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ERRORS OF DIAGNOSIS IN PAEDIATRICS*

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One of the few benefits which a physician gains from advancing years is experience through his mistakes. The account that follows is not only a personal confession, but also a review of some of the errors encountered during the course of thirty years in practice.

The subject requires some tabulating under various headings, which can be incorporated under four main aspects, all based on misconceptions or false interpretations. References are also made to overpopular diagnoses and to mistakes that are made by giving too much or, alternatively, too little significance to certain clinical features.

Disease Patterns in Adults and Childhood

Errors are sometimes made by imposing, as a kind of miniature replica, the pattern of disease of adults on to childhood. As a rule, in fact, illness in children tends to be much more acute and overwhelming, but there are some infections which have an entirely different clinical picture. Tuberculosis is a good example. Children with a chronic cough, mild pyrexia, anorexia, loss of weight, a debilitated look, and a history of sweating at nights are often thought to be tuberculous. Phthisis, which these symptoms suggest, does not occur in childhood, except in the rarest circumstances, and the diagnosis generally turns out to be an intestinal disorder once described by Eustace Smith as "mucous disease." Children with this disorder have a coated tongue, halitosis, and mucus in the stools. Sometimes threadworms are also present. Night sweats have probably raised the greatest suspicion, but this symptom is so common in childhood as almost to be physiological, if it is not the result of too much clothing and bedding, with lack of sufficient ventilation.

Otitis media in infants may progress without the usual warnings, and the drum finally ruptures after a stormy illness; earache may never have been present, or may have been difficult to establish. Vomiting and diarrhoea may have been the predominant feature, confusing the issue, and no reliance can be placed on pyrexia and leucocytosis, which may well be absent.

At this early age, also, quite advanced meningitis may occur before the right diagnosis is established. Rapid increase of intracranial pressure is largely avoided by separation of the sutures, so that the classical features of the disease do not arise until late, and various wrong conjectures are made. Bulging of the fontanelle instead

of depression, to conform with the general state of dehydration and wasting, should finally throw true light on the condition.

Misconceptions

Perhaps the most dangerous diagnosis to make in an obviously sick infant is teething. Throughout the centuries it has been the refuge for doctors who are at a loss to know what is wrong. In this way I have known erysipelas, otitis, pyelitis, meningitis, and pneumonia go unrecognized. Although a physiological process, babies can be severely disturbed during the process, but all other sources of their trouble should be excluded before "teething" is blamed. The situation is not made any easier by the fact that during this episode the child's particular weakness may be set off, such as an attack of bronchitis or "croup," an intestinal upset, or even a fit.

Reactions of the blood to simple infections in children can be misinterpreted. Twice I have seen the lymphocytosis of pertussis labelled leukaemia. No diagnosis could be more serious, as the implications are so well known to most parents, and once made it is difficult to retract what has been said. With modern methods of bone-marrow puncture such a mistake could hardly occur.

Masked Clinical Picture

The course of pneumonia has been entirely altered by modern therapy, and it is rarely now a serious disease of some duration. Nevertheless, errors in its diagnosis and the oversight of other underlying conditions can occur. It can mask pertussis, which becomes obvious only as the pulmonary complication subsides. This may have troublesome consequences from spread of the infections to others in a ward before it is recognized.

In children, asthma is usually accompanied by so much catarrh and bronchial secretion that the clinical picture may be more like pneumonia. A history of repeated attacks of this nature of surprisingly short duration, and the association of an expiratory spasm with the general dyspnoea, should put the diagnosis straight and direct the correct treatment.

When an apparently straightforward case of pneumonia fails to react rapidly to penicillin or some other suitable antibiotic, and the clearing pulmonary skiagram reveals cyst-like cavities, the mystery of the protracted course seems to be explained. Still, it is unwise to jump to the conclusion immediately that cystic disease of the lung is present, as in some cases complete disappearance of the cavities eventually occurs. The "cysts" were

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abscesses which finally healed, and this can be demonstrated only by a series of x-ray films.

Turning to alimentary disorders, coeliac and fibrocystic disease (muco-viscidosis) in infants can be completely masked by diarrhoea. Gastro-enteritis which fails to improve with standard modern therapy after a reasonable period should raise a suspicion of one or other of these two disorders. Fibrocystic disease will be associated with very evil-smelling stools and possibly some pulmonary trouble as well.

One is never on safe ground in regard to appendicitis. To miss the condition in childhood is particularly serious, as peritonitis may so easily follow. An unusual position of the appendix behind the caecum or ascending colon is a well-known trap in the diagnosis, as then no tenderness and rigidity in the right iliac fossa need be present. I find that the good family doctor has an uncanny intuition in regard to this disease, and a specialist who disregards an opinion from that quarter is indeed a foolish man. When in doubt surely it is wiser to explore.

The situation has been further complicated by all too ready administration of antibiotics in doubtful cases. This can lead to an infected appendix being brought half under control; later it may rupture and produce a pelvic abscess. Diarrhoea may then be one of the main symptoms and, with the tense and tender abdomen, suggest some other abdominal disorder such as typhoid fever.

Misinterpreted Symptoms and Signs

Mothers often say they are able to tell the difference between their babies' crying from pain or from hunger; I wonder. The fact remains that the majority of infants who are brought to the doctor with supposed "colic" are suffering from underfeeding, and the trouble is easily remedied.

The aches and pains of muscular strain and spasm in genu valgum can be mistaken for those of subacute rheumatism, but rheumatic children seldom complain only of their legs. A much more serious error is to call osteomyelitis acute rheumatism. This has happened so often that a warning is given in most textbooks.

It should not be difficult to differentiate a tic from chorea, but they are continually being confused. When analysed, no choreic movement is entirely repetitive or can ever be said to have served a useful purpose. Children with tics, on the other hand, have insight into their ailment and can be encouraged to demonstrate their habit. The correct diagnosis is of more than academic importance, as the treatment of the two conditions is diametrically opposed.

A faint should be easy to distinguish from a fit if careful inquiry is made into the circumstances immediately preceding its occurrence, the aspect of the patient during the attack, and his behaviour afterwards. Emotional breath-holding in young children with resultant cerebral anoxia is easily recognized, although mistakes have been made and something more serious suspected. The real trouble arises in deciding whether a true fit is due to epilepsy or is merely an associated symptom of some febrile complaint. There are indeed some authorities who believe that "symptomatic" fits can occur only in potential epileptics. Certainly the E.E.G. gives some assistance, but one must always be quite convinced before labelling a child an epileptic.

Vomiting by its frequency in so many disorders of childhood inevitably leads to errors in diagnosis. Some newly born infants vomit all fluid for the first few days, and are soon thought to have a congenital abnormality of the alimentary tract. Abdominal distension and peristalsis are important signs in any form of intestinal obstruction, but are not always obvious and depend on the position of the lesion. Radiological evidence of pooling of air in the upper part of the gut and its absence at a lower level is sometimes

helpful in the diagnosis, but fluid levels can be misleading. If meconium has been freely expelled and there is no bile in the vomit it is safe to wait. Passage of a rubber catheter into the stomach will exclude an oesophageal malformation. An unusual amount of mucus is often found in the vomit; this seems to be the main source of the trouble and can be remedied by gastric lavage.

Age is important. Certain diagnoses can be discounted on this alone—hypertrophic congenital pyloric stenosis, for instance, when symptoms first appear after the age of 3 months.

Vomiting and headache together are such classical features of serious intracranial disease that I hesitate to mention them. Errors are still made by the unwary, and the possibility of a brain tumour, tuberculous meningitis, or some other serious complaint must at least be considered. Migraine and cyclical vomiting should never be diagnosed until renal and cerebral disease have been excluded. With this in view the fundi are an important part of the physical examination. Lead-poisoning is rare, but should be noted as likely to give rise to a similar mistake.

There are a number of physical signs which are open to misinterpretation. An apical systolic murmur is commonly attributed to an organic lesion with little justification. It is a decision that must not be lightly taken; rheumatic carditis is usually diagnosed and the child unnecessarily condemned to a semi-invalid life. An intense murmur immediately after the first sound, with a fairly wide area of conduction, becoming louder on exercise and better heard with the child recumbent, is more likely to be due to an organic lesion. Cardiac enlargement, the presence of a thrill, and possibly a rheumatic history would be confirmatory evidence.

Paroxysmal tachycardia in infants may masquerade as an acute abdomen. Cardiac failure can rapidly appear, and the enlarged tender liver may give rise to such abdominal rigidity that it cannot be easily palpated. Vomiting may be present and the child show speedy signs of distress. Concentration on the abdomen may result in the tachycardia being overlooked. I have seen a case like this saved from surgical intervention just in time.

Another condition which may appear to be a surgical emergency is acute enterocolitis of the dysentery group with melaena, which has to be distinguished from intussusception. On the other hand, melaena is not necessarily present in all cases of intussusception, particularly when the condition is incomplete or recurring.

In the past, scurvy has also been mistaken for osteomyelitis.

It is perhaps not generally known that a transient glycosuria may occur after severe vomiting or starvation, with resulting ketosis. Further urinary tests should therefore be made, especially after the child has been given some sugar, before the possibility of diabetes mellitus is entertained. I need hardly remind you that coli bacilluria commonly gives rise to signs suggesting an acute abdominal condition, and that this urinary infection, acute appendicitis, tuberculous peritonitis, and enteric fever have all to be considered in a differential diagnosis. The physical signs of appendicitis and tuberculous peritonitis are sometimes so indistinguishable that laparotomy is the safest procedure.

Urethral valves in boys usually lead to bilateral hydronephrosis and hydroureters, which easily become infected. Sometimes congenital aplastic kidneys are present. Uraemia is the main feature, with vomiting and an intestinal upset. The enlarged ureters may be mistaken for dilated gut, and the whole clinical picture looks more like some alimentary disorder. As the condition is rare, this is all the more likely to happen.

A more common complaint is incontinence of faeces, and the child suffers from continuous soiling of his pants. Some of these cases find their way quite wrongly to child guidance clinics; others are diagnosed as Hirschsprung's disease. The rectum is found to be loaded right down to the anus, and

faeces can often be felt on abdominal palpation. The condition is really a very severe dyschezia due to bad bowel habits, sometimes originating from defaecation fears due to pain of an anal abrasion or fissure. Absence of enuresis should exclude any psychological factor.

On the other hand, a true case of Hirschsprung's disease may be overlooked in infancy when it presents all the features of lower intestinal obstruction. The most likely disorder with which it is apt to be confused in the immediate neonatal period is meconium ileus, the infantile variety of fibrocystic disease.

The only common blood disease which may lead the doctor astray is leukaemia, since it may first appear in various obscure ways—as a case of serious anaemia, agranulocytosis, purpura, generalized adenitis—or give rise to bone pains from subperiosteal deposits and be mistaken for rheumatism.

Only two neurological difficulties will be discussed. Todd's paralysis after an epileptic fit may persist for quite an appreciable time and cause anxiety in respect of some organic lesion of the central nervous system. "Otitic" or "toxic" hydrocephalus is a mysterious complaint which has quite often been confused with a brain tumour. No one could be blamed for subjecting a child to ventriculography and even more drastic measures when headache and vomiting with papilloedema are so striking. It is true there may be no localizing signs, but these are not invariably present with a centrally placed neoplasm. There seems to be no way of avoiding this mistake.

Finally, Still's disease may be puzzling when it arises with little or no arthritis, and merely with an irregular undulating fever, a rash, and a neutrophil leucocytosis. The possible diagnoses will then be legion. Alternatively, pericarditis may be present at the onset and rheumatic fever would then seem to be the correct diagnosis. It is perhaps not generally known that rheumatoid arthritis in childhood may first attack one joint alone. The fever, leucocytosis, and toxic state of the child will naturally lead to fear of a pyogenic arthritis, and the doctor in charge feels impelled to explore the joint for pus. The subject of Still's disease should not be left without referring to polyarteritis nodosa, which runs a very similar course.

Overpopular Diagnoses

Bronchiectasis is certainly diagnosed too readily. If there is a persistent productive cough, steps should always be taken to exclude a chronic sinus infection or segmental pulmonary collapse. Glandular fever is the other popular diagnosis which is consistently made on insufficient evidence. If adenitis is confined to the cervical region, tonsillar sepsis is a much more likely cause. Recently we have also been told that a glandular-like fever with eosinophilia but a negative Paul-Bunnell reaction may in fact be toxoplasmosis, an infection which is apparently commoner than we thought.

Finally, I would like to issue two warnings. One is against calling a child hysterical until all other possible causes have been excluded. Serious diseases can begin in this way. Meningitis, for instance, in children may produce most curious temperamental changes. Once I was very nearly misled in a case of subacute bacterial endocarditis. It arose in an excitable rheumatic girl of 12 years who was suddenly struck dumb on seeing her mother after an interval of three weeks. Apart from an old mitral lesion there was nothing else to discover. I was sorely tempted to consider the whole affair an hysterical outburst, but somehow refrained from this. There soon followed a right-sided hemiplegia which proved fatal, and the loss of speech was due to a small embolus in Broca's area.

It is easy to place too little significance on clinical features, but one can err in the opposite direction. Children have been confined to bed for months on end for a continued mild pyrexia—a "ninety-niner" it could be called—with no symptoms, no signs, no leucocytosis, a normal sedimentation rate, and all investigations negative. Surely the

advice here is to throw the thermometer out of the window and allow the child to get up.

So ends what I have to say. My remarks have probably been of little value. Growing children rarely profit by the mistakes of others; they have to make their own experiences. I wonder if adults are any better, even those who belong to our profession.

Congreve was indeed wise when he wrote, "Error lives ere reason can be born."

A "FOLLOW-UP" CHEST X-RAY SURVEY IN THE RHONDDA FACH

I. PULMONARY TUBERCULOSIS

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Techniques for evaluating the effect of various therapies on groups of individuals have recently been much studied and most effectively applied both in the tuberculosis and in other fields. This report attempts the more difficult task of evaluating the effect of preventive medicine on a community.

In 1950-1, as the first step in a long-term investigation of the aetiology of progressive massive fibrosis (the more serious form of coal-workers' pneumoconiosis), 89.0% of the inhabitants of the Rhondda Fach over the age of 15 were x-rayed (Cochrane *et al.*, 1952). In addition, owing to the ready co-operation of the Welsh Regional Hospital Board, we were able to offer immediate admission to hospital to all "active" cases. In this way the inhabitants of the valley may be said to have received "radical" therapy for tuberculosis.

It will be argued by some that the technique would have been more radical if B.C.G. had been given to all those whom we found to be tuberculin-negative at the time of the first survey. This was not done for two reasons: (1) we did not think the evidence in favour of B.C.G. so convincing that it would be unethical not to vaccinate the tuberculin-negative, and (2) we were particularly anxious to measure the "conversion" and "reversion" rates. Tuberculin-negative children under 5 years of age were, however, given B.C.G. if they were "contacts," while older "contacts" were similarly vaccinated if their parents so wished.

In 1953, during the second stage of the investigation, the community was again x-rayed, and we are therefore in a position to measure the changes in the death rate and prevalence rate of tuberculosis and measure the attack rate of infection.

It is, however, impossible to cover all this in detail in one report. The epidemiology of pneumoconiosis,