PNEUMONIA IN CHILDREN

The clinical picture of pneumonia in children diverges from that in adults in many respects. A quotation from Leslie is very impressive. He says 'as regards the clinical pictures, it is the atypical character of the symptoms and course of the disease which is the outstanding feature; and it is the aberrancy of type which adds so greatly to the difficulty of diagnosis, particularly in young children'.

The following are some characteristic features of children's pneumonia:—(1) High respiration rate, generally 50 to 80, (2) high pulse rate, generally 150 to 170, (3) no marked dullness, (4) diminished breath sounds or sometimes broncho-vesicular breathing, (5) absence of sputum which is usually swallowed, (6) remittent and relapsing character of pyrexia, (7) frequency of cerebral or gastro-intestinal symptoms, (8) greater tendency for complications, and (9) frequent absence of characteristic signs.

It must be noted that the child who appears irritable during illness generally progresses towards recovery and one who lies prostrated in bed usually declines towards a fatal end.

Principles of treatment are the same as in adults except that a child's position should be frequently changed in order to promote coughing and emptying of the bronchial tubes. Leslie advises occasional lifting of the infant out of bed and carrying it about in one's arms in order to bring on paroxysms of coughing which are apt to clear out the plugged bronchi. Emetics are useful in early stage when cough is feeble and there is accumulation of secretion. Opiates should not be used. Ammonium bromide with aromatic spirits of ammonia proves a valuable night sedative for a child. Hydrotherapy, specially a mustard bath, is of great service. Leslie recommends a combination of ammonium carbonate and ipecacuanha, but authorities are not unanimous on the use of expectorants.

SUMMARY

1. Two hundred and thirty-three cases of pneumonia in a tea garden of the Doom Dooma district have been reviewed.

2. Cases of influenzal pneumonia markedly outnumbered those of lobar and broncho-pneumonia.

3. Atypical clinical pictures were more common than the classical pictures of text-books.

4. The largest number of cases were found between 10 to 50 years of age, but no age was exempt.

5. Males were found to be more affected than females but the death rate was lower in the former. The gross mortality rate was 26.6 per cent.

6. The months of May and August showed the highest incidence, the reasons of which have been explained.

(*Continued at foot of next column*)

A CASE OF RHINO-MENINGORRHEA

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Discussion.—The central nervous system preserves its character as a hollow organ throughout life, beginning its development as a neural tube with a wide cavity throughout its length. The ventricle of the spinal cord does not seem to perform any important function.

The ventricular cavities in the normal adult brain form a continuous channel for flow of cerebro-spinal fluid throughout its length. If any part of this channel is occluded to prevent free circulation of its fluid, increased intra-cerebral pressure results in hydrocephalus or other serious pathological processes.

Dandy (1919) has actually produced experimental hydrocephalus by plugging the foramen of Monro in a dog.

Choroid plexuses are developed in the ventricles and most of the ventricular fluid is derived from the blood vessels of these plexuses by a process of filtration, osmosis and selective secretion.

The subdural space is scarcely more than a potential space. It contains a minimal amount of fluid. The subarachnoid space is traversed by connective tissue trabeculæ. It contains a large amount of fluid and is independent of the subdural space.

(*Continued from previous column*)

7. No specific therapy was given. General outlines of treatment followed in this hospital have been described.

8. A few controversial and confusing points in treatment have been briefly dealt with.

9. The distinctive features of children's pneumonia have been briefly narrated.

10. The necessity of early admission of patients to hospital has been shown.

ACKNOWLEDGMENTS

I am indebted to my chief Dr. W. F. Whaley, M.D., for his kind permission to use the hospital statistics and for his valuable help in the preparation of this paper. My sincere thanks are also due to Mr. H. O. Swannell, the manager of the garden, for his unfailing co-operation and support in the management of the hospital.

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The subarachnoid space is widened in a few places to form cisterns where the arachnoid is widely separated from the pia. The most important of the cisterns is cisterna magna. The fourth ventricle communicates with this cistern through three openings in its roof—a median foramen of Magendie and two lateral foramina of Luschka.

The cerebro-spinal fluid is the water-bed in which the central nervous system is suspended. This fluid protects the brain from mechanical injuries. Nutrient media and waste products are probably dissolved in it.

The subarachnoid spaces are in free communication and cerebro-spinal fluid may pass through them from end to end of the nervous system. The amount of the fluid is variable, estimated as 80 to 100 c.cm. or even as much as 150 c.cm. It differs in chemical composition from all other fluids of the body. It is limpid, slightly viscous and has a low specific gravity 1004 to 1008. It contains only traces of proteins, small quantities of inorganic salt, and dextrose and a very few lymphocytes (10 in 1 c.mm.).

The cerebral fluid is constantly renewed. It circulates slowly through the brain ventricles and through the meshes of the subarachnoid spaces. If these spaces are opened to the outside by injury in man, a large amount of fluid steadily drains off—200 c.cm. or more in a day.

The sources of this fluid.—Primarily the blood vessels of the choroid plexuses, pia mater and brain substances give origin to this fluid. From the brain substances the flow is outward into the subarachnoid spaces and from the choroid plexuses it flows inward into the ventricles.

More recent experimental studies indicate that the plexuses are wholly secretory and not resorptive in function. Absorption of fluid from the ventricles into neighbouring veins has been shown experimentally to take place through the ventricular walls [Wislocki (Cowdry, 1928)]. The chief source of ventricular fluid is the choroid plexuses, as has been shown by embryological studies of Weed (1914) and his colleagues.

Pettit and Girard (1902) showed that the flow of cerebro-spinal fluid is increased by drugs that stimulate secretion (pilocarpine, muscarine, etc.), and choroidal cell changes indicative of the activity.

The chief channel of discharge of ventricular fluid normally is from the lateral ventricles of the cerebral hemisphere where the fluid is derived from the lateral choroid plexuses, through the foramen of Monro into the third ventricle.

Here the fluid is added from the choroid plexuses. From the fourth ventricle it passes into the cerebello-medullary cistern, and from here it diffuses in all directions through the subarachnoid spaces. The pathway by which cerebro-spinal fluid passes from the subarachnoid spaces back into the blood stream is very difficult. Some of it gets into extracranial lymphatics by way of perineural spaces within the sheaths of the cranial nerve roots.

The perineural spaces in the optic nerve are in free communication with the subarachnoid spaces. The arachnoid membrane is imperforate around nerve roots and any fluid that passes outward into perineural spaces must pass through it by extravasation.

A very small part of the cerebro-spinal fluid enters lymphatics or veins but most of it passes directly into the big endocranial venous sinuses through the arachnoid villi. By numerous well-controlled experiments it has been shown that the arachnoid villi provide the main pathway for outflow of cerebro-spinal fluid directly into the venous circulation (*vide* figure).

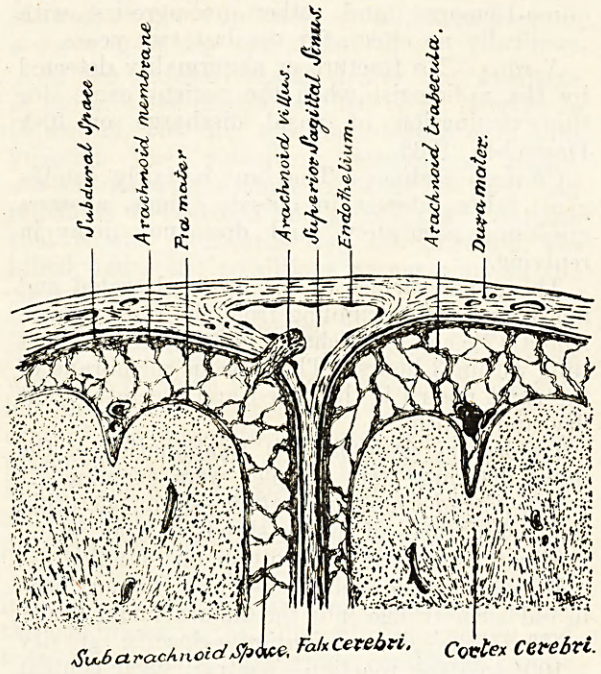

Diagram of coronal section of meninges and cerebral cortex to show relation of arachnoid villus to dural venous sinus. (After Weed.)

The case.—A male, aged 7 years 2 months.

History of previous illness.—At the age of (*i*) 2 months was attacked with pneumonia, at (*ii*) 7 months, again attacked with pneumonia and later on suffered from cough and fever occasionally, at (*iii*) 4 years 6 months, fever for 25 days treated as malaria, and at (*iv*) 5 years 2 months had a fall from a height of about 36 feet from a roof and remained unconscious for 5 days.

As a result of the fall he had the following manifestations :—(*a*) lacerated injury at the root of the nose, (*b*) bleeding from the right nares for about 2 weeks, (*c*) dribbling of watery discharge from the nares; since the bleeding stopped (the discharge is still persisting),

(*d*) a big swelling at the centre of the forehead which suppurated and eventually burst with discharge of pus (a scar mark is left), (*e*) an oblong swelling on the vertex, soft and compressible which disappeared with the bursting of the abscess on the forehead, and (*f*) swelling of the left eyelid which hung down to close the eye completely for about 1½ months, and a dark red spot left on the eyeball when the swelling disappeared.

History of present illness.—(*a*) Irregular fever for two years. The fever often comes with chill and rigor, occasionally remains continuous for 7 or 10 days, and at times lasts for a day or so and comes down with sweating.

(*b*) Repeated dribbling of the watery discharge from the right nares which rarely dries up and reappears again.

He has been treated with quinine, atebrin, quino-hæmogen and other antipyretics with practically no effect, for the last two years.

X-rays.—No fracture or abnormality detected by the radiologist when the patient came for the examination of nasal discharge on 10th December, 1935.

Clinical findings.—The boy is fairly intelligent, takes interest in outside things, answers questions accurately, and does not delay in replying.

The upper surface of the lip is ulcerated and moist with fluid dribbling from the right nostril. About 12 c.cm. of discharge is collected in a test tube within 3 hours. The mucous membrane of the right nostril is thickened and ulcerated; left dry and healthy.

Laboratory findings.—(*i*) Examination of the nasal discharge (six samples were examined).

(*a*) *Naked-eye examination.*—Faintly turbid fluid with traces of mucus shreds floating in it.

Slight deposit at the bottom on standing.

It has not the yellowish-brown colour seen in old hæmorrhage into the subarachnoid space.

(*b*) *Chemical examination.*—Specific gravity —1004 to 1008; reaction—neutral; sugar content —variable percentage, in different samples, from 0.05 to 0.2 per cent or more; albumin content—variable in different samples, 0.01 to 0.05 per cent or so; globulin—no reaction; urea—10 mg. per 100 c.cm. or 0.01 per cent (only one sample tested).

(*c*) *Microscopical examination.*—Mucus shreds, nasal epithelial cells and a few lymphocytes are seen. No red corpuscles were detected.

Culture yielded pneumococci predominantly besides other mixed organism, *e.g., micrococci catarrhalis* and staphylococci.

The variability of the sugar contents in different samples remained unexplained. About 6 samples of fluid were examined on different occasions (estimation of sugar by Folin's method in a Klett colorimeter).

(*ii*) Glucose content in blood—0.08 per cent.

(*iii*) Examination of urine and blood—no abnormality detected.

Clinical diagnosis.—Coryza is a watery discharge associated with the watering of eyes. It is generally acute in onset, and the diagnosis of its cause is not difficult as a rule.

Common cold, lachrymation, iodism, bromism, arsenism and trigeminal neuralgia also cause excessive discharge from the nares.

Rhinorrhœa may be a result of neurosis.

The only other form of watery discharge from the nares is the escape of cerebro-spinal fluid, and the laboratory diagnosis showed the discharge to be such.

Conclusion.—There was a history of injury; the only possibility would be a fracture of the base of the skull involving the anterior fossa at the cribriform plate of the ethmoid with the rupture of the dura and arachnoid leading to the escape of cerebro-spinal fluid through this route. Extravasation of fluid through the perineural spaces in the optic nerve through the subarachnoid spaces is a less likely occurrence and the patient does not show any ocular disturbances.

The escape of fluid from one of the nostrils is a marked feature. The continuous flow of cerebro-spinal fluid for such a long time is interesting because dural defects are quickly repaired by formation of new dura.

It is difficult to explain the conditions under which the usual repair was not possible. Moreover, such a loss of fluid has not lessened the intracranial pressure, possibly the fluid lost has been replaced by increased secretion from the choroid.

The fluid discharge was continued for the last 2 years without any ill effects on the patient. No method is known to stop the cerebro-spinal fluid discharge. The advisability of stopping the flow of cerebro-spinal fluid is questioned as the choroid is secretory in function and will continue to secrete more and more, and serious pathological manifestations may be evolved by this procedure.

Occasional fever troubles him and it seems that it is due to local infection of pneumococci affecting the nasal cavities and the pharynx. Pneumococci are commensal in those regions and when they find a good nutrient medium in the constant presence of cerebro-spinal fluid discharge in the nasal cavities, they may occasionally become pathogenic and cause infection.

Extension of local infection into the meninges may lead to a fatal issue. It is, however, likely that nature has elaborated sufficient immunity against the infection to resist further extension into the meninges.

It is desirable that an autogenous vaccine should be tried to increase immunity against the local infection and it is expected that the fever may then be stopped.

The case is recorded on account of the comparative rarity of the condition.

(*Continued at foot of opposite page*)

MORE ON HILL MALARIA

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and
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IT has recently (1935) been suggested by the senior writer that the spring epidemic of malaria in the lower Himalayan hills was spontaneous, and different from that at Calcutta where it was only due to relapses, because of the local differences in the physical conditions, of which the temperature was the most important factor.

Another possible explanation, however, not then taken into consideration, was that human infection in the hills was acquired during autumn just as in Calcutta but did not appear till spring, as has been reported to happen in Holland.

With this possibility in view anophelines infected in Calcutta during the recent autumnal infective season were transported by us to the lower Himalayan hills and the behaviour of the Plasmodia watched. *A. stephensi* was used as one now knows that its infective rate in Calcutta is at this season very considerable and would afford a good datum line for the observations in the hills.

The result of these have been that while the anopheline was becoming infected in Calcutta, when used as a strict control, at a rate of 58.5 per cent*, in the hills the rate was about 6 per cent. Further the evidence adduced below will show that under more 'natural' conditions than obtained during our observations autumn infection in the mosquito in the hills probably does not take place at all. The spring epidemic† of malaria in the lower hills of the Himalayas is therefore not to be considered as a manifestation of autumn inoculation as it is in Holland, and is a *de tempore* phenomenon, the reverse of the state of affairs in that country.

The schedule below the report shows the detailed observations. In detail it will be seen that only 3 out of 49 mosquitoes taken to the hills, dissected and examined after 10 days had the glands infected with sporozoites and it is significant that these 3 were included in 2 batches (nos. 1 and 2 in the schedule, Table I) that had been kept, except for 2 days‡, after arrival, in a closed room on the south side of a laboratory on which the sun beat down and which was otherwise kept warm by a charcoal fire; the resultant temperature being as shown in Table II where it is contrasted with the temperature at which the other batches, which showed no gland infection at all, were kept, in a room open day and night.

As the required material was not available in the hills the mosquitoes had to be infected in Calcutta§, but this was an advantage in that infection was putatively established in the mosquitoes at the same rate as if they had remained in Calcutta and so one may conclude that it was afterwards that the infection was killed under the conditions of carrying on the observations.

It had been anticipated that if this event should take place, the degenerating parasite would be revealed by 'black spores' in the gut, but, in the sequel, whereas in Calcutta 32.5 per cent of the mosquitoes showed the developing plasmodia as zygotes or oöcysts in the gut wall, in the hills only 1 specimen, or say 2 per cent, showed black spores, so that the balance of the putative gut infection was entirely lost.

Then it was thought possible that the normal infection inseminated in Calcutta might under the conditions in the hills only be arrested and that, on restoring favourable conditions to the mosquito, the infection would forthwith manifest itself. With this in view, 28 of the mosquitoes were, after a greater or less interval, returned to Calcutta and then after another period of from 1 to 5 days examined for parasites. In one of these 28 mosquitoes infection of the glands was seen, while of 24 mosquitoes that remained in the hills all the time 2 developed infection. There was thus no proof that the infection had merely remained in abeyance in the hills.

*This rate would doubtless have been greater if two of our batches of mosquitoes had not been fed about 24 hours after a course of plasmochin which had not eradicated the gametocytes, but which doubtless affected their viability.

† Steps are now being taken to ascertain the spring rate of infection in the mosquito in the hills.

‡ On these 2 days the minimum temperature was 57°F. and the maximum 77°F.

§ Some little time had to elapse before they arrived in the hills, the mosquitoes after being fed being usually either despatched the same night to the hills by post or taken by some guardian by train. Batch 1 was exceptional in remaining in Calcutta an extra 24 hours. The journey through the plains takes about 12 hours.

(*Continued from previous page*)

My thanks are due to Major R. Linton, I.M.S., Superintendent, Medical School, Dacca, for allowing me to publish this case note and also to Dr. P. Chakravarty, M.B., D.M.R.E., radiologist, for sending the case to me for investigation.

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