DIARRHŒA IN CHILDREN.*

By FRANCIS HAWKINS, M.D.,

Physician to the Royal Berkshire Hospital, formerly Clinical Assistant to the Hospital for Sick Children, Great Ormonde Street, etc.

DR. FRANCIS HAWKINS commenced by discussing diarrhœa as met with in pneumonia, scarlet fever, measles, and nephritis; then diarrhœa due to local irritation and acute and chronic dyspepsia, reflex diarrhœa and diarrhœa in rickety and tuberculous children. He then proceeded: I now ask you to discuss with me that very fatal form of so-called diarrhœa. So many names have been given to this form that the whole subject seems to me to be in complete chaos. Let me mention a few names: Infantile Diarrhœa, Choleraic Diarrhœa, Infantile Cholera, Dysenteric Diarrhœa, Gastro-enteritis, and Gastro-intestinal Catarrh, Infective Diarrhœa, Epidemic Diarrhœa, and perhaps more commonly Summer Diarrhœa, and still more recently, by Professor Vaughan, Acute and Subacute Milk Infection. On turning over the reports of the causation of death, especially those of Ballard, we find yet another list of names: Atrophy, Marasmus, Convulsions, Hydrocephalus, Vomiting, etc.

I now venture to submit to you that the disease called or designated by all these various names is a specific disease, as much so as pneumonia, enteric fever, tuberculosis, rheumatism, or cholera. And in so doing I am not claiming any new idea; for Ballard in 1887 strongly indicated "that autumnal diarrhœa was an infectious disease impending on soil in the first and season in the second instance." He also adduced facts showing that the disease was not solely a chemical intoxication, but due to some microbe derived from a particular soil and capable of multiplying within the animal body. Hensch writes: "I still think that an abnormal chemical action in the contents of the stomach and intestine set up by unknown influences is to be regarded as the primary process."

Later on I shall revert to the morbid anatomy of this condition, but will merely mention here that although some of the gravest symptoms in most speedily fatal cases are accompanied by the most superficial lesions, yet it would appear that the intestines in all cases exhibit more or less pathological change. I therefore propose to call this disease *Infantile Enteritis*, and define it as an acute specific disease occurring during all seasons of the year, but

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most frequently during the summer months, affecting not only children but adults and those advanced in years. You may say, If this disease occurs in the adult, why speak of it as "infantile"? I would, however, remind you that while we speak of Infantile Paralysis, yet this same paralysis is met with in adults, and this, therefore, is my excuse, if such be needed. The ætiology of this *Infantile Enteritis* is somewhat obscure; but recent experiments made by Klein and Andrewes would tend to show that it may be due to the *Bacillus Enteritidis sporogenes*. In observations made by Klein on bowel discharges and bowel contents of eleven infants, he found that in four fatal cases the spores of *Bacillus Enteritidis* were detected by culture, and that in six fatal cases and in one non-fatal case bacilli, as chains and as cylindrical rods, could be demonstrated in microscopic specimens of the bowel contents. These bacilli he thought were *Bacillus Enteritidis* in a non-sporing state. "In this disease the bacteria which normally inhabit the child's alimentary canal, and are under normal conditions beneficial, multiply enormously, and their products act as severe general poisons and as a local irritant to the mucous membrane of the digestive tract" (Thompson). The poisons produced differ apparently in the degree of irritation to which they give rise; some cause choleraic symptoms. Chemical changes are by Baginsky thought to be important. He thinks that, while the lesions of the mucous membrane and general intoxications are certainly produced by the products of bacteria, it seems exceedingly probable that the abnormal multiplication of these is often secondary to a functional chemical change in the contents of the stomach and bowel.

Of the predisposing causes, that which affects us most as practitioners of medicine is food; for while the surroundings are of importance, yet the disease does affect children having the best of surroundings.

Food as a Cause.—Feeding is a very important factor. Children fed from the breast are remarkably exempt. Of 1,000 fatal cases recorded by Hope 30, of 602 cases recorded by Meinert 24, and of 341 by Ballard 7, had the breast exclusively; therefore if we take the total—viz., 1,943 fatal cases—only 3 per cent. had the breast exclusively. Hope found

I. "That infants fed in whatever way with artificial food to the exclusion of breast milk are those which suffer the most heavily."

II. "That children fed partially at the breast and partially with other kinds of food suffer to a considerable extent, but very much less than those brought up by hand."

III. Respecting the use of the bottle, Hope found that it is

decidedly more dangerous than artificial feeding without the use of the bottle.

Maternal neglect and carelessness in infant management is also an important factor in the causation of this disease. I now come to consider

Age.—As I am only considering this disease in relation to children, it may be said that the disease is one of early infancy, occurring mostly during the first two years of life. Henoch found its frequency mostly during the first and second years of life. Holt and Crondal found that

14	per cent.	of their cases	occurred	under	six months.
29	"	"	"	between	six and eighteen months.
17	"	"	"	"	eighteen and twenty months.
16	"	"	"	over	two years.

We must now discuss the symptomatology.

This disease may be met with in a very acute or in a less severe form, and may resemble very closely an unusually severe form of acute indigestion. A study of the symptoms of this disease will itself suggest its specific infectious nature; for there may be no prodromata—nothing whatever to indicate its onset, no local, no constitutional disturbance. The child may appear in good health and be suddenly attacked. In other cases the child may be out of sorts—fretful, restless, and distressed. The temperature may rise to 102°, 103°, or even 104°. The child may be dull and sleepy, the bowels slightly loose, and in most cases there is more or less general disturbance of the nervous and vascular systems.

As to symptoms proper, *vomiting* is constant; it at first consists of undigested food and later of watery mucus, and it may be tinged with bile. Ballard found that in only 43 out of 326 fatal cases was vomiting absent during some period of the illness. Vomiting usually occurs at the commencement of the illness, in some cases not till the end of the first or at the commencement of the second, and in some instances not till the third or fourth day, and in other instances it does not occur until the end of the illness. On the other hand, vomiting may be the one prominent symptom from first to last, or it may cease after the first day and not recur.

Vomiting may occur concurrently with *Diarrhoea*.

Diarrhoea.—The disease may run its course without this symptom being present in any marked degree, and thus it may not be noted as a symptom. In most cases, however, diarrhoea is sufficiently marked for anyone to note that the frequency and quantity of the stools are abnormal, and Ballard observes that "in most cases diarrhoea is a prominent symptom, lasting throughout the illness, or only disappearing shortly before death." The diarrhoea may be

trifling in quantity at first, and then as the disease advances become profuse. I saw in consultation not long since a case where the diarrhoea was so slight at first that no notice was taken of the child's illness until vomiting and slight twitchings attracted attention. On the other hand, the diarrhoea may be from the first extremely profuse. There is, I believe, nothing particular to note as to the colour of the stools. They may, however, resemble in character those of cholera, or of dysentery, and may be associated with tenesmus, or even prolapsus ani. While the stools are usually offensive, they are not so in every instance.

Nervous Phenomena.—A knowledge of these is of some importance, for in not a few instances has the cause of death been certified as "convulsions," when the real disease causing death has been "infantile enteritis," and thus a symptom has been assigned as the cause of death instead of the disease. What would be thought of a man, I wonder, certifying oedema of the legs as a cause of death in a case of heart disease?

But few cases run their course, especially the fatal, without exhibiting some nervous phenomena. These in some instances are slight, such as working of the hands, rolling of the head or eyes, or a slight twitching of the limbs. On the other hand, marked convulsions may be present, which may be unilateral, but are usually general. One case which I saw in consultation at first had regular convulsive movements on one side only; after the convulsions there was marked twitching of the face. Later the convulsive movements became general. The relations of diarrhoea and vomiting to these nervous or convulsive phenomena have been well worked out by Ballard. He found that in some cases when diarrhoea or vomiting increased suddenly in severity, the convulsive phenomena first appeared; in other instances when the diarrhoea or vomiting, from being severe, lessened, or ceased, these convulsive phenomena set in, the eclampsia replacing the vomiting and diarrhoea.

I may here refer to the condition known as *hydrocephaloid*, which frequently occurs in this disease, described by Marshall Hall; the characteristic symptoms being "advancing apathy and drowsiness, half-closed eyes, flattening or depressing of the great fontanelle, opacity of the cornea from fragments of mucus, great weakness of the pulse, and fall of temperature."

The temperature may be high at first, and fall later below normal; this is especially so in fatal cases.

The urine is usually reduced in quantity.

Emaciation.—This again is a symptom of some importance, for deaths are not unfrequently certified as "marasmus," "atrophy," etc. Emaciation is a part of the disease, and may proceed with consider-

able rapidity. A fairly well-nourished child may become emaciated or atrophied in the course of a very few days. Especially is this noticeable in the adductor muscles of the thighs. Subsequently the extremities become cold and clammy, the abdomen soft and retracted.

Such are, in brief, the symptoms of a disease I venture to call "Infantile enteritis"; and most of you will, I think, agree with me in thinking that such symptoms suggest that the disease is an infective one. Compare the symptoms with those of other acute infective diseases and I ask, is there not a marked resemblance?

One word as to the *pathology*, and here I must quote Henoch, who writes: "We find nothing at all that is characteristic. We generally observe nothing but an abnormal pallor of the digestive mucous membrane, or perhaps only a slight enlargement of the solitary glands and Peyer's patches; in others, streaks of redness and swelling of the mucous membrane of the intestine and stomach." He also alludes to changes in other organs. Ballard found marked changes in the intestines, even in those of infants, the total duration of whose illness did not exceed twelve or fourteen hours. For the most part the intestines were empty, or only contained a little yellow faecal matter or mucoid fluid, or the surface was coated with some thick creamy catarrhal exudation. The amount of hyperæmia of the mucous membrane of the stomach and intestines varied sometimes. There was observed some follicular ulceration both in the small and large intestine. Generally there was more or less inflammatory thickening of the mucosa, and even in the cases of only a few hours' duration, denudation of the epithelium both of the stomach and intestine. Now and then ecchymoses were seen, or even a little blood effused into the alimentary canal. The solitary and agminated glands of the small intestine were mostly prominent; the mesenteric glands were enlarged.

Besides the changes in the intestine, Ballard also found changes in other organs. The *liver*, exhibited in nearly all cases fatty degeneration of its cells; in other cases it was either congested or pale or bloodless.

The *kidneys*, when normal macroscopically, invariably showed changes microscopically, showing inflammatory and degenerative changes, intense glomerulo- and parenchymatous nephritis.

The *spleen* varied; it was sometimes congested, or exhibited hyaline degeneration of the arteries.

The *lungs* showed marked evidence of acute catarrhal, or catarrhal and interstitial pneumonia.

Dr. Hawkins concluded by dealing with the treatment of the disease.