EXPERIENCES WITH CHOLERA IN A JUNGLE CAMP IN THAILAND.

BY

Captain J. MARKOWITZ,
Royal Army Medical Corps.

"Sunt lachrymae rerum et mentem mortalia tangunt."
VIRGIL.

This paper is an analysis of an unusual outbreak of cholera in a confined community of 7,000 more or less disabled British and Dutch prisoners of war. By the middle of May, 1943, disquieting rumours reached us of outbreaks of cholera among railroad construction parties in Central Thailand. All these rumours agreed on two things: the outbreak was severe and facilities for treating the cases were non-existent. Some heroic improvisations were rumoured—in one camp a medical officer made an intravenous needle by drilling a bamboo thorn, by means of which he infused a salt solution made by adding table salt to boiled river water. One presumes therefore that even rain water was lacking which, at a pinch, can be made to do in place of distilled water. At about this time one case of cholera was admitted to No. 1 Base Hospital at Kanchanburi:

Case History: Two British O.R.'s engaged in driving a lorry accepted some food which a native hospitably gave them. This they ate with relish. About 24 hours later when on duty both men took ill and one of them collapsed. Both were brought into hospital. The collapsed patient complained of copious diarrhoea, buzzing in the ears, dimness of vision, and he was cold and almost pulseless. He could not stand. The stool resembled rice water but a hanging drop examination failed to disclose any motile organisms. He was isolated with the provisional diagnosis of cholera and died during the night despite a subcutaneous injection of one litre of Ringer's solution. His companion, admitted at the same time with less severe symptoms, recovered. The Japanese poo-pooed the diagnosis of cholera on the grounds that there was none in the vicinity, and the case was labelled choleraic dysentery.

On June 14, after we had been transferred to Chungkai, a Tamil was found by Major M. T. Read, M.C., R.A.M.C., to be dying of cholera outside our enclosure. That night two patients in the surgical ward developed cholera within a few hours of each other. The first case was typical and was isolated. The second case when seen by the surgical officer had profuse watery diarrhoea with brown fecal motions. His ailment was not recognised until he died during the night. Fortunately, owing to the existence of cholera up country, inoculations against cholera had already commenced on June 14, and were completed by the 15th. The evolution of the epidemic is shown by the diary of events at the end of the paper which discloses that it came in two waves separated by an interval of two weeks. The first ended July 15 after a duration of exactly one month; the second and lesser wave tailed off on September 15 after a duration of six and a half weeks. At the moment of writing (November 26, '43) there are
two cases of cholera in the isolation ward having been admitted on the 7th and 19th respectively.

The fact that cholera had broken out in the camp was unwelcome to the Japanese guards who on subsequent occasions complained that this diagnosis put the area under quarantine. Squadron Leader Cummings, R.A.F., our pathologist, was impressed by the Japanese to work in a nearby Field Laboratory and from him we learned that their examination of suspected stools was perfunctorily carried out by an orderly. Cultures were made of the stools in the accepted manner and both these and faecal suspensions were incubated with immune rabbit serum for precipitation. He told us that we were to regard a negative result as being worthless. At any rate this is the most charitable explanation we can offer for the fact that in spite of several faecal specimens having been sent to the Japanese laboratory from typical cases they reported them negative and declined to take action. However, on June 23 they reported that all five stools which we had sent from five typical cases were positive. Three days after the receipt of four more stools (June 27) the Japanese cholera squad arrived and took cultures from all the patients in the cholera ward. With this official recognition came an enhanced supply of disinfectants and 12 ampoules of Ringer’s solution, each containing 300 c.c.’s. By this time the disease was prevalent in the surrounding villages and one
heard stories of Tamil labourers collapsing on the latrines or being found dead in the fields.

In the first week of the epidemic most cases were patients already in hospital suffering from other diseases, although these comprised only approximately 20 p.c. of the population of the camp. Among these the majority were suffering from avitaminosis, bacillary dysentery or tropical ulcers. Indeed, as nearly as could be ascertained in our final analysis of this wave, out of 42 patients admitted who were not confined to bed in the hospital proper, only two were category B (fit for light duty), the others were category C (unfit for duty). On the whole, therefore, our figures bring out the fact that the first wave of the epidemic was largely confined to the sick and the unfit.

As stated above the Japanese on June 23 reported that all five faecal specimens sent in were choleraic stools. Details of the five positive cases follow:

Sigm. M., age 26. Ten days before his admission for cholera this patient was admitted for acute bacillary dysentery, and was discharged category C two days before he developed cholera. Convalescing when positive report received.

Sgt. R., age 31. This man had chronic diarrhoea for many months, which was diagnosed seven months ago as amebic dysentery. Convalescing when positive report received.

L/Bdr. B., age 26. Transferred from dysentery ward, having had diarrhoea for one month. Convalescing when positive report received.

Lieut. S., age 49. This officer was permanent category B on account of age. Convalescing when positive report received.

Sigm. C., age 36. Transferred from dysentery ward where he had been for three months. Died six days after positive report received.

It will be seen that the second wave comprised less than half the number of cases in the first wave; the mortality, however, was the same—42 p.c. against 40 p.c. in the first wave. The mildness of some of these cases made the diagnosis more difficult as shown by the fact of a higher proportion of suspects who turned out not to be cholera and who were quickly discharged. The lesser number of cases involved in the second wave is in part due to the fact that the preventative inoculation had already taken hold. Many of these afflicted were comparatively healthy individuals. At least six worked in the cookhouse peeling vegetables; despite repeated warnings and threats of disciplinary action they would secretly nibble choice titbits of pumpkin, onion, etc. We have the impression that when they developed cholera it was more severe than usual.

**Diagnosis.**

As soon as cholera was recognised in the camp it became important to formulate diagnostic criteria which would enable us to act quickly and appropriately. Every case of severe diarrhoea was regarded with suspicion. It was transferred to the cholera ward when it presented one or more of the following four cardinal symptoms:

1. Copious watery stools, more particularly rice water stools;
(2) collapse which in typical cases occurred in the Asiatic type of latrine, the patient being unable to rise from the squatting posture;
(3) sudden alteration in the timbre and strength of the voice;
(4) muscular cramp.

Hospital orderlies quickly learned to recognise these criteria. In most cases the diagnosis was evident at a glance. In the first wave of the epidemic, indeed, the great majority of the patients presented all the symptoms, progressing to vomiting, cyanosis, dehydration and anuria. The presence of tenesmus in a patient with diarrhoea is generally considered as evidence against the diagnosis of cholera. While this is a sound rule for healthy communities, it was less valuable in this camp since so many of our patients had a history of dysentery. In these, choleraic enteritis was often accompanied by tenesmus.

The diarrhoea of cholera differs from the diarrhoea of ordinary enteritis owing to the fact that the site of the disease is largely the ileum. This moiety of small bowel is predominantly absorptive in function. Into it are normally
poured the chloride-laden secretions of the stomach, liver and pancreas which are only imperfectly absorbed in the upper bowel. In choleraic ileitis, therefore, there is not only an inflammatory transudate as the result of the cholera, but there is the failure of absorption of whatever reaches this part of the gut from above. We have often seen rice in the rice water stool. The value of morphine in cholera, were it available, would be to slow down the reflex peristalsis of the colon enabling absorption to occur.

A suspect was discharged from the cholera ward when he had (a) no other symptoms of cholera beside profuse watery diarrhoea and when, in addition, (b) the stool became faecal in two or three days.

Case History: Pte. S., admitted 20/6/43, a batman in the R.A.M.C. officer’s mess, developed profuse watery diarrhoea. He passed 18 stools in 24 hours, a unique occurrence for him both before and since this episode. In the cholera ward he appeared quite well, sitting up, eating all the food offered him and smoking continuously. He passed faecal stools by the second day after admission, when he was discharged.

Although this man was quickly released from quarantine, it is impossible to say that he did not have cholera.

Case History: Capt. M., R.A.M.C., while giving an intravenous injection of saline to a patient with cholera received some cholera vomitus full in the face. Next day he developed a watery diarrhoea which became more profuse as the day wore on and late at night he passed his eighth motion consisting of about a pint of fluid. He felt slightly cold, had slight cramps in the feet and the medical officer who attended him thought there was slight cyanosis of the finger nails. He was given ¼ gr. morphine with atropine by mouth and 24 hours later was perfectly well and able to resume his duties.

It is likely that the number of cases of true cholera is greater than those presented here, since an odd mild case quickly recovered without development of pathognomonic features and was promptly released with advice to wash the hands after defaecation.

**ETIOLOGY.**

It is this feature of cholera which makes control of an epidemic so difficult in a community. The cholera vibrio can and does exist in the intestine with no symptoms until something upsets the symbiosis, usually a bowel irritant. It would appear that the negative phase following inoculation may precipitate cholera in such individuals. Thus the crest of the first wave occurred four days after the inoculation of the camp and the bulk of the cases in this wave occurred in two weeks.

Four officers in the first wave lived in a crowded hut within what might be called flatulating distance of each other; all four developed cholera in two days. Indeed, the spread of cholera by such contact appeared to be a common mode of transmission. The number of men in this Mess was at least 100. In fact, there was no evidence that this outbreak was spread by food or water, with the exception of cooks who surreptitiously nibbled raw vegetables. During the outbreak drinking water was superchlorinated and an effort was made to serve all meals piping hot. Anti-fly measures were intensified.
Not one orderly attending the sick in the camp developed the disease although they often became soiled with faecal discharges and vomitus. They were careful to disinfect themselves meticulously.

It could be argued that the epidemic was transmitted by flies or dust. We have no evidence on these points; our impression was that it was transmitted by direct contact through carriers. The extent of human commerce in faecal particles is not adequately appreciated. The management of defaecation is not aseptic and seldom clean. Moreover, the expulsion of flatus should be regarded in the same light as the cough of an open case of tuberculosis. This point has not been emphasised enough, obviously on the grounds of indelicacy.

TREATMENT OF CHOLERA.

One week prior to the outbreak of cholera a still was improvised out of two four-gallon kerosene tins, and a supply of distilled water was thus rendered available. At the same time ordinary table salt was re-crystallised twice from distilled water. The task of administering saline aseptically to so many patients...
Experiences with Cholera in a Jungle Camp in Thailand

Through our improvised infusion apparatus defeated us. We quickly found that if the water was collected hot from the still and was used within two hours domestic cleanliness sufficed and chills did not occur. The infusion apparatus was boiled daily. Just before use it was rinsed with fresh saline. In point of fact the Japanese supply of Ringer's solution in hard glass ampoules caused slight chills and was hence inferior to our material. We have shown conclusively that the pyrogenic substance is absent from freshly distilled water. This fact should be valuable in the mass treatment of cholera in the field. One litre of distilled water hot off the still is treated with 50 c.c's of 25 p.c. sodium chloride stock solution. The latter need not be fresh.

The average patient in our series received 1,500 c.c's of this on admission. The dose was repeated as often as necessary. When the flux was greater we tied a cannule in the vein and kept up a continuous slow drip. This we were loth to do since asepsis could not be maintained and chills would result. It was most exceptional to cut down on a patient's vein, a sharp needle with a syringe to guide it being sufficient.

We found potassium permanganate of doubtful value in doses of 2 gr. four-hourly. We had the impression that it aggravated the vomiting. In any case, our supply was limited.

Mild cases and patients who were not vomiting were encouraged to drink copiously of physiological salt solution and well salted beef tea. For food they were given sweet ground rice, soft boiled eggs and a little tinned milk in increasing quantities. It bears repetition that we had no supplies of remedial drugs. Patients destined to recover reacted promptly to an intravenous injection of hypertonic salt solution which generally had to be repeated in 24 hours. The acutely fatal cases continued their copious diarrhea, the extent of which outdistanced our efforts to replace the lost fluid. An occasional case developed a typhoid state with delirium and picking at the bedclothes which lasted five days before death or convalescence began.

Case History: Sgt. R., was admitted from the amoebic dysentery ward with severe cholera. He was infused repeatedly for the next three days by which time he appeared to be dying. He was given frequent small quantities of a mixture of milk, raw egg and samsu (a native rice spirit). He was delirious and incontinent for three more days before he began to improve. Five months later he was carrying out duties as an orderly in the cholera ward.

We found accidentally that the infusion of 2 p.c. salt solution was an even better method of meeting cholera than the 1·2 p.c. solution generally in use. This might bear some emphasis. It appeared that the introduction of hypertonic salt solution into the blood stream stopped or ameliorated the flux by competing with the bowel for fluid. For example, a patient might pass a large stool every hour until he received his infusion when the diarrhea would dramatically stop for six hours. As in the case of cerebral oedema, this effect is purely osmotic.

The usual causes of death were diarrhea which outpaced the infusion, with resultant circulatory collapse; toxæmia and fever; cardiac failure.
generally heralded some days before by feebleness of pulse, cardiac irregularity and, characteristically, by an alternating pulse. In some instances death could be ascribed to a generalised enfeeblement of the vital powers one week after the choleraic flux had ceased. This showed itself by diarrhoea, anorexia and terminal pneumonia. Anuria resulting in uraemia was an uncommon cause of death. In brief, a patient could die from cholera either from loss of fluid so that his plasma oozed out through the bowels—a condition comparable to high intestinal obstruction or to the shock displayed in a patient grossly scalded by steam; or he could die of toxæmia as in any other infectious disease.

**CONCLUSION.**

An outbreak of cholera is described in a Prisoner of War Camp in Thailand. Its chief interest is in its restricted extent. An additional feature is our discovery that distilled water taken fresh from the still can safely be used without the development of chills. This fact should prove of value in the mass treatment of cholera in the field. It was found that 2 p.c. salt solution had some advantages when infused compared with the more dilute fluid.

**DIARY OF EVENTS.**

*Cholera Epidemic: Chungkai P.O.W. Camp, Thailand.*

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Experiences with Cholera in a Jungle Camp in Thailand

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* Includes 11 convalescents admitted from up country camp who were not considered in our series.