TREATMENT IN GENERAL PRACTICE

This article is one of a series on the management of some of the major medical disorders met with in general practice

TYPHOID FEVER ITS CHIEF COMPLICATIONS

BY

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Unremitting medical attention and first-class nursing are essential in typhoid fever. There is no specific treatment of value. Prompt diagnosis, skilful management, careful feeding, and early detection of complications materially improve the outlook. Patients apparently moribund from extreme toxæmia and exhaustion are surprisingly capable of recovery.

Unless the home is of exceptional convenience and resources are adequate, hospital is the ideal place for treatment; but the patient should be removed there in the early stages of disease, and not when prostrated by toxæmia or suffering from severe complications.

General Management

The sickroom should be of adequate size, well lighted, and sparsely furnished. An open fireplace is desirable, and a bathroom and lavatory should be adjacent. Flies should be excluded. The room temperature should be from 60° to 65° F. Thirty inches is a convenient height for the bed, which should not be more than three feet wide, and should be easily accessible on both sides. A hair mattress, resting on springs and covered by two folds of blanket and a waterproof sheet, should be provided. Over this is laid the lower sheet, and a drawsheet is placed under the patient's hips. A sheet and blanket cover the patient. The pillow should be low. Absolute rest, both physical and mental, should be aimed at. Visitors are undesirable. The patient should be taught to use the bedpan and urinal in recumbency from the first.

Two nurses experienced in the management of typhoid patients are necessary; in exceptional cases, a third. Sometimes a male nurse may be called for. The nurses should have been inoculated against fevers of the enteric group, but this should not prevent their taking all the usual precautions against infection. Washable overalls should be worn. Four-hourly temperature, pulse, and respiration charts should be kept, and also an accurate register of food and fluid intake, of urine passed, of stools, of sleep, and of any other special features.

Arrangements should be made for immediate notification of serious symptoms to the physician, such as those indicative of hæmorrhage or perforation. Surgical aid should be in readiness. The patient's blood should be typed and a donor available, preferably one known to be typhoid-immune.

Disinfection

Urine, stools, sputum, and vomit should be saved for inspection in properly covered receptacles. Disinfection of excreta, discharges, and wash water is essential. The urine should be mixed with an equal quantity of 1 in 20 carbolic acid or of 1 in 500 corrosive sublimate to which 5 per cent. of strong B.P. hydrochloric acid has been added. In the case of stools thrice the volume of disinfectant should be employed. The disinfectant should

be in contact with the excreta for at least two hours. It is convenient to receive sputum into small cloths, and to burn it at once. Soiled linen should not be allowed to dry, but should be placed at once in the sublimate solution. Bedpans, urinals, enema syringes, and thermometers should be thoroughly disinfected and washed after use, and the patient's crockery, spoons, medicine glasses, etc., boiled. On no account should the nurse be engaged in the preparation of food for the rest of the household.

Nursing Details

A nightgown open down the back is the best garment. The toilet of the mouth must receive attention. Dentures should be removed and the whole buccal cavity cleansed gently several times a day with soft linen rag wrapped round the finger, especially after feeding. Stringy mucus may be removed from the pharynx in the same way or by mounted cotton-wool swabs. Water is the best detergent; some prefer an alkaline carbolic lotion.

Ulcers in the mouth or on the fauces should be painted with tincture of iodine or with Mandl's paint. Crusts in the nose may be softened with liquid paraffin, and vaseline be applied to the lips and nares. A few drops of lemon juice squeezed on the tongue encourage salivation. Secondary infection of the skin and the development of pressure sores must be avoided. Parts soiled by urine or faeces are cleaned at once by wet sponging, dried, and dusted with talc powder, particular attention being paid to the natal cleft, vulva, or scrotum. The skin over pressure points is hardened by the four-hourly application of industrial methylated spirit, which is not coloured, followed by circular inunction with zinc ointment, to each ounce of which a drachm of compound tincture of benzoin has been added. A water bed is unnecessary, but water cushions or air rings can be employed if necessary.

Several times a day the patient's position should be changed from dorsal to right and left lateral, and maintained by a supporting pillow. The feet should be supported to prevent foot-drop, and pressure of bedclothes be avoided by the use of cradles. Night and morning the patient should be tepid-sponged in warm blankets—arms, chest, abdomen, legs, and back, in turn—but no voluntary exertion must be allowed. The sponging should last fifteen to twenty minutes, and may suffice to keep the temperature within reasonable limits. In severe cases it may have to be repeated, a temperature of 102.5° or 103° F. being taken as an indication. In some instances sponging with cold, or even iced, water may be necessary. Antipyretic measures are most effective if applied at the hours when a natural remission of the fever is expected. Antipyretic drugs of the coal-tar group are best avoided; they may cause dangerous collapse. Retention of urine may cause great restlessness and aggravate fever. If fomentations and an enema fail to relieve it, a soft catheter should be passed, with strict aseptic precautions.

In addition to a scrutiny of the charts and inspection of the stools and urine, the physician's daily routine examination should include inspection of the abdomen for signs of meteorism, bladder distension, or other complications, and watch should be kept on the heart, the lung bases, and on the lower limbs for signs of venous thrombosis.

Diet During Febrile Stage

In the past, when the fear of haemorrhage, perforation, and relapse was allowed to outweigh the occurrence of inanition and exhaustion, many patients received no more than 1,000 calories a day, despite the fact that the average increase of metabolism in typhoid fever is over 40 per cent., and that a daily intake of 4,000 to 5,500 calories is necessary if nitrogenous equilibrium is to be obtained and the weight maintained. Inanition, far from preventing the accidents mentioned above, may actually be a factor in their appearance. On the other hand, at the height of the fever desire for food may be entirely absent and administration of nutriment a great difficulty. Even in patients who are amenable the pushing of a high calorie diet may induce nausea, vomiting, diarrhoea, and tympanites: its advocates admit that in the early days of the fever it may be impossible to raise the intake above 1,500 calories without inducing a digestive upset. As a matter of practical experience it is found that a daily ration of from 2,000 to 3,000 calories is sufficient for the average adult patient.

Many patients have been tided successfully through the acute stages on a diet of three pints of milk (1,200 calories) in the twenty-four hours, given at regular two-hourly intervals night and day, each feed of five ounces of milk being diluted with two ounces of barley water. If curds are passed one grain of sodium citrate is added to each ounce of milk. Chicken broth or beef tea, salted, is allowed up to a maximum of one pint daily, unless diarrhoea proves troublesome. It should be divided into three doses, and taken at midday, late evening, and in the small hours of the morning, as recommended by Ker. The calorie value of this diet is easily increased by the addition of sugar and cream. Of the sugars some prefer lactose because it is less easily fermented; dextrose is permissible, but cane sugar is too sweet. One drachm of lactose and one drachm of 20 per cent. cream may be added to each feed, and the quantities doubled if well tolerated. Each ounce of sugar equals 120 calories, and each ounce of 20 per cent. cream 60 calories.

The requisite calories are thus mainly supplied by additional carbohydrate, which is protein-sparing. In the ordinary course of the fever the absorption of foodstuffs is normal, with the possible exception of fat in large quantities. Cold water is allowed throughout between the milk feeds, and some patients easily take from three to six pints in this way. Aerated waters are better avoided, but fruit juices are acceptable drinks, and are excellent vehicles for the administration of sugar.

Solid Food

The temperature should be normal for three days before the diet is increased: some would disregard a slight evening rise if the morning temperature remains normal. The first addition is breadcrumb boiled in milk or Benger's food, then egg beaten up in milk, custard, thin bread-and-butter with lightly boiled egg, pounded fish, and pounded chicken, the amount of food given being increased cautiously.

In most attacks of any severity patients do not show any desire for solid food until defervescence commences, and are quite content with the regime set out above. Should a more varied and higher calorie diet be desirable, and the patient's condition and appetite warrant it, the following may be substituted for three of the feeds at appropriate times.

Morning.—A lightly boiled or poached egg. One ounce of bread or toast with half an ounce of butter. A cup of tea or coffee with sugar and cream.

Midday.—In addition to the soup or beef tea, one ounce of mashed potato with half an ounce of butter. Four ounces of custard or well-boiled sago or tapioca, and a tablespoonful of apple sauce.

Early Evening.—Another lightly boiled or poached egg, with four ounces of well-boiled rice or two ounces of sieved spinach. In such cases two night feeds will be found sufficient. Should abdominal discomfort or increase in fever ensue, the diet should be simplified at once.

Meat should not be added to the typhoid diet during the febrile period. Any return of fever during convalescence involves a return to absolute rest and strict diet until its cause is ascertained. Alcohol is in disfavour; its stimulating effect is fictitious and its food value not great. In large doses it has a deleterious effect. In those greatly addicted to its use it may be unwise to discontinue it suddenly.

Diarrhoea and Constipation

In most patients on a suitable milk diet constipation is the rule. A soap-and-water enema every other day is sufficient. In defervescence half an ounce or more of liquid paraffin at night may be substituted. Administration of purgatives like calomel, even at the very beginning of the infection, have no convincing effect on the course of the disease. After the first week purgation is dangerous.

Diarrhoea is a feature of some cases. If slight it calls for no interference beyond proper adjustment of the diet. If curds are present in the stools the milk should be citrated, peptonized, or diluted. Whey may be substituted in intractable cases. Beef tea, meat juices, and fruit juices should be excluded. The starch and opium enema is useful if stools are very frequent, but often 5 grains of Dover's powder at night suffices. A gentle but thorough lavage of the colon with warm water may prove effective. Vomiting is exceptional in uncomplicated attacks, and is treated by modifying the diet as in diarrhoea. In perforative peritonitis vomiting is a late symptom. It may be a symptom of uraemia.

Toxaemia and Circulatory Failure

Toxaemia at the height of typhoid fever may be profound; it is accompanied by circulatory failure and hypostatic congestion of the lung bases, and is itself responsible for many deaths. As Osler long ago stated, water inside and out is the best remedy. The cold bath treatment elaborated by Brand of Stettin is rarely used nowadays in England. It is difficult to apply in private practice. Systematic tepid or cold sponging takes its place, and where the pyrexia is very persistent the ice cradle is a valuable adjunct. Buckets of ice or ice-bags wrapped in flannel to prevent condensation and dripping are suspended in a cradle which covers the patient's naked chest and abdomen and is covered only by a sheet. The temperature is taken half-hourly, and the cradle remains *in situ* for several hours, the legs being covered by a blanket, and hot-water bottles applied to the feet. Toxaemic patients should drink copiously of cold water. Glucose lemonade (half a pound of glucose in a pint of water flavoured with the juice of two lemons) and imperial drink (one drachm of cream of tartar in a pint of barley water, flavoured with the juice of a lemon) may form part of the fluid intake, which some would push to a minimum of six pints in twenty-four hours. It is well to bear in mind that excessive fluid throws a strain on both heart and kidneys, and may induce meteorism. The development of polyuria is a good sign.

In the accompanying cardiac failure digitalis and strophanthus are most disappointing. Strychnine, adrenaline, and analeptics such as coramine 1 c.cm., or

cardiazol 1 c.cm., given hypodermically, are more effective, especially when the lung bases are congested. A well-tried combination given hypodermically every four or six hours is:

Strych. sulph. ...	...	...	gr. 1/100
Atrop. sulph. ...	...	...	gr. 1/200
Adrenaline ...	...	...	m v
Sterile water ...	...	...	m x

Cyanosis and dyspnoea may call for oxygen by the soft intranasal catheter, the gas being bubbled briskly through warm water and the catheter secured to the cheek by strapping.

Delirium

Delirium often accompanies the toxæmic state. In the usual form it is nocturnal and muttering, and this may pass into coma vigil: sometimes it is violent, especially in drinkers. A delirious patient should never be left alone. Mechanical restraint is undesirable, but a large draw-sheet may be passed across the body and well tucked in. In mild cases ice-bags or cold compresses to the head with tepid sponging may be effective. The administration of 1 or 2 drachms of paraldehyde or of 10 grains of medinal with 10 grains of aspirin at night may induce sleep, but a 10-grain dose of Dover's powder is more effective. In extreme cases, especially when the delirium is accompanied by severe headache or meningismus, lumbar puncture should be performed and the cerebro-spinal fluid allowed to drain freely. An examination of this fluid will show whether actual meningitis is present. In some cases one is compelled to fall back on injection of morphine (1/4 grain) or of hyoscine (1/100 to 1/50 grain).

Meteorism

Meteorism should be watched for and treated before it reaches a severe degree. It may be due to errors in feeding and easily be kept in check, but in toxæmic patients it is apt to be severe and may mask peritonitis. It may be necessary to substitute whey and albumin water for milk. Intestinal antiseptics are of doubtful value, but 15 minims of oil of turpentine in almond emulsion every four hours may be tried. The irritant effect on the kidneys must be watched. Other ways of using turpentine are as fomentation or stupe, and as enema.

A thick flannel fomentation, wrung out and sprinkled evenly with one or two drachms of turpentine, is applied to the abdomen, covered with protective and wool, and fixed with a many-tailed bandage. A bed-cradle is applied. Reddening of the skin is watched for. An application of twenty to thirty minutes is sufficient as a rule. In some cases an ice poultice is more effective than a turpentine stupe.

As an enema half an ounce of turpentine is given in six or eight ounces of mucilage of starch. A soft rectal tube passed well in and left *in situ* sometimes relieves the distension. In extreme cases injection of 1/2 c.cm. of pituitrin or 1/50 grain of eserine or 0.1 gram of acetylcholine, repeated if necessary, may be successful. Some also advise careful lavage of the colon with two quarts of water.

Perforation and Haemorrhage

Sudden onset of abdominal pain, especially towards the end of the third week, is strongly indicative of perforation of the bowel. Other possible causes are concealed intestinal haemorrhage, cholecystitis, basal pleurisy, suppurating mesenteric lymph glands, thrombosis of an iliac vein, or urinary retention. Pain, collapse, a rising pulse rate, and perhaps a rigor, accompanied by localized immobility and rigidity of the abdomen with local tenderness, usually in the right iliac fossa, point to perforation and immediate operation.

Haemorrhage from the bowel necessitates absolute rest and starvation for twenty-four hours at least. The bed-

pan should not be used, the motions being passed into pads of tow or wool, frequently replaced. An ice-bag may be applied to the right iliac fossa, but should not be left on for more than a day. The foot of the bed is raised and the feet kept warm. An injection of 1/4 grain of morphine is given, bearing in mind, however, that one-fifth of the cases of perforation are accompanied by haemorrhage, and that the morphine may mask important local symptoms. Of haemostatics the most efficient are calcium chloride, 1 grain in 10 minims of sterilized water injected deeply into the buttock; haemoplastin, 2 c.cm. subcutaneously, repeated if necessary every four hours; or coagulen-Ciba, 20 c.cm. subcutaneously once or twice a day. If the bleeding is severe or repeated a blood transfusion of ten ounces may be called for. After haemorrhage has occurred no enema should be given for at least forty-eight hours. In slight haemorrhages a starch and opium enema of 30 minims of tinct. opii to 4 ounces of mucilage of starch is often effective. If it is necessary to move a patient after haemorrhage he should be lifted bodily, not rolled over.

Other Complications

Thrombosis of superficial or of deep veins, usually of the left leg, may occur during the subsidence of the fever or in early convalescence. Absolute rest is indicated, and should be enforced for several weeks, the limb being immobilized with pillows or sandbags. Application of methyl salicylate liniment on lint will relieve the pain. For persistent oedema gentle massage is useful.

Cholecystitis usually subsides without special treatment. Only when it is severe and progressive does operation become necessary.

Parotitis is rare when the mouth receives proper attention. The ice-bag or emplastrum kaolini may be applied according to predilection. Incision is indicated when pus is definitely present.

Convalescence

Convalescence from typhoid may be slow. For ten to fourteen days after defervescence the patient should be kept in bed. Few are fit to work until two or three months have elapsed. In a severe case the period may be six months or longer.

Typhoid carriers continue to pass the bacilli in the stools or urine after convalescence, often in an intermittent manner. Before discharge three bacteriological examinations of the faeces and urine should be made at weekly intervals. Purulent discharges, especially from bone lesions, should also be examined. Chronic carriers should not be employed in handling food or in dairies. They should wash their hands thoroughly after micturition or defaecation, have towels restricted to their own use, and deposit their excreta in safe receptacles. Their soiled body and bed linen should be disinfected. Urinary carriers should take urotropine 10 grains three times a day. Cholecystectomy in the case of bowel carriers, and nephrectomy after proper examinations in renal carriers, have in some instances cured. Such operations should not be performed precipitately, for the carrier state may cease spontaneously after many months. On the other hand, it may persist for years.

We are asked to state that hospitals situated within eleven miles of St. Paul's desiring to participate in the grants made by King Edward's Hospital Fund for London for the year 1935 must make application before March 31st to the honorary secretaries of the Fund at 10, Old Jewry, E.C.2. (G.P.O. Box 465A). Applications will also be considered from convalescent homes which are situated within the above area, or which, being situated outside, take a large proportion of patients from London.