I found her in a remarkably good state of health generally; she was much stouter and very cheerful. When she left the infirmary in February, 1894, she could only use affirmatives and negatives. It was several months after this before she could utter the words "father" and "mother." When I saw her in September, 1901, she was then able to make use of a very large number of words. She could name any object that was presented to her, and she had no difficulty in the employment of proper names. She had an excellent memory and could repeat nearly all that was said to her. She read a good deal, read loudly correctly, and she wrote pretty well. Her difficulty with words was mostly observable when she attempted to carry on a conversation or tried to make up a sentence. She was like a child who was learning to speak; she could supply all the nouns and many adjectives, but could not put in the verbs. The sentences therefore had to be filled up by those with whom she was conversing. In talking of the work which she did in the house she would, in answer to my inquiries, use such words as "floor," "beds," "clothes," etc., meaning by these that she scrubbed the floors, made the beds, and washed the clothes, etc. She travelled by herself on the railway, as she could ask for a ticket for the particular station she was going to, which she named readily. In testing her with numerals she counted quickly up to twenty, and could have gone on further. Occasionally there was quite a noticeable delay in reply to questions. Counting backwards was impossible to her. When asked what numeral came after 6 she had to begin enumerating from 1 before she could answer. She wrote her name for me on paper with pen and ink. This she did with her left hand. The writing, I may say, compared most favourably with that executed by the right hand of other healthy women of her own age and in her own rank of life.

It is fully six years ago since she began to write with her left hand. There was just the slightest paresis of the lower half of the right face. She walked well, but dragged and swung the right foot. The fingers of the right hand were usually kept firmly flexed upon the palm. She could at will loosen them, but in sleep they relaxed of themselves. She could raise the arm to any ordinary height, and had no difficulty in undertaking common household duties. She could lift and carry by the right hand such things as a moderately full kettle, but she did not attempt to do work with this hand of such a risky nature as lifting a kettle off or on to the fire. For these she used the left hand. There was a well-marked knee-jerk, but ankle clonus was hardly obtainable. The limbs on the right side, in consequence of being less employed than formerly, and of having their spinal centres no longer so fully influenced by the higher or cortical centres, showed a very slight loss of flesh. The right arm measured 10½ in. in circumference, compared with the left 10½ in., and the right calf 14½ in., compared with the left 15 in. Her eyesight is good. On ophthalmoscopic examination the discs were seen to be very pale, and the borders well defined and even. When asked if she ever had headache she replied in the negative, but on tapping with the point of the finger tips the posterior part of the upper border of the wound in the cranium that was made at the time of the operation slight pain was experienced. She was never sick. Appetite was good. Menses had been regular for the last four years. It appeared that, with few exceptions, she did not menstruate for three years after the operation. Since her menstruation has become re-established, she had had no convulsive seizures. It was noticed, particularly when patient was sitting, that her head was kept gently drawn to the right, so that her eyes looked outwards over the right shoulder. The right half of the face was slightly flaccid; there was a little puckering of the left angle of the mouth, and the tongue was very distinctly protruded to the right. The urine was free from albumen and sugar, and her bowels were regular.

There is still a considerable loss of power in the right hand and forearm, especially of the smaller muscles concerned in finer movements. The fingers are firmly flexed upon the palm of the hand, but this, along with the well marked wrist and knee-jerk, was present before the operation, and is explained by the descending degeneration caused partly by the tumour itself, and subsequently by the operation having destroyed the cortical centres of the muscles.

Although the power of speech has not been quite regained, yet the extent to which it has been recovered is very considerable. This recovery may be due to improved nutrition of the remnants of the speech centre in the left side of the brain that escaped the stroke of the scalpel at the time of the operation, or it may be that the right cerebral hemisphere has undertaken the function of speech through education, an assumption to which patient by having cultivated the use of the left hand in writing may have contributed.

THE VALUE OF LUMBAR PUNCTURE IN GENERAL PRACTICE.

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The following cases are placed on record to emphasize the diagnostic and therapeutic value of lumbar puncture in cases of cerebro-spinal disease.

The diagnostic value has already a well-recognized position and these cases only confirm a more or less general opinion,

but the therapeutic value of this operation has not yet gained a certain place for itself in the practice of the general practitioner. It will be shown that a simple operative procedure can yield valuable results in many forms of disease associated with an increase of intracranial pressure. Not only can an obscure case and the line of treatment to be adopted be made clear, but also the most alarming and distressing symptoms be relieved.

I will detail under a few simple headings what lumbar puncture may do (1) for the patient, (2) for the practitioner.

1. What can be done for the patient?

A. Relief of pain, headache, etc.

CASE I.—A girl, aged 21, with gliosarcoma of the optic thalamus had frequent vomiting and very severe pain in her head, which no drug more than partially relieved. After 2 oz. of spinal fluid had been removed, she slept easily, and awoke with the pain and discomfort much more tolerable.

B. Coma is diminished, and consciousness may return after coma has been established through the increase of intracerebral pressure.

CASE II.—A child suffering from post-basal meningitis, unconscious, and with head retracted, lips blue, breathing shallow, and of the Cheyne-Stokes type, was apparently dying. After half-an-ounce of spinal fluid had been withdrawn, the patient slept and breathed easily and regularly, presenting a much less repulsive appearance. This alone was most grateful to his friends.

CASE III.—A child dying of tuberculous meningitis suddenly stopped breathing. Her face was pallid and bluish. She remained quite two minutes without taking a breath, yet after a few minims of fluid were removed she breathed again easily. The child's life after this treatment was sufficiently prolonged for it to be seen by its parents before death, which occurred some hours later.

C. Lumbar puncture may indicate the necessity or otherwise for operation.

CASE IV.—A woman, 34 years of age, was admitted to the London Temperance Hospital with a history of aural discharge (no evidence of perforation or bulging of the tympanic membranes), severe headache, rigor, a high temperature, relatively slow pulse, vomiting, and congestion of the optic discs. The presence of a cerebral abscess was discussed, and a surgeon called in. He thought there was probably a collection of pus in the brain, and was prepared to operate. Lumbar puncture was performed and purulent fluid containing staphylococci drawn off. No further operation was considered necessary. The diagnosis of purulent meningitis then made was confirmed at the necropsy two days later.

D. It has been a definite aid towards recovery. In several cases of post-basal meningitis, a child, apparently dying, has tided over the frequently-recurring crises of dyspnoea, cyanosis, associated perhaps with convulsions, and ultimately recovered when lumbar puncture has been systematically employed to reduced the excessive intracranial pressure.

CASE V.—In one case a child, admitted to the Temperance Hospital last summer, whose tuberculous cervical glands had been scraped, developed signs of meningitis, retraction of the head, vomiting, and later intense optic neuritis, Kernig's sign, etc. It was put out in the sun all day, fed very carefully, and although on several occasions its condition appeared hopeless because the breathing and pulse-frequency became so irregular and vomiting incessant; yet, after the withdrawal of some spinal fluid the child rallied, was much better for a few days, and ultimately, after between two and three months, recovered, apparently entirely.

Some four months later the baby, now 17 months old, returned to the hospital with similar symptoms of meningitis (these were quite absent during the interval) and died after six weeks. The necropsy revealed old encapsulated and quiescent tubercles, as well as the more recent infection. I believe if this child's tissues had been a little more resistant to the tubercle bacillus he would have completely recovered.

2. What can lumbar puncture do for the general practitioner?

A. It may correct or confirm a diagnosis.

CASE VI.—A child, aged 4 years, was admitted to St. Bartholomew's Hospital suffering from symptoms of meningitis, vomiting, slow pulse, temperature about 102°, delirium, head retraction, etc.,. Widal reaction negative. A diagnosis of tuberculous meningitis was made. Lumbar puncture failed to tap spinal fluid, showing no excess. After three weeks of fever the temperature fell to subnormal, and Widal's reaction was reported positive though feeble. The child recovered completely. Evidently a case of infantile typhoid.

Case IV also shows the value of examining the spinal fluid in a doubtful case of intracranial disease.

CASE VII.—In one patient, in whose case ulcerative endocarditis was diagnosed, cerebral symptoms developed. Bacillus coli was cultivated from the spinal fluid, the patient ultimately dying from coli-septicaemia. The site of inoculation was probably an intestinal ulcer.

Often post-basal meningitis can be early diagnosed from other forms of meningitis by the presence of Still's intracellular diplococci in the spinal fluid.

B. By rendering less intense a coma from excessive intracranial pressure, it obviates the necessity of nasal feeding and other such tedious, and often dangerous, nursing pro-

cedures. On many occasions I have noticed that after a lumbar puncture and the withdrawal of a small amount of fluid the patient has been able to drink naturally or suck a bottle, although previously nourishment had to be introduced by a tube through the nose.

The operation is practically unattended with risk so long as it is carefully performed and rigid asepsis ensured. It is rarely at all painful. Almost always some good results. I do the operation with a boiled glass syringe and needle, and sterilize the spot of skin selected with a drop of pure carbolic acid. The barrel of the syringe should be detached as soon as the subarachnoid space has been tapped, and the fluid allowed to drip from the needle into a boiled test tube.

I have to acknowledge my indebtedness to the staff of the London Temperance Hospital for their kindness in permitting me to mention these cases.

A NEW METHOD OF COUNTING THE CORPUSCLES OF THE BLOOD.

BY
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THE following method of counting the white and red cells of the blood has been worked out primarily with a view to obtaining permanent preparations from which white and red cell counts can be made at any subsequent period. We also aimed at dispensing with the use of a ruled counting chamber, thus eliminating a considerable source of error due to variations in the depth of the cell.* We believe that our method will be of especial use in the tropics, where it may be necessary or advisable to examine the blood collected at the same time from a number of patients, and where skilled assistance is not available.

In principle our method consists in diluting a measured quantity of blood with a measured quantity of a fixing solution with which there is combined a suitable stain. After a few minutes, to allow of fixing and sufficient staining of the corpuscles, a measured drop of the mixture is allowed to evaporate to dryness on a slide, when a cover-glass is applied over the resultant film in the usual manner. We find balsam the best medium for mounting, and if the slides are to be kept for any length of time acid-free balsam dissolved in thiophene-free benzine should be used, as otherwise there is a tendency for the dye used for staining the white cells to become faint with age. A number of experiments were made in which various stains were tried. Many of these gave tolerable results, especially polychrome methylene blue and piconigrosin, but it was finally determined that the most satisfactory results were obtained by using solutions of methyl violet and eosin for the white and red cell counts respectively.

DETAILS OF METHOD.

The finger or lobe of the ear, cleaned in the usual manner, is pricked, and 5 c.cm. of blood sucked into a Hawksley pipette of the usual pattern. This is then blown out into a suitable vessel (we have found a small weighing bottle most convenient) containing 495 c.cm. of the first diluting fluid consisting of:

Sodium chloride	...	...	0.75 gram.
Methyl violet	...	...	0.012 gr.
Formalin (commercial)	...	...	1.5 c.cm.
Distilled water to	...	...	100.0 c.cm.

This is the composition of the actual mixture used for counting the white cells, but as the practical value of our method would be greatly diminished were it frequently necessary to weigh out 0.012 gr. of methyl violet and an even smaller quantity of eosin, we proceeded to make a number of stock solutions which, when mixed in sample proportions, gave a solution of the same composition. These are the solutions of salt, formalin, and methyl violet mentioned below. As a matter of fact, we found that the actual fluids used for diluting the blood kept perfectly well for about three weeks, provided they were not exposed to light and contained neutral formalin.

* Two Zeiss slides which had been in use in the laboratory for about three years, and in which the ruled lines were everywhere perfectly clear and sharply defined, gave results which were fairly consistently 10 per cent. higher than those obtained by our method and by two new Zeiss slides. This would be accounted for if the depth had increased by only 0.01 mm.

The solution used as a staining diluent to count the white cells, and which corresponds in composition with the formula given above, consists of a mixture of 12.5 c.cm. of a 3 per cent. solution of NaCl, 12.5 of a 6 per cent. formalin (commercial), both in filtered distilled water, 495 c.cm. of a 1.3 per cent. solution of methyl violet, the whole made up to 50 c.cm. with distilled water. A similar solution is used as a diluent for the red cell count, except that 495 c.cm. of a 0.8 per cent. solution of eosin (Grubler w.g.) is substituted for the same quantity of methyl violet solution.

In practice we have given up using stock solutions, and now make use of tabloids† containing the requisite amount of dye and salt which, when dissolved in water, require only the addition of formalin. We take this opportunity of thanking Mr. Edmund White, Pharmacist to St. Thomas's Hospital for making these tabloids for us, each of which contains 0.25 gram pure sodium chloride combined with 0.004 gram methyl violet or 0.0025 gram of eosin. To make the diluent solutions all that is necessary is to dissolve one tabloid in 30 c.cm. of clean distilled water and add 0.5 c.cm. formalin, filtering the solutions so obtained through a not too large filter paper, so that the strength of the dye in solution may not be appreciably weakened by the absorbing power of the paper.

WHITE CELL COUNT.

The mixture of blood and methyl violet diluting fluid is well stirred and 5 c.mm. are drawn into a pipette and carefully blown on to a slide so as to form a drop some 10 mm. to 12 mm. in diameter. Care must be taken to avoid leaving an appreciable quantity of fluid at the end of the pipette. Another possibility is that bubbles of air may be forced into the drop while blowing it on to the slide. A little practice is all that is required to avoid this, but should it occur the slides need not be rejected unless the bubbles burst and scatter minute droplets of the mixture beyond the periphery of the main drop.

Fig. 1.—Film showing white cells deeply stained among unstained red cells. From a case with 20,640 leucocytes per c.mm. = 1,032 leucocytes in film.

Since the ordinary Hawksley 5 c.mm. pipettes are graduated to contain but not to deliver 5 c.mm., special pipettes must

† Messrs. Parke, Davis, and Co. have made a number of these tabloids for us which are in every way satisfactory. It is probably important that the sodium chloride used should be free from magnesium chloride on account of the hygroscopic properties of the latter. The formalin used must be neutral, and should before use have stood over CaCO₃ or MgO, and have been adequately filtered—that is, through two thicknesses of filter paper. Messrs. Griffin have put up for us a number of bulbs, each containing 0.5 c.cm. of formalin so prepared which have kept well. For preference the bulbs should be of non-actinic glass, and should contain but little air above the fluid. The small weighing bottles referred to above are stocked by Messrs. Allen and Hanburys.

‡ These are of the ordinary pattern, but graduated to deliver 5 c.mm. contained between a mark on the pipette's stem and its point. A pipette graduated so as to deliver 5 c.mm. when the meniscus of contained fluid passes from one mark on its stem to another seems to offer certain advantages, and we are experimenting in this direction.