no exciting cause for the onset of the infection could be traced. In one, where hemiplegia followed the tapping of an empyema, the man died the same day. At the inspection it was obvious that the two abscesses had really been present for some time, but had given rise to no symptoms. In the majority an ulcerating surface was found in the lung, but not in all of them. The situations of the abscesses vary so much that there are but few symptoms that are common to the series. The most important are a dull lethargic state (6), headache (3), convulsions, unilateral or general (4), coma (3), vomiting (2), and hemiplegia (2). One patient became aphasic from a lesion apparently limited to the first and second left frontal convolutions, and there was another abscess in the inferior part of the right occipital lobes. For four days preceding his death he was blind. In most of the cases the abscess had been the determining cause of death.

5. *Four Cases of Abscess, Cause indeterminate.*—There remain 4 cases about which it was not possible to be certain as to the origin. One was the case I have already alluded to (No. 91), of a man with an ulcerated and carcinomatous stomach, which was probably the source. The second (No. 92) was one with thickened cardiac valves, and it would be difficult to decide whether this was the cause. There remain the two following unexplained.

CASE XCIII.—A man, aged 50, had suffered with headaches for years. He was feeble, and remained comatose for the last month. At the *post-mortem* examination a small abscess was found in the right centrum ovale. There was broncho pneumonia, with old and recent meningitis.

CASE XCIV.—A girl, aged 8, admitted in a typhoidal state, comatose for six days. Numerous small abscesses in the brain, bronchitis.

An abscess an inch in diameter can form within a week; in 3 cases the duration before death was seven, nine, and twelve days. These had no definite walls, but were unencapsuled. Several of the older abscesses were also without a definite capsule; we should, therefore, not be justified in assuming that an abscess without a well-marked capsule must be acute. The more foul abscesses had usually ragged walls. A capsule can be well-formed at the end of a month. In one case of eleven weeks' duration the wall was so tough that it was removed complete from the brain substance in which it lay. It was over a sixth of an inch thick. On microscopic examination it showed on the inner surface granulation tissue, then a layer of very elongated spindle cells, which were organising into fibrous tissue. There were numerous bundles of fibres arranged in parallel layers, and containing numerous capillaries. Outside this the tissue was infiltrated with small cells.

The conclusions to be drawn from the whole series of abscesses are as follows: Headache is more severe in the cases due to ear disease than in those due to other causes. In the cases secondary to cranial lesions the symptoms resemble those of meningitis, but they come on in the second week or later after an injury, and are less acute in their course. The abscesses are cortical, chiefly in the frontal lobes, and often give rise to motor disturbances. Abscesses due to pyæmia and to lung lesions are multiple usually,

they occur in the white matter of the brain, and not infrequently in the cerebellum; the symptoms are often most obscure and the lesion is often unsuspected during life

Cerebral Abscesses. Fifty-six Cases.

Regions.	Ear.	Other Cranial Lesions.	Pyæmia.	Lung.	Indeterminate.	Total.
Frontal	0	12	2	3	1	18
Centrum ovale	2	0	1	6	1	10
Occipital	0	2	2	1	1	6
Temporo-sphenoidal	12	2	2	0	0	16
Cerebellum	3	0	3	2	0	8
Pons	1	0	0	0	0	1
Parietal	0	3	1	0	1	5

An Analysis of Forty-four Cases of Sinus Thrombosis.—Sinus thrombosis occurs under two conditions: 1. With a feeble cerebral circulation, associated with exhausting diseases. 2. In connection with adjacent diseases. These are generally spoken of as primary and secondary thrombosis.

Primary Thrombosis.—In this form, owing to the stagnation of the circulation, clotting tends to take place in the sinuses, the clot becomes adherent but seldom infects the blood or gives rise to emboli. Dr. Fagge was only able to find a record of one example at the hospital during the period he examined. During the last twenty years I find that we have had 8 cases. There were 3 patients between the ages of 39 and 46, 2 between 20 and 30, and the remaining 3 were under 2; three were women. In the infants, the thrombosis was secondary to empyema, suppurative pericarditis, and a scald. In the adults the thrombosis was associated with chronic Bright (2), phthisis, fæcal fistula, and old syphilitic stricture of the rectum. Thrombosis started in the longitudinal sinus 5 times, spreading into the cerebral veins in 4, and into the lateral sinus 3 times. In two other instances the thrombus was limited to the lateral sinus, and in one to a cerebral vein. Each group was therefore affected five times.

Case CII is of especial interest, because there is clinical evidence to suggest that thrombosis may start in the veins, but at present there is but little pathological evidence to support it, as the patients after these attacks seem rarely to come to the *post-mortem* rooms; still it must be allowed that most of the cases in which thrombosis occurs in the veins are probably preceded by clotting in a sinus, as in four of these cases. In three of the five cases of venous thrombosis there was ecchymosis of the cortex, corresponding to the blocked veins, and in one instance there was an ochreous deposit; in the remaining case the patient probably died soon after the clotting took place. In one remarkable case (No. XCVII) the clotting extended into the right auricle down the jugular vein, and the superior vena cava, setting up pulmonary embolism and gangrene of the lung. In the majority of the cases there were no symptoms which were due to the thrombosis, the patients simply dying out from exhaustion. One baby had a convulsion and was unconscious for some time afterwards, but lingered on for a month, finally dying in a comatose state. Another had symptoms which during life was thought to indicate meningitis; the child was extremely feeble and was constantly moaning. It was admitted with a scald on its arm, and died six days later.

CASE CII.—A. G., aged 1½. Under Dr. Moxon. July 17th, 1885. He has had a cough since measles, six weeks previously. The child looks ill, respiration is rapid, there is dulness, with bronchial breathing at the right base. July 22nd. He was livid and collapsed. A hypodermic syringe was put in at the right base; the child died a short time afterwards. *Post-mortem*: There was a large vein, running along the upper part of the right temporo-sphenoidal lobe, which was full of *ante-mortem* thrombus for three inches. The sinuses and the jugular vein were free, and the brain appeared perfectly healthy. Chronic broncho-pneumonia; localised empyemata.

A man with old pelvic suppuration and chronic Bright's disease was the only one that had meningitis (Case 100). In this instance the thrombosis had started at the torcular Herophili and extended to the jugular foramen, but it was not clear whether it had produced the meningitis. The absence of symptoms, in most of the cases, makes it impossible to determine the age of the thrombus; in two it had lasted a month and in one a week, but death in

all cases was due to the original disease during which the thrombosis had ensued.

Secondary Thrombosis.—This occurred 36 times. Of these 22 were due to ear disease, and the infection had spread from the posterior wall of the petrous bone in nine, the dura mater being inflamed, sloughing, or suppurating. In 4 the clotting spread to the longitudinal sinus, and in 11 to the jugular vein. Three-quarters of the patients died with pulmonary pyæmia, which the breaking down thrombus had set up. Fourteen cases remain for consideration. Seven of the cases were traumatic, once the bone was exposed and inflamed, in six there was a fracture, three times it was compound, and in four it ran across the sinus. The sinus was lacerated twice. Of the remaining seven, three had spread from malignant pustules or carbuncles on the face, two from an adjacent pachymeningitis, one from compression by a growth, and only one from a distant source, namely, from pyæmia set up by a carbuncle on the back. The clot was found in the longitudinal sinus in three, in the lateral in nine, and in the cavernous in three [spreading from the facial and ophthalmic veins]. Once the clot had extended into the circular and into the inferior petrosal sinuses, and only once into a cerebral vein. The patients were all males; ten of them were between the ages of 30 and 60, the youngest (boys) were 7 and 9. Three times meningitis was set up, and six times pyæmic abscesses in the lung. The condition of the clot varied greatly; in eight cases it was suppurating, in four comparatively recent, and in the two associated with pachymeningitis it was firm and well organised.

In the majority of the cases the symptoms were mainly those of pyæmia, associated in some with physical signs of disease in the lung. In two cases in which the fracture ran across the groove for the lateral sinus, extreme difficulty in respiration came on at the end of two weeks, and rapidly proved fatal. Thrombosis had taken place in the outer part of the sinus, and had spread downwards to the foramen lacerum jugular. Probably the consequent distension at this spot had led to pressure on the vagus, and thus to the urgent respiratory symptoms. The cases of pachymeningitis had, the one, intense headaches worse during the last three months of life ending in coma; and the other, epileptiform convulsions; but it is not possible to determine to what extent these symptoms were due to the thrombosis. In two instances the optic discs were noted to be swollen.

The cases which could have possibly have been diagnosed during life, were those in which the clotting had spread from inflammation on the face, and from the ear, and some of those secondary to fractures of the base of the skull; but in more than half of the total series this was not possible.

Forty-four Cases of Thrombosis of the Sinuses.

	Primary.		Secondary.		Total.
			Ear Disease.	Other Causes.	
Longitudinal Sinus ...	5	...	4	3	12
Lateral sinus ...	5	...	22	9	36
Cerebral veins ...	5	...	1	1	7
Cavernous sinus ...	—	...	1	3	4
Circular ...	—	...	1	1	2
Inferior petrosal ...	—	...	1	1	2
Superior petrosal ...	—	...	2	—	2

SOCIETY FOR THE STUDY OF INEBRIETY.—At the annual meeting on Tuesday last in the rooms of the Medical Society of London, after a reception to Dr. F. R. Lees, the President (Dr. Norman Kerr), in his annual address, referred to the marked advance in public opinion on compulsory legislation for diseased inebriates, as evidenced by the fact that the Inebriates' Legislation Committee of the British Medical Association had, in response to circulars to Poor-law guardians, received five times more replies in 1889 than in 1882. The favourable returns were in much the same proportion. Scotland, through the legal, clerical, and medical professions, was asking for full power to compel inebriates of all classes to enter special homes, and for the treatment of the poor at the public charge. The records of the Dalrymple Home for gentlemen at Rickmansworth proved that scientific treatment of the disease of inebriety was very successful, more than one-half of the patients discharged having kept firm. The demand for compulsion was also growing on the Continent. A strong protest was made against the employment of hypnotism in the treatment of inebriety.

A CASE OF LOCALISATION OF A LIMITED LESION OF THE SPINAL CORD,

FROM PHYSIOLOGICAL DATA.

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THE following case is interesting from a physiological aspect, especially regarding the function of the anterior or direct tracts of the cord. It is therefore given *in extenso*.

H. R., aged 60, labourer, was admitted to Ward 29, Royal Infirmary, Glasgow, October 31st, 1889, suffering from an injury to the cervical region of the spinal cord.

He had fallen a distance of fifteen feet from a hayrick. He cannot describe the exact position he was in when he fell, and no one saw him fall, but the bystanders found him on the ground with his face downwards, and they considered him unconscious. He considered that he was unconscious for about half a minute, and afterwards he found himself lying on his face quite unable to move. When admitted, he complained of pain in the neck in the region of the fourth, fifth, and sixth cervical vertebrae, and Dr. Johnston (house-surgeon) believed he detected something like osseous crepitation, such as might be occasioned by separation of one of the cervical spines.

On admission, the patient, who was quite conscious, lay on his back with both arms abducted to nearly a right angle, the forearms fully flexed on the arms, and the hands lying on the chest. The wrist was flexed, as were the fingers, with the exception of the index, which was partially extended. The little finger was most flexed, the others less so. The right index finger, though extended, was found to be ankylosed in that position, but the left was normal in this respect. He had absolutely no grasp. He could not extend his arms, but when passively extended he could fully flex the forearm by the biceps and brachialis anticus. Occasionally this flexion was involuntary. He could raise his upper arm easily by the shoulder muscles namely, deltoid, trapezius, supraspinatus, but beside that there was a distinct adduction in his attempts to raise the arms which seemed to be occasioned by the coraco-brachialis and possibly the pectorals.

The muscles of the shoulder-joint were in very good form. The supra- and infra-spinati, the deltoid, biceps, and brachialis anticus contracting when he wished to raise the arm, though all were feeble in their action. He could not supinate his forearm. Several of the muscles in the upper arm, but especially the biceps, contracted on touch, and the latter also contracted automatically when the forearm was extended.

The breathing was distinctly diaphragmatic. The chest was extended and fixed, and the intercostal muscles were inactive. The ribs were fixed, and the intercostal tissues were blown out and sucked in on each expiration and inspiration, very much like pieces of inert membrane. In the lower limbs the power was good, as tested while the patient lay in bed. He could lift his legs right up from the bed, and flex and extend them with ease.

Sensations.—The sensation of the arms was slightly dulled, and in the forearm and hand the dulness was increased from the outer toward the inner side, and on the ulnar border of the right it was entirely wanting, while the sensation was present to a slight extent in the left.

The cutaneous reflexes were much impaired, with the exception of the plantar, which was normal. The cremasteric reflex was absent, as were likewise the patellar reflex and ankle clonus. The bladder emptied itself when full, but the urine did not dribble away. He knew when the urine was flowing, but could not restrain it. The motions were also passed in bed.

Eyes.—The palpebral clefts were narrow. The pupils were in a state of stabile myosis. There was paralysis to light and skin reflexes, but there was slight contraction to accommodation. On dilatation of the pupils by homatropine, the fundi were normal, possibly a little congested.