THE DYSENTERIES IN THE ARMED FORCES

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History abounds with examples of dysentery as a disease of wars. "No major military campaign has been free of its ravages" (Felsen). But it is one with which our medical and sanitation officers cannot become familiar in their civilian experiences. The filth-borne diseases are fast disappearing in this country and our young clinicians and public health workers, who predominate in the medical services of the Armed Forces, scarcely encounter cases of typhoid fever or dysentery during their training. There is even less opportunity for contact with epidemics of enteric infections. Certain aspects of an epidemic in Korea involving prisoners of war, will be considered here as illustrative of the peculiar nature of the problem of dysentery in the Armed Forces.

The most unusual feature of the epidemic was its size. An outbreak of enteric infections with 161 hospitalized cases with a fatality rate of 9 per cent, and some 800 milder nonhospitalized cases, would be regarded as a major epidemic. In the Korean outbreak an average of this number of cases and deaths occurred each day throughout a four month period. Moreover, the outbreak continued at a lower level for about one year. There were, in other words, some 150 major epidemics compressed into one.

The responsibility of the United Nations for the North Korean prisoners of war was a small part of its broad activities. Diarrheal disease was present everywhere. The civilian refugees, for whose health and welfare the Armed Forces of the United Nations had official concern, lived under poor sanitary conditions; the prisoners of war had excellent facilities by comparison. The amount of diarrheal diseases occurring endemically among them, if the cases and deaths had been reported, probably would have far exceeded that among the prisoners. Further, South Korean officers from a near-by battalion sought the assistance of our unit in the diagnosis and treatment of diarrheal disorders which were highly prevalent among their troops. Even among the American personnel, particularly in the Navy, some units were temporarily ineffective due to a general and high prevalence of diarrheal disease. During and since World War II, the Armed Forces of the United States have lived and fought in countries in which the diarrheal diseases are highly prevalent—more prevalent probably than they have been in this country at any time during our entire history. Today in military medicine the infectious diarrheal diseases continue to be highly important.

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Diagnosis is the first problem in any epidemic of enteric infections. In this country this is relatively simple, as for example, in institutional outbreaks. A representative sample of the cases, when they are examined, ordinarily are found positive for one pathogen only. The unexamined cases may be assumed to be due to the same cause. Such will be the findings in an epidemic occurring in a population among whom the infections normally are rare. The situation in Korea was markedly different. Each day among cases admitted to hospital, there would be an admixture of cases of amebic dysentery, bacillary dysentery due to several types of Shigella, some salmonellosis and the inevitable cases of diarrhea of undetermined etiology. Thus, in a population with a high endemic incidence of dysentery, it becomes increasingly important to do adequate diagnostic studies on each individual case.

Laboratory studies are essential for the reliable diagnosis of acute diarrheal diseases and under the above conditions large numbers of diagnostic tests are required daily. Hence, laboratories serving the Armed Forces in the field need to be prepared for volume work in enteric bacteriology and parasitology. Most bacteriologists are trained where few fecal cultures are performed and each suspicious organism is studied with an array of biochemical and serological tests. Similarly, in parasitology, students have been impressed with the need for repeated and time-consuming tests. Only a few cases per day can be examined by such methods. Actually this approach does not meet the need in an Armed Forces installation.

Three laboratories had been concerned with the study of the dysentery occurring among the prisoners of war by the methods ordinarily employed. Specimens were collected on the wards and sent to the laboratory. The number per day was limited to 25 as a maximum. The importance of fresh specimens had been emphasized, though it was learned later that the specimens were collected ordinarily during the night and submitted in the forenoon. These methods had revealed an occasional case of amebic dysentery and some 25 bacteriologically positive cases per week.

When we first had contact with the problem, the case load had dropped markedly. Two simple changes were instituted at that time. The parasitology technicians with their microscopes were moved to the hospital. There was no laboratory, no electricity, no table—just large boxes for the microscopes and smaller ones to sit on, but fecal specimens were brought to the microscopists immediately on passage. Amebic dysentery changed from a rare sporadic infection to an epidemic disease with more than fifty severe acute cases per week. In bacteriology the use of the rectal swab was begun. On the second day 89 patients were cultured and 64 were found positive for an enteric pathogen. It soon became routine to take 300 to 400 cultures daily, which included the follow-up on treated cases. It was not unusual to report more than 50 positives per day. By these changes, without any increase in the technical staff—but with additional glassware and media—the number of cases diagnosed by dependable laboratory findings was multiplied many times. The objective of a service laboratory in the Armed Forces must be to provide reliable diagnostic aid in as many cases as practicable. To attain this goal for enteric infections, the
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essential requirements include fresh specimens, preferably direct from the patient, a careful selection of media and biochemical tests, an adequate supply of dependable diagnostic antisera and senior laboratory workers with experience in organizing and handling volume work.

The clinician as well as the bacteriologist must be able also to adjust his procedures to provide needed services for large numbers of patients. Sigmoidoscopic examinations, for example, are of substantial assistance in the diagnosis of dysentery. In our experience in Korea at first two or three sigmoidoscopic examinations were a major accomplishment. It was found practicable next to do initial examinations on all cases positive for E. histolytica trophozoites, likewise follow-up observations to determine the response to therapy. A little later with additional instruments and better facilities for their sterilization, the severe cases which were negative bacteriologically were referred for diagnostic sigmoidoscopic studies. This led to the final step of adopting as a routine the sigmoidoscopic examination of all patients admitted to the service. The daily admissions were then between 50 and 90 and follow-up examinations averaged some 35 daily. It became a not too strenuous routine for two physicians and the prisoners of war assistants to make 100 sigmoidoscopic observations daily. The record reached 142 examinations in one day.

There is an understandable reluctance to replace the exhaustive and limited studies of pure science with the volume work required in applied science. The former seems exact and satisfying, the latter appears less so. Actually, well organized volume work need not compromise reliability in the single case, and the resulting findings provide a much more reliable picture of conditions in the group as a whole. If communicable diseases occurring epidemically—or endemically—are to be handled effectively, a change of viewpoint is required. The group more than the single case must be the object of study. To attain this goal some modification of training procedures appears indicated. Laboratory workers in particular require the opportunity to learn the method of handling volume work. There are obvious difficulties in providing this training experience, but one possibility is suggested. The public health laboratories, of necessity, must develop efficient procedures for handling large numbers of specimens. The potential value of these laboratories for training purposes has not been appreciated.

A second striking feature of the epidemic under study was the apparent atypical nature of findings. The dysenteries seen in Korea differed widely from the shigellosis and amebiasis encountered in this country. It has been emphasized repeatedly that the usual manifestation of Shigella infections in this country is a simple diarrhea. The infection in young adults as observed here is a relatively mild and transient disorder. Gross bloody exudate is unusual. In Korea by contrast, the disease was the classical bacillary dysentery. In case after case the stools were nothing but a mass of bloody mucopurulent exudate. It has been recognized in other infections that the nature of a disease may vary from area to area and time to time. The observations made in this epidemic emphasize that this can be true for bacillary dysentery.

The clinical features of the acute amebic infections were not atypical but the
laboratory findings were unusual. The characteristic motile *E. histolytica* was present in the exudate of some of these cases in amazingly large numbers. Microscopically, there would appear to be nothing but a squirming mass of motile amebas. Accurate counts were impossible, but it was repeatedly concluded by multiple observers that there would be more than 100 *E. histolytica* per high power field in these exceptional preparations.

The bacteriological studies of the bacillary infections provided a challenging and exasperating array of problems. The identification of shigellosis in adults in this country is a comparatively simple laboratory procedure. The organisms are ordinarily present in substantial numbers, the colorless colonies are uniform in appearance and contrast strikingly with the red colonies of the lactose-fermenting organisms. The cultures in Korea however, had the widest variety of suspicious colonies. By inspection of plates one could not select from this assortment those which probably would prove to be *Shigella*. Moreover, in positive cases the pathogens frequently were present in small numbers only. Of multiple simultaneous cultures on the same case some would be found positive and others not. Two experienced workers picking the same lot of plates would identify about the same number of positives, but each would miss some which were found by the other. There were further problems in salmonellosis. Paratyphoid A was widely prevalent. Elsewhere enrichment media are accepted as an essential in the isolation of *Salmonella* but in Korea neither selenite or tetraphionate had any value as an enrichment for *Salmonella paratyphi* A.

It is clearly evident that enteric infections as encountered in the Armed Forces abroad may differ widely from those seen at home.

The Korean outbreak demonstrated again that an epidemic situation provides an opportunity to accumulate valuable scientific data very rapidly. The evaluation of the relative efficacy of antibiotics in amebiasis and bacillary dysentery was the major interest at this time. Within a six month period some 650 cases of acute amebic dysentery were observed on 24 different therapeutic or dosage schedules with close clinical and laboratory follow-up during therapy and for four weeks thereafter. The uniformity of conditions and type of case provided unusually favorable conditions for comparative studies. Moreover, some 1600 cases of proven or suspected bacillary dysentery were followed on 18 different treatment or dosage schedules. The studies were a sound type of clinical inquiry which were in the best interest of the patients themselves.

The need for assistance in unusual outbreaks of communicable disease has been recognized and appropriate plans developed. When this epidemic was reported, the information was made available to the Chairman of the Armed Forces Epidemiological Board and through him to the Commission on Enteric Infections (The Board and its Commissions are civilian consultants who work in association with designated representatives from the medical Services of the Armed Forces). A plan of action was formulated, recommended and promptly approved. A civilian member of the Commission and a senior officer from the Army Medical Service Graduate School proceeded to the site of the epidemic to investigate, with authorization to call for additional assistance and supplies
if needed. A broad cooperative activity rapidly developed. The Fleet Epidemic Disease Control Unit with its well equipped floating laboratory and trained staff was already there, and permitted the immediate initiation of indicated studies at the site of the epidemic. The medical officers in charge of preventive medicine and laboratory services in the theatre gave every assistance. That part of the clinical staff of the 64th Field Hospital which was providing medical care to dysentery cases became part of what was designated "The Joint Dysentery Unit". Scientists working in the fields of bacteriology, parasitology, epidemiology, sanitary engineering and investigative clinical medicine came to join the Unit for periods of two or more months as working consultants. The Joint Dysentery Unit took full charge of the problem, including managing the large and active dysentery service in the hospital. This Unit had value beyond the contribution of its individual members. Its requests for services or supplies were given high priority. Facilities previously unavailable were soon at the disposal of the Unit. There is therefore, an effective mechanism for bringing to a problem from civilian or Service sources both expert assistance and needed facilities, if the problem justifies special study or unusual control activities.

The assistance provided in this epidemic probably was less effective than it might have been. The epidemic had been in progress four months before its occurrence was made known to responsible officers in Washington. It is doubtful whether the program which started in May could have been applied in December or January, but prompt reporting would have involved a sharing of responsibility. Moreover, in the usual outbreak of limited duration, early reporting and immediate action are required if an epidemic is to be rapidly controlled or adequately studied.

There is a particular need for consultants in the field of infectious diseases in the Armed Forces. A high proportion of medical officers over-seas are young, energetic and resourceful but with little experience other than that derived from studies on predominantly noninfectious illnesses encountered in academic and hospital training. They have had virtually no opportunity to learn the problems of the common, prevailing and epidemic infections of tropical areas. This recent experience suggests that with advantage, needed guidance can be provided through the intimate cooperation of civilian commission members and senior medical officers of broad experience in preventive military medicine.

Epidemics of dysentery encountered in the Armed Forces may be of unprecedented size, the clinical and laboratory features may be atypical, and the opportunities for study may be unexcelled. There are simple though essential requirements for the handling of these major problems. For effective action, prompt reporting is as essential in military as in civilian practice. Consultative assistance in the clinical, laboratory and epidemiological field may be required. A mobile laboratory may be essential for the highly important early studies of a major epidemic. Our experience in Korea calls attention to the value of the commissions of the Armed Forces Epidemiological Board. A more frequent use of this available assistance in the field may be recommended.