5. *Epitheliomata*.—16 men developed malignant skin tumours (all confirmed by biopsy), and of these 9 had previously suffered from simple warts and 3 had multiple epitheliomata. There were no fatal cases. The 9 with simple warts have also been included under "papillomata."

TABLE V.—*Latent Periods*

Folliculitis, acne, comedones		1 month or more
Melanosis		6 months to 5 years
Shagreen skin		Over 10 years
Keratosis		6 months or more
Papilloma		6 months to 43 years
Epithelioma	{ Rural district	18 months to 5 years
	{ Urban district	9 to 34 years

Note.—The shorter latent period for the appearance of a skin carcinoma in the rural district is discussed under "Ultra-violet Light." Because of this latent period all employees who leave the firm are requested (where practicable) to report to us any rash, pimples, or warts that might appear at some future date.

TABLE VI.—*Site Incidence: Papillomata*

Employees affected	..	102 (including 6 women. Age from 29 to 66)
Single lesions	..	40
Multiple lesions	..	62
Site affected:		
Nose and lips	..	43
Cheeks, eyelids, chin	..	24
Ears	..	6
Neck	..	8
Scalp	..	1
Hands	..	29
Forearms	..	16
Scrotum	..	11
Leg	..	1
Anus	..	1
Total	..	140

It would appear that the site of election for these growths is the face (48%); the incidence on the hands and forearms is 32%, and on the scrotum 8%.

TABLE VII.—*Site Incidence: Epitheliomata*

Employees affected	..	16 (no women. Age from 34 to 62)
Single lesions	..	13
Multiple lesions	..	3
Site affected:		
Cheeks	..	5
Nostrils, lips	..	4
Ears	..	3
Neck	..	2
Scalp	..	1
Forearms	..	3
Arm	..	1
Scrotum	..	4
Total	..	23

The most frequent site for the appearance of epithelioma is on the head and neck regions (65%). The upper limbs and the scrotum each show a rate of 17%.

Summary

A brief account has been given of the preparation, the chemistry, and the industrial uses of coal-tar and pitch.

The following clinical effects have been described and discussed: tar burns; tar erythema; allergic eczematous dermatitis; folliculitis, acne, and comedones; melanosis; shagreen skin; neoplastic changes, and epitheliomata.

The pathogenesis of pitch and tar cancer has been discussed.

Various prophylactic measures have been described.

A statistical survey has been included.

APPENDIX

Formula for Starch and Kaolin Paste for the Prevention of Tar Erythema

Starch		28 g.
Kaolin		1,600 g.
Phenol		36 g.
Glycerin		50 ml.
Distilled water		2 litres

The starch is made into a thin paste with about 50 ml. of water and poured into 950 ml. of boiling water. The boiling is continued for a few minutes to ensure the breaking up of the starch cells. The phenol and glycerin are added to the mucilage, and finally the kaolin, in small quantities at a time, with constant stirring. The final mixing is best done with the hands to make certain that no lumps remain.

The phenol prevents the development of mould in the paste and the glycerin renders the paste more "supple" and prevents rapid drying and cracking. Colouring matter such as cochineal may be added for a better cosmetic effect.

I wish to thank the Controller of H.M. Stationery Office for permission to reproduce the tables from the Annual Reports of the Chief Inspector of Factories, and Professor Kennaway for permission to publish the results of his experiment with a barrier cream in the production of experimental skin cancer (1946). I also wish to express my indebtedness to Mr. A. E. Wiggs, B.Sc., Dr. Henry MacCormac, Dr. Davidson, late H.M. Inspector of Factories, and Dr. L. B. Bourne for their kind assistance and suggestions.

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OBSERVATIONS ON TUBERCULOUS MENINGITIS IN CHILDHOOD*

WITH SPECIAL REFERENCE TO EARLY DIAGNOSIS

BY

W. S. CRAIG, M.D., F.R.C.P.Ed., M.R.C.P.

Professor of Paediatrics and Child Health, University of Leeds

Of all the clinical pictures met with in children there is probably none which has sustained such intense interest over so many years as that of tuberculous meningitis. The first account of the clinical course of the condition was given over 180 years ago by Robert Whytt during the time that he occupied the chair of medicine at Edinburgh University. His description, under the title "Observations on the Dropsy in the Brain," is still recognized as a classic.

Interest in the subject of tuberculosis in childhood, and of tuberculous meningitis in particular, has received added stimulus from the trials being given to streptomycin therapy. If this new form of therapy is to receive reasonable trial patients submitted to treatment must be diagnosed early. This constitutes something of a challenge to clinicians, because it must be admitted that we have not advanced greatly from the days of Whytt in the early diagnosis of tuberculous meningitis, no matter how improved are our methods of investigation in relation to the later stages of the condition.

Successive Clinical Phases

It is customary to describe the clinical course of tuberculous meningitis in terms of three stages. Sir Frederick Still used to say that while no fool could err when the middle and last stage had been reached, the wisest physician might fail to recognize that anything serious was amiss with a child in the first and early stage. It is this early

*Summary of an address given to the Harrogate Medical Society on Dec. 11, 1947.

stage with which I am concerned, but in order to present things in their proper perspective I will first briefly describe the clinical course of a typical case of tuberculous meningitis in childhood from its insidious onset to its tragic termination.

Because I am anxious to lay stress on clinical aspects I propose to consider my subject in the light of what I feel to be the immediate problem faced by the family doctor who has not the advantages of laboratory facilities at his elbow.

First Stage

This is usually described as *the prodromal or the premonitory stage*. There are many recorded opinions concerning the average length of this period. While most are agreed that it usually lasts for some two to three weeks it has been recognized that it may last for as long as two months. It is generally agreed that there are no absolutely characteristic symptoms during this phase of the disease. Indeed, a disconcerting feature is that not only are symptoms rather vague but they are too apt to resemble those often met with in a number of other conditions. To add to the worry of the clinician, when tuberculous meningitis is suspected at this early stage the problem is not merely one of differential diagnosis as between a number of serious possibilities, but is equally one of deciding whether the symptoms are in fact attributable to a serious or to a comparatively minor condition.

Most of us can remember children whom we have had under observation on account of anorexia, fretfulness, or lassitude, and possibly also failure to gain weight, and who in the course of only a week or two have developed headache and constipation severe and persistent enough seriously to raise the question of meningitis. If vomiting is also present we would instinctively suspect meningitis, but it has to be remembered that cases occur in which the vomiting is so infrequent or is so isolated in character that its significance may not be immediately grasped. Nevertheless I have no hesitation in saying that of the triad vomiting is unquestionably the earliest symptom in the great majority of cases no matter how occasionally it may occur in the individual case. A further point well worth mentioning is that sometimes a child not complaining of headache will complain of pain or perhaps only discomfort in the neck—a symptom never to be lightly ignored.

I like to look upon this stage as one characterized by symptoms which individually appear to have no serious import but collectively reflect considerable and to some extent increasing physical and emotional debility, and concerning which the most striking feature is their persistence.

Second Stage

The prodromal stage is usually described as being followed by *the period of irritation* or, as it is sometimes called, the stage of invasion. The transition from one to the other is only gradual. Despite the fact that such suggestive terms as "invasion" and "irritation" are employed, the point to remember is that even in this second stage many of the pronounced signs and symptoms commonly associated with other forms of meningitis are much more likely to be absent than present. This is certainly the case until such time as the stage of irritation is in process of passing over to the third and terminal stage—that of increased intracranial pressure.

In saying this I do not wish to suggest that the clinical picture in the second stage is not often typical to the extent of being almost diagnostic. It is during the second stage that prodromal symptoms lose some of their earlier vagueness and assume more pronounced form. A disgruntled fretful child is seen to become irritable to the point of petulance. Lassitude gradually merges into drowsiness. As drowsiness increases the breathing tends to become irregular, and even before this the child can be heard every now and again—sometimes at long, sometimes at short intervals—to give a prolonged, deep sigh. Even at this stage older children may be found up and about in their homes, but more often than not they are curled up in a chair in a shaded corner of the room, their faces turned from the light. If, on the other hand, the child is in bed all the points I have mentioned can be observed without turning down the clothes.

Often the cheeks are slightly flushed although there may be little or no fever. The so-called *tache cérébrale* can be easily obtained. In many cases you will find the child grinding his teeth, sometimes for hours on end. In strange contrast the eyes retain an unnatural brightness.

The moment you draw down the clothes the child shows his resentment. He pushes away the examining hands, clutches at the sheets, protests in a high-pitched voice, firmly closes his eyes, and remains curled up on his side, his legs flexed at the hips and knees. The likelihood is that the bones of the thoracic skeleton will be a little prominent, and that the abdomen from being a little full is beginning to show a scaphoid contour. Increasing anaemia becomes apparent. There are periods of great restlessness during which the child picks away at his lips, the umbilicus, or genitalia; and may cry out, not in pain but rather irrationally. These periods are only too likely to alternate with times when the patient may sit up and take an interest in his immediate surroundings. Often there is a frown of the forehead, which is the more striking because it is so rare in children. These intermissions of spontaneous interest gradually lessen in length and in frequency as weakness increases.

When you come to examine the child in greater detail the pulse will be found to be slow and possibly irregular until eventually it usually assumes the characteristics of the so-called cerebral pulse. Too much should not be expected from examination of the central nervous system at this stage. It is the exception rather than the rule to elicit Kernig's sign—and although many disagree I find little help from Brudzinski's sign. An extensor plantar reflex is sometimes present in older children, but its absence is of little or no significance. Nor is neck rigidity by any means a constant finding. There are, on the other hand, cases which show evidence of what I like to describe as objection rather than rigidity in response to flexion of the neck. This I realize is only a matter of degree; nevertheless, I have found that sensing neck objection of this sort has helped me to anticipate the development of other and more conclusive signs.

If the child with tuberculous meningitis is an infant the fontanelle provides valuable clinical evidence. Here again, however, it is, I am convinced, well worth while trying to recognize differing degrees of departure from normal in an attempt to arrive at an early diagnosis. There can of course be no mistaking the tense pulsating fontanelle, but before this stage is reached it is sometimes possible to appreciate a fullness characterized by "bogginess" rather than by tension. Where this occurs in the presence of other suggestive findings it is of undoubted value in arriving at a diagnosis. Even where there is neck rigidity, head retraction of any degree is unusual, and where it is present a noticeably thick exudate in the medullary region is usually found at necropsy.

In general, then, it can be said that true neck rigidity, head retraction, and Kernig's sign, as they are found in other forms of meningitis in childhood, are by no means typical where infection is due to the tubercle bacillus. A more common finding at this stage is the sudden appearance of motor palsy, albeit slight, in some form or another. Ptosis, unilateral or bilateral, and strabismus, usually internal, are the most common. Either of these may be associated with irregularity or inequality of the pupils. More rarely, but not altogether uncommonly, a limb or the facial muscles are involved, sometimes temporarily for some days, only to reappear.

So much for the stage of irritation, which usually lasts for a week but which more often than is sometimes stated may last longer than that.

Third Stage

I do not propose to enlarge upon the terminal stage. Suffice it to say that during this stage the slow pulse gives place to a rapid pulse, coma develops from drowsiness, and the temperature from being moderately irregular rises progressively. There may be delirium; convulsions are common—so also is incontinence of urine and faeces; flushing is pronounced; and wasting is increasingly rapid. The gaunt facies, the dry lips, the haggard expression, and the rattle of the throat make for one of the most trying ordeals parents at the bedside of a dying child have to face. I have dwelt on this because I feel that in striving to improve our knowledge of the condition we

should be mindful of the anguish that we may be able to save parents to whom at present we can offer little comfort, only understanding.

Such, then, is the unfolding clinical picture presented by tuberculous meningitis in childhood. This picture contains three salutary warnings, one related to each phase of the picture. Briefly these lessons are: (1) The clinical picture in the third and terminal stage is so predominantly one of intracranial disease that sight is apt to be lost of the fact that infection of the meninges has been secondary to an earlier infection elsewhere in the body; (2) The clinical picture in the second stage is sufficiently typical to suggest a correct diagnosis, but it is not dependent for its characteristics on findings associated with other forms of meningitis in childhood; (3) The symptoms which go to make the clinical picture of the first or prodromal stage have four more or less constant characteristics—namely, vagueness, insidiousness, a slow progressiveness, and a certain ominous persistence when reviewed over a period of time.

The Problem of Early Diagnosis

It is to this baffling prodromal period that I shall devote the rest of this address. When we are faced with the problem of diagnosis in a child presenting vague but rather persistent symptoms, what factors should or should not raise the question of tuberculous meningitis?

And here I would say at the outset that I think we would succeed in diagnosing tuberculous meningitis earlier were we, in the first place at least, to consider whether active tuberculous infection is present rather than whether there is or is not meningitis. In saying this I am influenced by two things. First, it is recognized that there is a special risk of meningitis occurring during the three months which succeed primary infection; and, secondly, the symptoms of primary infection, of early miliary infection, and of early meningeal involvement are vague and indefinite. The symptoms, consisting of nothing more than slight fever in a child who for some unexplained reason has gone off his food or off his feet, may pass unrecognized.

I have already referred to the importance of headache, constipation, and vomiting in the early symptomatology. Judged by the literature on the subject there is no agreement on which of these three is the earliest. As I have said, in my experience vomiting has almost always been the first. A point of some importance, more especially in the case of older children, is that mention of vomiting is often omitted in the mother's description and that reliable information is got only if leading questions are asked. The reason for this is that the vomiting bears no relation to food, has no periodicity, and occurs at long intervals. A point concerning the constipation is that more often than not it is associated with a clean tongue. In most cases the headache is frontal, but in the early stages at least it is not usually severe enough to keep the child awake.

Quite apart from actual wakefulness at night, restlessness may be an early complaint. Sometimes by restlessness at night a mother means irregular and unusual breathing during sleep; and observations which I made on cases of early tuberculous meningitis when holding resident hospital appointments certainly did suggest that irregular breathing in sleep is by no means uncommon at an early stage in these cases. Other forms of restlessness in sleep have been given a good deal of prominence in the literature but I have not found them to be constant findings. More commonly a mother comments, without any suggestion of worry, that her child is more difficult to waken in the morning. This may mean little, but if later the mother remarks that her child is not only difficult to waken in the morning but has gone to sleep after tea or has volun-

tarily expressed a wish to go to bed earlier than usual, then the clinician must be very much on the alert.

While on the question of information given by the mother there is another aspect which I should like to stress. Important as questions and replies may be, very often it is the aside made by the mother or her casual observation that sounds a note of warning. The mother is the first to note changes in temperament in her child. Because she is perplexed she is not always good at describing what she has noticed. If a mother talks about her girl or boy "being different" or "not himself" it is always worth while probing deeper. Disinclination to play is an early sign of many illnesses in childhood. But on many occasions it has struck me that this temperamental change or adjustment goes a stage further in cases of tuberculous infection. The child not only limits his physical and mental activities but, over and above that, withdraws from contact with others and retires within himself. He wishes neither to be spoken to nor to talk. He shows a preference for a chair in the corner. He is moody to the point of sullenness; and then, for no apparent reason and with altogether surprising suddenness, recovers some but not all of his former vivacity and interests. A certain sense of tiredness, perhaps even weariness, persists and increases as the moods come and go, but still the eyes remain bright and the pupils a little dilated. I do not wish to suggest that the picture I have drawn is diagnostic, but I do say that in the presence of other indefinite symptoms this fitful temperamentality in association with tiredness is an important feature of most cases.

Physical Signs

And what of physical appearance and physical findings as distinct from emotional behaviour? There is no typical appearance. While it is true that many children show evidence of previous disease or of debility of varying degrees, many others are apparently robust, well clad, and rosy-cheeked. In the individual case an appearance of ill-health is of value in diagnosis, but the fact that a child looks physically healthy and does not seem to have lost weight in no way offsets the possible significance of other symptoms suggestive of tuberculous infection. On the other hand, no matter what my own assessment of a case may be, I never ignore a mother's suspicion, much less her statement, that a child has got thinner. And when I have compared my own observations with those of parents I have usually found that any discrepancies have been due to the latter sensing an early almost infinitesimal loss of subcutaneous tissue as yet unaccompanied by wasting of muscles.

Another feature worth noting is the tendency of many of these patients—including those of apparently robust physique—to show an unnatural and early dryness of the skin. This is usually most in evidence over the trunk, but sometimes it first appears over the inner aspects of the thighs. Although of itself a small point, I mention this minor observation as being one of many which go to make up the elusive clinical picture of some cases of early tuberculous meningitis.

There are of course other aspects of a case which may legitimately influence diagnosis. Chief among these is a history of exposure to infection or the presence of tuberculosis elsewhere in the body. So far as exposure is concerned there is, I think, a tendency to jump to conclusions too readily. It is not the fact that a member of the household has had open tuberculosis that matters, but the fact that the patient has or has not been in contact with the suspected person at a material time (Table I). My experience on this particular point is mainly based upon hospital work in Edinburgh and to a smaller extent in the south, but it has always surprised me how very often

TABLE I.—*Environmental Factors**

1. History of contact in connexion with cases due to human infection or to infection of unknown type :	
No. of cases lacking reliable history of contact	48
No. of cases with no reliable history of contact but with history of tuberculosis in family	42
No. of cases established as having been exposed at a material time to contact with :	
A. Unsuspected open infection in :	
a. A parent	20
b. A sibling	5
c. A grandparent	4
d. Other relative	9
e. A member of the household (or children's community) not a relative	13
f. Neighbours	6
B. Previously suspected infection in a relative :	
a. Discharged from the Services	4
b. On leave from sanatorium	2
c. Awaiting transfer to sanatorium	7
2. History concerning milk consumption in 45 cases known to be due to bovine infection :	

Particulars Concerning Milk	No. of Cases from	
	Rural Area	Urban Area
No information	5	9
Never boiled	13	5
Occasionally boiled	3	4
"Pasteurized," "T.T.," or "invariably boiled"	2	4

* The cases included in the series were drawn from many administrative areas in both Scotland and England.

careful inquiry can establish that there has been an unquestionable risk of exposure. Another finding which has impressed me is the frequency with which there is a history of previous children in the family having died from tuberculosis. In the series on which I am basing my remarks this was true of no fewer than 17 children, representing over 8% of all the cases. Equally striking in this same series is the fact that no fewer than 25 (12%) of the 205 cases occurred in first children who at the time of their death were "only" children. Why this should be I am uncertain. Nor can I explain why it is that so often this dread form of disease seems to pick out "the bonniest of bairns."

Tuberculin Skin Test

Where tuberculous infection is known to exist elsewhere in the body the occurrence of new symptoms, no matter how vague or slight, should at least bring to mind the possibility of meningeal involvement. Even in those cases in which infection may have been previously suspected and not established, recourse should in such circumstances be had to radiological examination without delay. The fact remains, however, that in a large proportion of children known to be suffering from intracranial tuberculosis it is not possible to establish during life the presence of infection elsewhere in the body. I would suggest that this common experience has its lesson. We should accept that we cannot expect physical signs to help us very much where early meningitis is suspected. That being so, much greater use should be made of tuberculin skin tests to determine at an early stage whether or not a child has in fact been infected and acquired sensitivity. It may be argued that these tests are apt to fail in cases of tuberculous meningitis. That is true, but in my experience only rarely, and I am yet to be convinced that it ever fails in the early stages of the condition. In part the explanation lies in the fact that severe anaemia, impaired peripheral circulation, hyperpyrexia, and cachexia, which may contribute to failure or suppression of skin reactions, are not present in the early stages of tuberculous meningitis. Subject to the employment of a reliable method I have always looked to tuberculin skin-testing for invaluable help. While the Mantoux test is the most reliable method, I prefer the multiple puncture test for use in the home as being simpler and almost as reliable as the Mantoux and because it is unquestionably more reliable than the jelly or patch test. To get a negative reaction to a reliable test in a vague

worrying case can, by allowing a more favourable prognosis at an earlier stage, save parents as well as physician much anxiety. A positive reaction in the presence of signs or symptoms even vaguely suggestive of meningeal involvement, more especially in a child of 6 years or under, should point to the necessity for immediate admission to hospital for further investigations.

Lumbar Puncture

If the tuberculin skin test is of value, what of lumbar puncture? In what I have said I have tried to keep the problems of the family doctor to the forefront, and the question of whether to perform a lumbar puncture or not often constitutes a problem in itself. It is always wise to study the parents before deciding to do a lumbar puncture in the home. There is the risk that in their distraction the relatives may attribute any subsequent developments to the puncture. And it is, I think, well to remember that in the early stage of tuberculous meningitis the findings in the fluid, while they may be valuable, are not likely to be conclusive. The fluid is always clear but not usually under pressure in the early stage. In the later stages a typical fluid shows a cellular increase mainly mononuclear in character, an increase in protein, a decrease in sugar, and a pronounced decrease in chlorides. It has been said that a chloride content of less than 650 mg. per 100 ml. is virtually diagnostic. This simplifies the position overmuch. A chloride content of 650 mg. is suggestive of tuberculous meningitis, but can in my experience occur where intracranial inflammation is attributable to organisms other than the tubercle bacillus.

In the early stages of tuberculous meningitis the cerebrospinal fluid findings vary considerably. There may or may not be an increase in the cell content. It is no uncommon finding for polymorphs to be as numerous as lymphocytes. In some cases the polymorphs are actually in excess. This is more likely to occur where the patient is a small child and where the condition is running a more than usually rapid course. Great differences are found in the protein content. A normal figure or one as high as 400 or 500 mg. per 100 ml. may be obtained.

A reduction in chlorides is the exception and not the rule in the early stages of tuberculous meningitis. In nine cases, each of which I had under continuous clinical observation for over five weeks and from each of which cerebrospinal fluid was obtained at intervals of not less than five days, early signs of irritation preceded any significant reduction of chloride content of the fluid. On the other hand, a low sugar content appeared some four weeks before death in four of these cases. Whereas the sugar content tended to fluctuate, the protein content, which rose comparatively early, continued to increase gradually and progressively to a level which varied for each case but which, once attained, was maintained until death.

It will be appreciated, therefore, that in the early days of tuberculous meningitis there is a certain element of chance in what one may find in the fluid. And where lumbar puncture is performed in the early stage the findings are likely to provide no more than equivocal information to be evaluated in relation to clinical observations.

There is just one reservation I must make in this connexion. If cerebrospinal fluid from a well-established case of tuberculous meningitis is allowed to stand, a "shimmery" frail coagulum appears in the course of a few hours. Sometimes this occurs in fluid obtained early in the course of the disease. On four occasions I have known this coagulum to appear during the prodromal stage. Allowing that the likelihood of this occurring so early is slight, it is, I think, worth looking for in any suspected case, because if found

it is so highly suggestive. The same may be said of choroidal tubercles and changes in the optic disks. These were encountered at an early stage in only five of my series, but were of value in allowing of more rapid diagnosis than would otherwise have been possible. Extensive miliary spread was demonstrated post mortem in all five cases.

The Factor of Age

And now I come to my last point, which I have left to the end because it has a bearing on almost all that I have already said. As is well known, the form which a particular disease assumes may differ in infancy as compared with older childhood. This tendency applies to tuberculous meningitis and in particular to the prodromal stage of the condition. A point of importance in diagnosis is that tuberculous meningitis is rare under 6 months of age. It occurs with greatest frequency in the second and third years of life (Table II). This is of some importance

TABLE II.—Age Distribution

Age Period	No. of Cases	Age Period	No. of Cases
6 months and less	6	7-8 years	6
6 months-1 year	31	8-9 "	8
1-2 years	45	9-10 "	3
2-3 "	37	10-11 "	5
3-4 "	18	11-12 "	4
4-5 "	16	12-13 "	1
5-6 "	11	13-14 "	2
6-7 "	10	14-15 "	2

because the condition tends to run a more rapid course in infancy than in older childhood. Of the triad—headache, vomiting, constipation—headache is rarely a recognizable feature in infants. It is sometimes said that headache is indicated by screaming and by the hands being raised to the head. This is contrary to my experience. My impression is that the infant with early tuberculous meningitis tends to be quiet rather than noisy. Often, indeed, it is unnatural drowsiness that first gives a hint of the presence of trouble. Most commonly, however, vomiting is the first symptom. Sometimes, and I think frequently, it is preceded by a sudden and complete loss of appetite. Almost invariably it is followed by constipation.

In contrast with the condition in older children the vomiting tends to be persistent rather than erratic, but if a careful history is taken it will usually be found that anorexia has preceded even the first vomit. As I said earlier, the fontanelle often raises suspicion at an early stage. So also does a certain strangeness in the expression—a strangeness usually described by the mother as vacant, but which to me sometimes suggests a sense of apprehension. Eventually the expression becomes fixed. Nor is there, I think, any question that convulsions are more likely to occur early in infants, whereas in older children they are usually a late rather than an early sign. It is rare to come across recognizable papilloedema in the small baby.

Another point worth mentioning is the frequency with which there is a history of recent ear discharge in cases of tuberculous meningitis in infants. My experience is that it occurs in some 20 to 30% of those under 3 years of age. There is always the risk that it may delay the real diagnosis. For what it is worth I might mention my impression that it is usually, if not only, in those cases of tuberculous meningitis with associated otitis that the child is seen holding his head or ears as if in pain.

Onset of Symptoms in Bizarre Form

So much, then, for the differences in infancy as compared with other ages. I need hardly say that we must

always be prepared for the case which presents at the onset in an altogether unusual, even bizarre, form. I have twice had children brought to me on account of ptosis which had developed suddenly and which later proved to be the beginning of meningitis. In five other cases the first complaint was of paresis of a limb or part of a limb, or of the facial muscles. In two of these five cases the paresis disappeared only to be followed after an interval by the symptoms of early meningitis. In two cases difficulty in walking was the first thing noticed. In another child, brought on account of hysteria, a coarse intention tremor of one hand was observed in the out-patient department. Ten days later the child showed signs of early meningeal involvement. Where there is inflammatory involvement of the cervical cord the head may be held in any grotesque position, and I have twice had infants referred to me in which torticollis was the first outward evidence of tuberculous meningitis.

Bizarre symptoms lacking other explanation—and they include the precipitately occurring convulsion lacking apparent organic or reflex association and the sudden development of gross athetoid-like movements in older children—should always raise the question of tuberculous meningitis. So, I think, should a history of headache dating back to an accident some time previously. This may seem rather irrational, but there was a history of accident in no fewer than 7% of my cases. Even allowing that the connexion between accident and illness was more a figment of the mother's distraught imagination than a reality in some instances, the figure is too high to be ignored, and it has some pathological justification if Rich's theory concerning meningeal infection is accepted.

Lastly, importance should always be attached to a child's past health history. Analysing my records, my impression is that the point of significance is not so much whether the child has had measles or whooping-cough recently as whether he has or has not had a number of debilitating conditions, more especially if they have followed in rapid succession or have been of pronounced severity.

Robert Whytt concludes his classic with a note on "The Cure of a Dropsy in the Brain." In this note he says: "If this disease could be known early, and before any considerable quantity of water has been collected, it might probably sometimes be cured." He goes on to say: "As it never discovers itself till so much water is accumulated . . . as to disturb the action of the brain we have little to hope from any medicine."

Whytt thought in terms of "purgatives, diuretics, blisters, frictions, exercise, and diet." To-day we are at the stage of giving trial to streptomycin, which may provide us with some of the answers we seek. As yet we cannot say, but success in the use of streptomycin, whether for research purposes or as a form of therapy, will, to quote Whytt again, depend on "knowing the disease early."

The United Kingdom Trade Commissioner at Delhi has forwarded to the Board of Trade the following report of an answer to a question in the Constituent Assembly of India (Legislative). "The country is self-sufficient in regard to the common vaccines used for public health purposes, such as cholera vaccine, T.A.B. vaccine, plague vaccine, and vaccine lymph. The indigenous production of other drugs is inadequate to meet the country's requirements, and the hospitals obtain Indian-made medicines to the extent they are available. The question of increasing the production of certain essential drugs is under the consideration of the Government of India in the Ministry of Industry and Supply in consultation with the Ministry of Health. In view of the shortage of foreign currency the Government are already following a restrictive policy in respect of imports of medicines and drugs, including patent medicines. Drugs are allowed to be imported only if they are essential."