An Address ON CHRONIC INTESTINAL TOXAEMIA IN CHILDREN.

DELIVERED BEFORE THE HAMPSTEAD MEDICAL SOCIETY,
JANUARY 19TH, 1928,

BY

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THE chief object of this address is to direct attention to the type of child who is persistently out of health owing to chronic intestinal toxæmia. I shall deal, first, with the signs and symptoms by which it may be recognized; secondly, with the various forms of intestinal derangement responsible for it, some of which are special to childhood; and finally, with the principles of its treatment. But I have also a subsidiary purpose in view, which is to emphasize the fact that in many of these children the most conspicuous symptoms are those pointing to disorder of the nervous system, so that there is a danger that the causative physical condition may be overlooked and the case regarded as a purely psychological problem. In these days, when the psychology of the nursery is so much under discussion, this danger is, at least in my opinion, by no means remote.

RECOGNITION OF THE "INTESTINAL CHILD."

The "intestinal child"—as, for lack of a better term, we may call the type produced by chronic intestinal toxæmia of all sorts—is often easily recognizable at sight, but it is seldom brought to see the doctor for any one very definite symptom. Occasionally it is brought for irregularity of the bowels, sleeplessness, persistent nocturnal rise of temperature, or bouts of feverish biliousness. Much more often it is brought that the parents may learn whether it is ill or not; and it is noticeable how often both parents accompany the child, so nonplussed are they about the whole business. "Why does it look like this? Why does it behave as it does? Surely there must be something wrong with the child." These are the things they say, the implication being, of course, that to such parents no child who is not placid but brilliant, and as least as beautiful as it is good, should have been vouchsafed. And indeed it must be confessed that the child brings its parents little satisfaction and no credit, for its appearance suggests exhaustion from a spell of debauchery, and its deportment is frankly impossible. In these days, when the sins of the children are visited upon the fathers unto the third and fourth generation, the parents of the intestinal child are little to be envied.

The symptoms of the child are perhaps best summarized under the headings of unhealthiness and unhappiness. In appearance (often so characteristic) it is thin and sometimes undersized; its complexion is pale, sallow, and muddy; its eyes, especially towards evening, are darkly ringed and the lower lids are baggy; its tongue is coated, its breath foul, and its odour often strong. Especially it is noticeable that the child looks completely tired out; it may feel and behave as though languid and exhausted, but more often it is feverishly active, chiefly in wrongdoing. Its appetite is bad, except perhaps for breakfast, after a purge, at a party, or on holidays. So had may it be that meals are often a burden and sometimes a horror to the family. Its sleep is usually poor: awake late at night, disturbed by frightening dreams, it is agog to be up and doing at dawn. Sweating is common during the night, and a persistent low fever may be discovered. This not unnaturally adds to the parents' alarm, and often the doctor, who has hitherto regarded the whole business as due to bad management and spoiling, becomes obsessed with the idea of the presence of tuberculous mesenteric glands: in this he will seldom be correct. Perversions of appetite,

such as dirt-eating, gnawing of bedclothes, and others, are not uncommon.

The nervous symptoms are often more conspicuous than those of physical ill health, and I have already mentioned some of them. Taken as a whole the child is chiefly unhappy, and its misery spreads to those round it. It is unreasonable, ill humoured, cantankerous, self-centred, emotional, negative—everything, in short, that can make a child unpleasant. In milder cases it is shy, frightened, occasionally spiteful, and on the whole disappointing; but more often it is actively and aggressively unpleasant. Much has been made of the negativism of nervous children, but it is the inevitable expression of nervous irritation and exhaustion. How else can a child show this? It cannot go home and bully its wife and family; so it shows its ill humour in refusing to do the ordinary things expected of it—the child's method of bullying.

The intestinal child is often in character singularly unlike its brothers and sisters. The parents, thinking on psychological lines, are reminded of the nervous taints and peculiarities in each other's relations, but surely in such circumstances a physical cause for the child's ill health should suggest itself.

In many cases the symptoms are altogether milder and less harassing, and here we see the difference between the normal and the neurotic temperament. The placid child, poisoned from the intestine, becomes sleepy, tired, apathetic, and protects its incapacity by withdrawing its interest from its surroundings. The neurotic child, on the other hand, becomes in its fatigue more restless, and so enters into the vicious circle so well demonstrated by adults who have command of their own course.

Thus far, then, we have the picture of our too-familiar friend the "nervous child." How are we to distinguish the group which originates in intestinal toxæmia? It is true that in most cases the very appearance of the child's face should suggest the presence of a toxæmia quite decisively; but there are other signs which point clearly to the intestinal tract, and of these I place reliance chiefly on the following: (a) enlarged abdomen; (b) the occasional or persistent occurrence of abnormal stools; (c) the presence of gross indigestion as shown by microscopical or chemical examination of the faeces; (d) the presence of much indican in the urine.

Enlargement of the abdomen is frequently overlooked by parents and doctor, and if recognized it is often misinterpreted. A child's abdomen ought not to swell visibly from time to time, or to diminish visibly after an action of the bowels. I always view with suspicion an abdomen of which the mother says it is the child's "best part." Enlargement of the abdomen must, then, be looked for, and if found must be explained. In intestinal toxæmia the distension is chiefly due to flatulence, the result of stasis, indigestion, malabsorption, and decomposition. The stools may be abnormal in various ways. Usually constipation is present, but this alone is not enough to give rise to toxæmia. The stools are frequently undigested or foul, and if careful notice is taken it will be found that at such times the child is worse: its complexion, appetite, temperature, and behaviour are all affected. The various forms of indigestion and malabsorption of food, as found by microscopical examination of the stools, I will deal with later.

But, it may be said, granted that there is an association between disorders of the nervous system and intestinal toxæmia, who is to say which is the cause and which the effect? Now I readily admit that just as there are "nervous children" without intestinal symptoms, so there is nothing to prevent a nervous child from developing intestinal toxæmia; further, that it is clear that in a neuropathic child nervous symptoms would be produced by a smaller degree of such toxæmia than in a more stable subject. Yet to distinguish between such causes and effects in individual cases is surely the customary task of the physician, and I here need only produce evidence that intestinal toxæmia is capable of producing the psychological picture of the "nervous child."

On this point I would say, first, that from the early days of babyhood intestinal derangement, apart from

pain, has a great effect on the nervous system: tetany and convulsions are but extreme examples of this. For a baby's misbehaviour there is still more merit in a dose of castor oil than in the most modern psychology of the nursery. In matters scientific the infant remains sadly out of date, and even the small child conservative. Secondly, as showing the possible production of nervous symptoms by intestinal toxæmia, I would cite as the clearest proof the child with coeliac disease. Here we have all the eccentricities of the "nervous child" in *excelsis*—the negativism, the introspection, the so-called "anorexia nervosa," and the rest of them. While psychological treatment alone is here a complete failure, correct dieting brings about gradually such a change for the better that the child becomes easy, well behaved, and lovable. Yet with an extra dose of fat, bringing back abdominal distension and foul stools, there reappear the irritability, the loss of appetite, and the unhappiness. I have seen this so often that I cannot doubt the sequence of events. Further evidence to the same point might be given. I could quote the experience of adults with intestinal toxæmia, the effect of Plombières treatment, and the alteration in the disposition of the "intestinal child" when properly treated; all these show that a toxæmia of intestinal origin can have a profound effect on the nervous system.

I will therefore conclude with two submissions. First, that any child who is brought to us for marked nervous symptoms and peculiarities should be examined with great care for some possible physical cause, particularly one originating in the intestine; remembering that the nervous symptoms are often so conspicuous that they are likely to mask the less evident intestinal symptoms. Secondly, I would urge that where intestinal toxæmia can be proved, a generous allowance should be made for the child's misdoings. I have seen such alterations in disposition in these cases that I am convinced that allowances should be made for these children on the ground that they are really ill children. I would even go further than this, and suggest that a like measure of charity be extended to the mother herself. For her to see her child looking often enough like a dissipated drug addict and behaving like a fiend is more than likely to make her morbidly anxious and unwise. After all, if our mothers may not be "unwise" with us, who may?

FORMS OF INTESTINAL DISORDER PRODUCING THE INTESTINAL CHILD.

Let me first exclude two conditions which should not be classed as causes of intestinal toxæmia—namely, simple constipation and abdominal tuberculosis.

Simple constipation does not, in my opinion, give rise to toxæmia. In a child, if it produces any symptoms, they are those of abdominal distension; pain, particularly after food (of which constipation is the commonest cause in a child); and perhaps some lack of appetite and disturbed sleep. Where toxæmia develops I class the case as one of toxic constipation or of the other types to be considered in a moment.

Abdominal tuberculosis is often diagnosed in these cases because there are chronic ill health, abdominal enlargement, and nocturnal fever with sweating. As a matter of fact, in the richer classes it is by far the least common cause of this triad of symptoms. Yet it is diagnosed because the doctor does not appreciate the alternative possibilities, and perhaps has not examined the stools. A child cannot be ill for two or three years from abdominal tuberculosis and yet show no abnormal signs in the abdomen. Tuberculous glands are the commonest lesion diagnosed, but there is no reason at all why their presence should be accompanied by foul and undigested stools. Some confirmatory sign should be elicited before such a diagnosis is made.

I turn now to the various digestive disorders which may give rise to intestinal toxæmia in children.

Coeliac Disease.

I put this first because it is both common and clearly recognized. I have not here in mind the classical form of the disorder, with its large, pale, offensive, unformed

stools containing a great excess of fat, chiefly in the form of fatty acids. Rather I refer to the milder type which I have elsewhere described¹ as the non-diarrhoeic type, in which the stools are large, formed, coloured, and contain their excess of fat chiefly in the form of soaps. This type gives rise to abdominal distension and considerable toxæmia, and can, of course, be recognized by a careful analysis of the stools on ordinary and on fat-free diets. There are, however, a few points which are of aid in reaching a diagnosis clinically. Growth in height is retarded more constantly and more seriously in this group than in any of the other forms of intestinal toxæmia. Flattening or wasting of the buttocks is a suggestive sign.² Lastly, coeliac children are very seldom constipated, and in this they differ from most other cases of intestinal toxæmia. On the contrary, the bowels act very regularly, and however little the child may eat one day it will not fail to pass a good-sized stool the next. How often this leads to the erroneous conclusion that there is nothing wrong with the intestine! Yet it is a noteworthy point in favour of malabsorption of fat.

I must not forbear to mention that H. C. Cameron, who has written so instructively and delightfully on the "nervous child," has repeatedly laid stress on its inability in many cases to take fat well. In doing so he has had, I think, the tendency to acetonaemia chiefly in mind. The intestinal child is not the type which is prone to true primary acetonaemia (cyclical vomiting), although it may have feverish bilious attacks with secondary acetonaemia. In the coeliac cases the child cannot absorb fat properly, and to give it induces toxæmia and perhaps a low persistent fever. In other types of intestinal toxæmia cooked fats (of roast meat, sausages, rich gravies, etc.) will upset, just as they will similar cases in adults.

Starch Indigestion.

In spite of the amount of attention paid to it in the textbooks I have not found this to be a common cause of intestinal toxæmia. It can be easily recognized in a microscopical examination of the stools, and may be suspected where a child passes rather loose acid stools, pitted or honeycombed from the evolution of gas. Such indigestion sets up a secondary colitis. These cases seem chiefly to arise from overfeeding with starch, but there seems little doubt that rarely there is a great intolerance of starch.

Nut Indigestion.

In the last three or four years I have met with a dozen or more cases of chronic indigestion in which the stools were full of undigested nut cells. These are easily recognizable as being the only vegetable cells which contain oil. The amount of these has been in some instances sufficient to make the stool large and fatty. I am not satisfied that I have always been able to explain the presence of this, and suspect that crushed nut is being used in some foods which I have not yet traced.

Lamblia.

Infection by this flagellate protozoon is now very common amongst the children of the hospital class in this country. I have published³ a study of the effects of it on them. It produces an enterocolitis with some distension of the abdomen and loss of weight. It is, however, more characterized by intractable diarrhoea than by an obscure toxæmia. The stools show all sorts of undigested food, mucus, but no blood. The flagellate is easily seen under the microscope during the diarrhoeic periods.

Toxic Constipation.

Lastly, there is the group of unclassifiable forms of intestinal indigestion similar to the usual adult type. Their origin is as difficult to dogmatize on in children as in adults. Personally, I believe that they arise in various ways. Some are the sequel to acute enterocolitis—for example, dysentery. Others are possibly the result of infection of the intestine from above—for example, infected tonsils or antra. By far the most common type,

however, is that which follows prolonged constipation: a harmless or simple constipation turns into a toxic constipation. How is this transformation brought about? I believe that abnormal infective agents have very little to do with it in ordinary cases, but that the sequence of events is increasing constipation causing faecal decomposition, which in its turn produces irritation and catarrh of the colon. In this the chemical irritants of decomposition are often aided by the use of improper purgatives and an unsuitable diet of "roughage." In my view it is the supervention of this mild colitis which permits the absorption of toxins from the bowel. A great function of the colon is to refuse to absorb the poisons which are ever present within it—at least in quantities greater than can be dealt with by the liver; it is not, therefore, unreasonable to assume that where the wall of the colon is abnormal its impermeability is impaired.

With the onset of the colitis there is not only toxæmia, but pain or discomfort in the hyperaesthetic colon may develop. Spasm of the colon (spastic constipation) is rare in childhood.

In such cases of stasis the stool is usually alkaline in reaction, and rather foul and greasy from the presence of a little mucus. Microscopically the food residues are found to be finely divided; the muscle fibres small, pale, rounded, with their striation largely lost. Although there is no excess of fat in the stool, many bundles of coarse fatty crystals can be found by the microscope. Oxalate crystals are also numerous. The benzidine test for occult blood is usually positive. The bacteria may be normal, but frequently there is a proportionate excess of streptococci. Other and more abnormal organisms are sometimes present, but I have seldom been able to trace any significance to them. Although the amount of mucus seen in the stool in ordinary circumstances is scanty, on washing out the bowel there is usually plenty, both old and recent. The urine contains a large amount of indican and many oxalate crystals.

Two conditions sometimes associated with toxic constipation require mention: parasites and appendicitis. This is the type of case in which threadworm infection is common. Except for local symptoms I do not believe its presence makes any difference. The so-called symptoms of threadworms are, for the most part, those of toxic constipation and colitis.

Recurrent appendicitis is common enough in children. Whether there is in them a condition similar to the so-called "chronic appendix" of adults is questionable. I will only say that I regard right-sided abdominal pain and tenderness as much more indicative of appendicular disease in a child than in an adult. My reason for saying this is, that although in adult cases there are many who still complain of the same pain after their appendix has been removed, it is very rare, in my experience, to meet such in childhood. With that I will leave it.

PRINCIPLES OF TREATMENT.

The treatment of intestinal toxæmia in children is apt to be long, and much patience and attention to detail are necessary to obtain good results. Here I can only very briefly enumerate the principles which should guide the treatment.

Rest.

Many of these children, when first seen, are tired and ill enough to benefit from a month's rest in bed. Where this is unnecessary, enough rest to ensure freedom from exhaustion must be maintained. Where restlessness is troublesome sedatives should be ordered; bromide is a sheet-anchor here. In older children adalin is very useful to promote sleep.

Diet.

Where the exact fault in digestion is known the alterations in the diet are clearly indicated. Dealing with the group of cases termed above "toxic constipation" the diet should be suitable for the associated colitis. This is quite different from that used for simple constipation, for the aim here is to give a diet which will leave a small smooth residue, and all sorts of "roughage" are

out of place. Fresh fruit, except orange juice and squashed ripe banana, should be forbidden, and cooked fruit given only sparingly and without pips or skins. The vegetables allowed should be only such as can be put through a sieve. Cooked fats of roast and fried food and rich gravies often disagree. On this diet, although the constipation may be increased, discomfort and distension are lessened, and a chance is given to the colitis to subside.

Aperients.

Much depends upon the selection of an aperient which, when given regularly, is efficient yet harmless. The aim should be to produce a stool which is soft but formed, avoiding either a constipated or a watery action. Liquid stools are far more toxic than are formed ones.

It is rather characteristic of the cases of toxic constipation that they are ordered doses of calomel once or twice a week. These, although they do temporary good, are liable to set up or increase colitis. Even for emergencies castor oil is safer.

Paraffin is, perhaps, the drug in most common use. Where quite small doses are effective there is small objection to its use; in large doses it is quite unsuccessful. Stools full of paraffin ferment readily, and a microscopical examination of them shows how great is the interference with protein digestion. On large doses children remain distended and toxic, and their tongues coated. An emulsion of paraffin and phenolphthalein has much more "cleansing" power, and, where it works efficiently in small doses, makes a good aperient for some of these cases. Cocoids of phenolphthalein make a very palatable aperient for small children, and magnesia may be sufficient for others. All preparations of senna and cascara are best avoided, if possible, for persistent use.

Where the child is old enough to swallow a tablet we have the group of bile preparations of which the proprietary preparation taxol is a pattern. These, in my experience, are extraordinarily successful, and on the whole a great advance on any of the other aperients for daily use. They produce no griping, the liver action is stimulated, the motions, with a properly adjusted dose, are soft but formed. In young children I have often prescribed taxol ground up in jam.

Intestinal Lavage.

Intestinal wash-outs are very useful in really severe cases, even though they may mean that the child will require more rest than would otherwise be necessary. They should be given about twice a week. The fluid used may consist of equal parts of Plombières water and ordinary water, or of a solution of 2 drachms of salt and 1 drachm of sodium bicarbonate to a pint of water; 1 to 1½ pints should be run into the bowel from a funnel, through a soft rubber catheter, and evacuated after being held in the bowel for a minute or two. Where proper Plombières treatment is available it is more efficient, but in children the wash-outs given at home are often quite successful. After six or eight treatments at three-day intervals it is usually possible to lengthen the intervals between the treatments. They should not be continued too long nor left off too abruptly.

Massage.

Some massage should be given, if it causes no pain, along the colon when cleared out by the wash-out. An overloaded bowel should not, I think, be subjected to massage; the bowel should first be emptied. Many cases show secondary dilatation of the stomach, and light massage for this is useful. General massage is rarely advisable, and should certainly not be ordered until all fatigue has passed off.

Later Measures.

As the child improves appetite and sleep return, and progress then is usually fairly assured. Additions may now be made to the diet and to the amount of exercise allowed. Change of air, and artificial or other sunlight, are of value.

REFERENCES.

- ¹ *Lancet*, 1923, i, 72. ² *Arch. Dis. in Childhood*, 1927, ii, 189. ³ *Ibid.*, 1926, i, 93.