2. *Weilerswist and Gross Vernich.*

The combined population of these two villages was estimated at 2,492. The villagers were informed by proclamation by the Burgomeister of the arrangements made for inoculation. They were similar to those adopted at Euskirchen.

The numbers receiving first and second doses were 1,763 and 1,738 respectively, thus over 70 per cent. of the population of the villages were protected by two doses. The age limits were fixed at 6 and 55 years.

3. *Secktem, Merten, Tripplesdorf, and Walberberg.*

These four villages were very closely adjacent, and their total population was given as 5,010. Similar orders were issued, and the numbers inoculated at the first and second period were respectively 3,314 and 3,417. Between 65 and 70 per cent., then, had received the two doses.

CASES OF TYPHOID FEVER.

There were 199 cases of typhoid fever in the three epidemics in the town and villages of a combined population of about 20,000, and of these cases 34 died—approximately 17 per cent.

Four of these deaths occurred in people who had been recently inoculated twice. The onset of the disease began within the first twenty-four hours after the second inoculation (2 cases), on the eighth day after, and on the nineteenth day after the second dose. Two other deaths occurred in cases after the first inoculation, and in each case the symptoms began within the first twenty-four hours.

There were altogether thirty-eight cases of typhoid following inoculation, and amongst them there were six deaths—that is, mortality = 15.7 per cent. With the exception of these six deaths practically all these cases were of a light nature.

SUMMARY.

It is hardly justifiable to arrive at any definite conclusion from the above figures. The daily numbers of onset were very much on the decrease before the inoculation was begun, but it must be remembered that some cases were not removed at once to the hospitals for isolation and they were acting as sources of infection for some time afterwards. During the early period of inoculation there were probably more sources of infection "at large" than appear at first sight, and one would be inclined to imagine more people, as a result, incubating the disease. The fact that there was in each epidemic a recrudescence of cases immediately after inoculation tends to support this theory.

The arguments against inoculation during an epidemic do not appear to be supported by facts, and it is claimed that additional evidence has been brought to light in favour of inoculation under these circumstances. The advantageous effects of the inoculation may for convenience be described under three heads—(a) direct, (b) indirect, (c) remote.

(a) *Direct.*—One of the most difficult problems in dealing with an epidemic of this type is the notification and consequent isolation of light cases in which no medical aid has been sought. It is apparent that the inoculation brought some of these to notice so that they could be removed and isolated more quickly. It is also suggested that some cases incubating the disease developed symptoms more rapidly than they would otherwise have done, and these again were more quickly found out and removed as sources of danger. The sudden cessation of the epidemic after inoculation is very striking.

(b) *Indirect.*—The indirect advantage lies in the accessory administrative handling of the epidemic. Undoubtedly much good was done by the issue of orders to the effect that exemption could only be allowed by medical certificate. This, accompanied by an energetic house-to-house inquiry, in the case of defaulters, brought several cases to light which would otherwise have lingered on in their own homes.

(c) *Remote.*—There can be no doubt that many cases were saved by the fact that contacts of some of the later cases had been inoculated. The almost dramatic termination of the epidemic gave a feeling of satisfaction and security to the inhabitants, and the precautionary orders regarding water and dairy supplies, etc., which were

issued were withdrawn or modified at an earlier date and with more confidence than could otherwise have been the case.

It is regrettable that the incidence and mortality amongst the inoculated were so high, but it may perhaps be added that in the neighbouring Kreis of Rheinbach, where immediate inoculation of all contacts of all new cases occurring in the area was ordered, there were practically no secondary cases of the disease and no deaths.

In conclusion, therefore, the opinion is put forward that an extensive inoculation during an epidemic of typhoid fever is beneficial, probably to the individual in particular and almost certainly so to the community as a whole.

REFERENCES.

- ¹ F. P. Gay: *Typhoid Fever, considered as a Problem of Scientific Medicine*, 1918. ² L. H. Spooner: *Antityphoid Inoculation*, *Amer. Med. Assoc.*, 1912, pp. 1360, 1361. ³ W. P. Elmer: *Study of a Recent Typhoid Epidemic with Special Reference to the Use of Antityphoid Vaccines*. ⁴ Jos. Basten: *Ueber Klinische und Sereologische Beobachtungen bei der Typhusschutzimpfung*, *Med. Klinik*, January, 1915, N. 21. ⁵ Furth, Pflugbeil, and Oertel: *Zeitschrift f. Hyg. und Infektionskrankh.*, Bd. 83, Heft 3, 1917.

IMMEDIATE SURGICAL COMPLICATIONS OF DYSENTERY.

BY

BASIL HUGHES, D.S.O., M.A., M.B., B.Ch.CAMB.,

B.Sc.LOND., F.R.C.S.,

ASSISTANT HONORARY SURGEON, CHILDREN'S HOSPITAL, BRADFORD;
SURGICAL PATHOLOGIST, BRADFORD ROYAL INFIRMARY;

AND

H. STANLEY BANKS, M.A., M.B., Ch.B.GLAS.,

D.P.H.CAMB.,

MEDICAL OFFICER OF HEALTH, MOTHERWELL; LATE BACTERIOLOGIST,
B.E.F., SALONICA.

"DYSENTERY" is a general term applied to conditions characterized by passage of blood and mucus in the stools. In amoebic dysentery the mucosa and submucosa of the colon is invaded by *Entamoeba histolytica*, which can ingest red corpuscles; this property is employed in the recognition of its vegetative form in microscopic preparations. Other manifestations of this infection are acute hepatitis or acute liver abscess. The majority of cases of these conditions fail to give a history of dysentery, although in all there has been possible exposure to infection by *E. histolytica*.

Bacillary dysentery is due to infection of the wall of the colon with a variety of organisms distinguished from one another by fermentation and serological reactions. The two chief groups are:

1. The *B. dysenteriae* (Shiga) group, which give rise to an intensely acute and severe form, and
2. The *B. dysenteriae* (Flexner) group (the chief perhaps being Flexner's Y bacillus), which give rise to a milder clinical type.

Both of these subgroups include a very large number of organisms which have the common group fermentation reaction, but in other respects have been shown to be distinct and separate entities.

The immediate complications of dysentery may be given in a comprehensive way as:

- A. Acute hepatitis.
- B. Acute liver abscess.
- C. Perforation of the colon (gangrenous colitis).
- D. Gangrenous proctitis.
- E. Synovitis with effusion into the larger joints.

A. and B. are due to infection by *E. histolytica*, and, amoeba having been found in the portal capillaries, this may well be the path by which it reaches the liver from the intestine. C. and D. are due either to infection by amoeba or bacilli, plus a secondary infection with intestinal organisms. E. is a complication of bacillary dysentery only.

A. *Acute Hepatitis.*

Acute hepatitis is often difficult to diagnose from liver abscess. After a period of malaise the liver is found to be enlarged and tender. Pyrexia is present, but is not so remittent as in liver abscess. Evening temperature may reach 103° F. Leucocytosis is generally present, varying from 10,000 to 20,000 per c.mm. The patient is sallow and the conjunctivae are icteroid.

One of us (B. H.) operated on two cases of acute amoebic hepatitis in which liver abscess had been diagnosed. In both the enlarged liver presented the same very characteristic appearance, the colour resembling that of a ripe damson. An exploratory needle thrust into the organ failed to find pus, and a syringe of blood was withdrawn.

In case of doubt as to the diagnosis, we think it justifiable to give the patient a course of emetine before undertaking any operation. If the condition be one of pure amoebic hepatitis, improvement will show itself within three or four days, and the whole of the symptoms will soon subside. The following case is typical of this condition:

Captain W. was admitted to hospital in Salonica in May, 1916, suffering from diarrhoea. He was evacuated to Malta, and while on the ship developed acute hepatitis. In Malta an

operation was about to be performed when, at the last moment, it was decided to try emetine, of which he had two seven-day courses of gr. 1 daily. He recovered without operation.

In September, 1917, a second attack occurred. He was admitted to the 28th General Hospital, Salonica. Temperature 101°; liver enlarged and tender; leucocytosis 21,800. Emetine 1½ grains daily,

was given for seven days, and repeated after an interval of seven days. The pyrexia and leucocytosis subsided in five days and all hepatic and other symptoms disappeared. The temperature chart is appended.

B. Acute Liver Abscess.

This is a very serious condition, because the abscesses are so often multiple. Acute liver abscesses, as we saw them, differed somewhat from textbook descriptions. An exploratory puncture with a needle in the sites recommended was useless, and in no case were we able to withdraw any of the abscess contents, since the pus was too thick to be drawn into the syringe. Successful aspiration of the contents of these abscesses has been reported from China, but we are informed that the instrument used there resembles what we employ for removing the core from an apple.

The most common site for liver abscess is in the upper and posterior aspect of the right lobe, although, as mentioned before, secondary abscesses often exist. The left lobe, though not a common site, is not exempt.

Most noticeable in our cases that came to autopsy was the extreme destruction of liver tissue—a destruction not confined to the abscess cavity only. Immediately adjacent to the main abscess cavity was a zone of ragged and destroyed liver substance; next to this was a zone of acutely inflamed liver tissue, and again outside this was a zone of liver tissue that had undergone extreme fatty degeneration. The remainder of the liver substance was in a state of acute hepatitis, and resembled that already mentioned.

The symptoms of acute liver abscess are fairly definite. The liver is enlarged and tender, the liver dullness may extend high up on the right side behind, and friction sounds may be heard at the right base; there may also be some fluid in the right pleural cavity. These last two signs are important. Pyrexia is present, the temperature reaching 103° and remitting. Leucocytosis from 10,000 to 20,000 is almost invariable, and the patient presents both an icteroid tinge and a characteristic facies. There may be, but often there is not, a previous history of diarrhoea with blood and mucus in the stools. When the negative history was given in our Salonica cases it was usually found that the patient had been in Egypt (where *E. histolytica* infection is rife).

The treatment that gave the best results was an anterior incision about two inches in length through the right rectus muscle. The liver was exposed and packed off with dry sterile gauze from the general peritoneal cavity. A long pair of sinus forceps was introduced into the right lobe in an upward and backward direction, and it was readily felt to enter the main abscess cavity. The thick contents, which resembled anchovy sauce, were evacuated, and a large tube was introduced. The patient was nursed

in the sitting position, and drainage by these means was excellent. Into the abscess cavity, through the tube, was introduced quinine bilydrochloride three times daily, and the patient was lowered for half an hour to prevent its immediate escape. In addition emetine (1 grain) was administered hypodermically daily for the first ten days. At first we instilled eusol through Carrel's tube placed inside the large drainage tube. This was not successful, the liver being found *post mortem* to be acutely autolysed. Twort has shown that eusol inhibits the movements of *E. histolytica* but does not kill it. The quinine solution, on the other hand, has an excellent effect. In making the daily dressings the strictest aseptic precautions should be observed. We found the track very apt to become infected with anaerobic bacilli, although we saw no actual gangrene.

Microscopic examination of the contents of an abscess cavity showed masses of liver cells, connective tissue liver cells, red and white blood corpuscles, granules of pigment, casts of bile capillaries, and tissue debris; the leucocytes were not in great excess. The amoeba was not found in the pus as a rule, although in one case, after an hour's search, it was discovered in very active movement. The amoeba was constantly found in scrapings from the wall of the abscess. Cultures made from the pus were in all cases sterile.

Macroscopically, the pus in the fresh state was accurately described as resembling anchovy sauce. After standing for a day or two it separated into three layers—a transparent zone of hemolysed blood above, a dark red intermediate layer, and a lower buff-coloured zone of solid matter.

In none of our cases did we employ the transpleural route for approaching and draining the abscess, because in the experience of our colleagues this route, in the case of acute abscess, did not give satisfaction. Out of nine cases operated upon by one of us (B. H.) there were five recoveries and four deaths. The prognosis was good so long as the abscess was single and was thoroughly evacuated and treated by quinine solution locally and emetine administered hypodermically. All such cases recovered. In cases of multiple abscess with very great destruction of liver tissue, and also in cases complicated by severe recurrent malaria, the prognosis was very bad.

C. Perforation of the Colon: Gangrenous Colitis.

This complication was notoriously fatal; it presented symptoms and pathological changes that were wholly new to us, and afforded ground for speculation. The usual history was as follows:

A patient, apparently convalescing satisfactorily from a chronic recurrent dysentery, exhibits abdominal distension. The pulse remains good, the patient is conscious and not apparently distressed. Within a very short time, often a few hours from this period, the pulse becomes rapid and thready. The patient breaks out into a cold perspiration, and dies within a few hours or so.

Operation was undertaken on three patients whose condition at the time seemed to justify its performance, whereas others were left, as their condition was hopeless. At operation it was found that the colon, especially in the region of the sigmoid flexure, was greatly thickened and gangrenous, and any attempt at handling it only resulted in tearing the gut, so friable was its condition. In one case that was operated upon before perforation had occurred, a colostomy was performed in the transverse colon, and the distal limb of the bowel, which appeared to be the main site of infection, was washed with warm Dakin's solution. At autopsy the same gangrenous condition of the gut was found.

Gangrenous colitis occurred mainly in cases of long-standing chronic dysentery, of both bacillary and amoebic types. The wall of the colon became ulcerated, infiltrated, and enormously thickened. Healing might occur at this stage after repeated acute attacks, and the typical thickened colon of the chronic dysenteric patient remained. If, however, healing did not occur gangrene and perforation were apt to set in suddenly. Most of the cases in which this occurred were complicated by frequently recurring malaria, and we think that this was a definite if not the determining factor in bringing about the lowered vitality of the wall of the bowel which led to the gangrene.

We never saw or heard of a case that recovered. The onset of the abdominal distension is so rapid that when once it has occurred operation seems hopeless. The

toxaemia is so intense that these patients die within a very short time, and operation only hastens their end.

D. Gangrenous Proctitis.

This condition may be due to an extension downwards of the process in gangrenous colitis or may arise primarily. The pathological condition appears to be the same as that occurring in the colon. Painful haemorrhoids at first appear which rapidly become thrombosed. This is followed by a varying degree of rectal prolapse, the prolapsed portion rapidly becoming gangrenous. The degree of toxaemia varies. It is usually very severe, depending upon the extent to which the rectum is affected. In one case the portion of prolapsed rectum sloughed away and recovery followed, but in three other cases death rapidly ensued, the degree of toxaemia being intense. Colotomy seems to be the only possible treatment, but, speaking from what we saw of this condition, the patients are too ill to stand any surgical interference.

E. Synovitis with Effusion into the Larger Joints.

This complication is usually the result of bacillary dysentery, and occurs from the eighteenth day after the infection first manifests itself. Any of the larger joints may be affected, but in our cases most commonly the knee-joint. Very rarely were two joints involved simultaneously. The joint becomes distended with fluid, hot, tender, and painful. The fluid shows little tendency to become absorbed when the joint is put at rest. If left alone the condition gradually passes into a chronic state, leaving a thickened synovial membrane which shows very little tendency to resolve. The synovial fluid from these joints is straw-coloured and not turbid; repeated examination has shown it to be sterile.

By far the most satisfactory treatment is early aspiration of the contents and the injection of 5 c.cm. of ether into the joint cavity during the acute stage. A general anaesthetic is usually required. The joint should be kept absolutely at rest, and as soon as the acute stage has passed firm strapping with Scott's dressing is employed. With this must be conjoined suitable treatment for the bowel. This treatment certainly gave most satisfactory results, in that the patients were able subsequently to use the joints without pain, thickening of the synovial membrane was avoided, and the wasting of the muscles around the joint, which was so extreme in cases that had passed on to a subacute or chronic stage, was in great part avoided. Subsequent recovery of the muscles was rapid.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

PLACENTA ABLATA TREATED BY PITUITRIN WITH OBSTETRIC ANAESTHESIA.

The following case, which occurred recently in my experience, may be of interest. The patient, aged 35, has had eleven children, born at full term; her twelfth conception resulted in miscarriage with persisting endometritis. She became pregnant again in March of this year. Throughout the pregnancy she suffered from severe pain—more or less continuous—in the left iliac region.

Labour commenced at 10 p.m. and continued normally until midnight when excruciating pain suddenly developed in the left side, accompanied by severe external haemorrhage. The patient felt sick and faint and commenced to vomit. As the haemorrhage continued a midwife was summoned. She in turn sent for medical aid. On arrival I found the patient practically pulseless, blanched, and collapsed. The uterine tumour was the size of a full-time enlargement with a somewhat ligneous consistence. Internally, the os permitted the entry of two fingers and was dilatable; the membranes were tense between the pains, while the head engaged the brim in the L.O.A. position. The external haemorrhage had stopped between the pains, but recurred in small measure with each pain. Under obstetric anaesthesia, $\frac{1}{2}$ c.cm. pituitrin was injected intramuscularly, followed by another $\frac{1}{2}$ c.cm. in half an hour. Immediately after the first injection, as there was evidence of hydramnios, I ruptured the membranes; the external haemorrhage ceased.

Ten minutes after the second injection a seven months foetus, partially macerated, was expelled, followed immediately by the placenta and membranes which were complete. There was no evidence of retroplacental clot nor placenta succenturiata. The uterine tumour was doughy in consistence and extended beyond

the umbilicus. Vigorous kneading and expression promptly stimulated the uterus to expel a clot equal in size to a foetal head, after which satisfactory contraction and retraction occurred. The convalescence of the patient has been very satisfactory.

With regard to some of the points that have been raised in discussion of the etiology of this condition, the following may be mentioned: (1) There was no history of trauma; (2) there was distinct albuminuria; (3) there was moderate hydramnios; (4) the umbilical cord was of normal length; (5) there was a history of endometritis preceding this pregnancy; (6) this was the thirteenth pregnancy.

With regard to the treatment, the use of pituitrin with obstetric anaesthesia gave good results in this case and obviated the use of forceps. In my experience, the action of pituitrin given, in suitable cases, in doses of $\frac{1}{2}$ c.cm., repeated in half an hour and modified by obstetric anaesthesia, gives far better results than if the action is not so modified.

J. LIND SMITH, M.A., M.B., D.P.H.(Aberd.).
Stockton-on-Tees.

SURGICAL EMPHYSEMA AFTER A BLOW ON THE NECK.

The following case seems worthy of record. A girl aged 10 years was playing in the garden on the morning of October 10th. At about 10.30 she placed a short ladder against the fence, which was between 4 and 5 ft. high. She climbed to the top of the ladder, which then gave way so that in falling she struck the front of her neck against the top of the fence. Within a quarter of an hour the neck began to swell and she became breathless. The doctor who attended her sent her to the hospital. I saw the patient at 11.45 a.m.

On examination there was a red mark on the skin over the trachea but no bruising. There was no visible bruise on any part of her body, the whole of which, from her head to her toes, was ballooned out with surgical emphysema. The skin was the colour of a boiled lobster, and one could indent one's finger into the trunk to a depth of almost two inches. The eyeballs were occluded on account of emphysematous eyelids, and the tongue was swollen. The patient was extremely dyspnoeic and cyanosed. It was obvious that she was being asphyxiated, and I decided to do a tracheotomy at once. After a few whiffs of chloroform the cyanosis increased and the patient stopped breathing. On cutting into the tissues of the neck the emphysema was so intense that the depth of the trachea from the skin was nearly 3 inches. The operation gave immediate relief. The next morning the patient could see a little with both eyes, and her general condition was better. She said she felt no pain, and was quite comfortable. During the next day or two a little more air escaped into the tissues of the upper part of the chest. The tracheotomy tube was removed on the fourth day. The surgical emphysema gradually disappeared, beginning at the extremities. The girl made an uneventful recovery, and was discharged from the hospital on October 31st.

The house-surgeon, Mr. Landells, and I examined her chest repeatedly and could find no evidence whatsoever of fracture. She gave no sign at any time of pneumothorax or collapsed lung. At the time of operation it was impossible to examine very closely the portion of trachea exposed, but there appeared to be no injury. The patient was a very intelligent little girl and described her accident minutely. She was emphatic in saying that she felt no pain anywhere else but at the point of impaction, the front of her neck. The most curious feature of the whole affair was the complete absence of any physical sign, fracture, bruise, or wound, which could explain the enormous amount of surgical emphysema present.

The only explanation which the house-surgeon and I can suggest is that the impact on falling suddenly dragged up the trachea and tore a hole either in one of the bronchi or possibly in the trachea itself. The patient immediately began to expire air into her neck and face, and then, when the swelling in her neck became sufficiently great, it partially occluded entry of air through the larynx, so that the patient would go on pumping air into her tissues through the hole caused by the injury. Tracheotomy immediately relieved the obstruction and gave the hole time to heal.

JOHN W. HEEKES, M.B., B.S.Lond.,
Surgeon, The Royal Hospital, Richmond.

PLEURAL REFLEX.

The following case, which presents unusual features, is, I consider, worthy of notice:

Two years ago the patient, a married woman, aged 29, had a right-sided pneumonia, followed by empyema. The empyema was drained after resection of rib, but the cavity continued to discharge for six months. An Estlander's operation was then performed and was successful except for the persistence of a small sinus, communicating with the pleural cavity and leading up to the root of the lung. Eight months ago, on syringing the