FOOD POISONING DUE TO CL. WELCHII

BY

Captain J. GERALD COLLEE, M.B., Ch.B.

Royal Army Medical Corps

(The Army Medical Centre, Fenham Barracks, Newcastle-upon-Tyne)

INTRODUCTION

The report of the Medical Research Council for the year 1951-2 records that one of the most recent additions to the list of recognized causative organisms of food-poisoning is a heat-resistant variant of Cl. welchii. The present paper describes an outbreak of food-poisoning in an army camp in which there is evidence to presume that Cl. welchii was responsible.

In a comprehensive study of clostridial food-poisoning, Hobbs, Smith, Oakley, Warrack and Cruickshank (1953) pointed out that, as early as 1895, Klein isolated Cl. welchii from stools obtained in two epidemics of diarrhoea, but that it was not until the last decade that evidence has been forthcoming to incriminate the organism more convincingly as a possible cause of much hitherto "non-specific" food-poisoning. They note, for example, that no adequate cause was found in 36 per cent. of the 2,431 outbreaks of food-poisoning recorded for 1949.

Smither (1953) investigated 90 unselected cases of gastro-enteritis in general practice, and he could isolate no recognized pathogens from 71 of his patients in this series. He was convinced that a heat-resistant staphylococcal enterotoxin was the commonest cause of mild gastro-enteritis, but he stated that no special bacteriological techniques were employed in his investigations and it appears that his specimens were not examined for Cl. welchii.

THE OUTBREAK

1. Cases.—Symptoms suggestive of food-poisoning occurred in 48 out of 138 men who lunched in the camp dining-hall on the day of infection and were questioned or examined in the next day or so. Attention was concentrated on 30 patients out of a company of 61 recruits, the most severely affected unit. Of these 30 men several had more than one complaint, though in all cases the symptoms were mild. Thus, 18 had abdominal pains, 15 had diarrhoea, 14 complained of nausea but only 2 had vomited, and 4 had headache. The onset of symptoms varied from six to twelve hours after the suspected meal. All the patients made a rapid recovery and all but two were fit for training on the following day. Several of those who complained of diarrhoea were given codeine on the day of the outbreak. No other drugs were issued.

2. Source of Infection.—It was thought that lunch of the preceding day was
J. Gerald Collee

responsible, but, unfortunately, all of the remains of that meal had been sent for swill before suspicion was aroused. The menu for lunch had included a choice of soup, roast and creamed potatoes, roast or stewed mutton, beans, peas, gravy, custard and prunes or trifle. All of the cases had lunched at the main dining-hall, which is supplied by its own cookhouse. This had been inspected during the previous week and found to be satisfactory. Immediately following the outbreak, an inspection of the cookhouse and food-handlers involved revealed no frank source of staphylococcal infection. The nature of the symptoms and their delayed onset were not considered quite typical of a staphylococcal form of food-poisoning, though these points did not exclude the possibility. When the bacteriological reports incriminating *Cl. welchii* were received, the stew was then thought to have been the most likely source of infection. The stew had been prepared on the preceding day, allowed to cool overnight and re-heated the next day. Beans and peas had been added during the cooking. These conditions are ideal for the sporulation and multiplication of any clostridia which may have contaminated the food (Hobbs *et al.*, 1953). In an attempt to confirm the presence of *Cl. welchii* in the cookhouse—and in view of the non-availability of a sample of the suspected stew—specimens of cooked food and meat-bench scrapings were taken from the cookhouse and submitted for a bacteriological report. *Cl. welchii* was not isolated from any of these samples. Several days after the outbreak it was attempted to prepare a list of the food which each soldier had eaten on the day preceding the outbreak, but this had to be abandoned as unreliable. Although by far the majority of those affected recalled eating the suspected meat, a few were uncertain and two were sure that they had not eaten the stew. They had, however, eaten the gravy and vegetables which were served with the stew. It was also evident that many others had eaten the stew with impunity. Of those who had symptoms, it appeared that the recruits were slightly more severely affected.

3. *Cl. welchii* in Faeces of Patients and Cooks.—Five specimens of faeces from 5 typical cases were sent for bacteriological examination on the day of the outbreak. On the following day rectal swabs were taken from all of the 30 known patients and from the 5 cooks involved. A heat-resistant form of *Cl. welchii* was cultured from all 5 specimens of faeces and from all of the 30 swabs taken from the cases. Four of the 5 swabs from the cooks also yielded heat-resistant *Cl. welchii*. No organisms of Salmonella or Shigella groups were isolated from any of the specimens or swabs sent. Fifteen days after the outbreak, stools from 20 of these patients and from 2 of the cooks from whom *Cl. welchii* had been isolated were sent for repeat examination. Culture of these stools revealed that only 7 of the 20 patients and 1 of the 2 cooks examined now harboured heat-resistant *Cl. welchii*. Repeat examination of the 7 positive cases on the 26th day after the outbreak showed that heat-resistant *Cl. welchii* was still present in 3 patients. At this time, stools from the 5 cooks were also sent for culture and none yielded the organism. Finally, on the 36th day, stools from the remaining 3 “positive” patients were submitted and it was reported that heat-resistant *Cl. welchii* was isolated from 2 of these.
Four days after the outbreak rectal swabs were taken from 17 personnel of the barracks who dined at other messes and who had no meals at the main dining-hall. Heat-resistant Cl. welchii was isolated from none of these "control" swabs. All of the bacteriological work involved in this investigation was done by the Public Health Laboratory, Newcastle-upon-Tyne, and the techniques employed were those in routine use by the laboratory.

DISCUSSION

Hobbs et al. (1953) stated that "... even if the suspected food were not available, a high percentage of stools showing heat-resistant Cl. welchii of the same serological type would be a strong indication that the outbreak was in fact due to Cl. welchii."

In this outbreak, a heat-resistant form of Cl. welchii was isolated from the stools or rectal swabs of all those initially known to have had symptoms of a mild gastro-enteritis. The organism was also obtained from 4 out of 5 cooks who were at risk but had no symptoms. It was not possible to establish the detailed serology of the strain of Cl. welchii involved and the need for a control series of swabs was evident. The result of the control experiment agrees with the figures of Cregan and Hayward (1953), who isolated Cl. welchii from the healthy small intestine of only 1 in 42 "normal" subjects, while Hobbs and her colleagues found that, of 45 "normals," the organism was isolated from 2.2 per cent. The latter workers also noted that an organism with the same characters as the heat-resistant variant of Cl. welchii concerned in their investigations was isolated from the feces of about 90 per cent. of the persons at risk. Time did not allow of similar investigations being done on the soldiers at risk in this outbreak, but this is a reasonable explanation of the occurrence of Cl. welchii in the cooks who had no symptoms. Hobbs et al. concluded that the strains involved in this type of food-poisoning were only feebly toxigenic.

The original source of the infection may have been Cl. welchii carried in the meat brought to the cookhouse, though the meat came from a central store which supplied the other messes in the barracks and no food-poisoning occurred in these. Many of the control swabs came from the food-handlers employed in these messes and none yielded heat-resistant Cl. welchii on culture. It is more probable that the stew became contaminated as a result of faulty hygiene on the part of a normal carrier who had access to the cookhouse.

SUMMARY

1. An outbreak of food-poisoning is described in which the symptoms were mild and transient, commencing six to twelve hours after the suspected meal and subsiding within a day in most cases.

2. Evidence that a heat-resistant form of Cl. welchii was the causative organism is presented.
TABLE—Occurrence of Heat-resistant Cl. welchii.

<table>
<thead>
<tr>
<th>Specimen</th>
<th>Source</th>
<th>Day</th>
<th>Number Examined</th>
<th>Number+ for heat-resistant Cl. welchii</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feces</td>
<td>Patients</td>
<td>1</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Rectal Swabs</td>
<td>Patients</td>
<td>2</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Feces</td>
<td>Patients (repeat 20)</td>
<td>15</td>
<td>20</td>
<td>7</td>
</tr>
<tr>
<td>Feces</td>
<td>Patients (repeat 7)</td>
<td>26</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Feces</td>
<td>Patients (repeat 3)</td>
<td>36</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Rectal Swabs</td>
<td>Cooks at risk without symptoms</td>
<td>2</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Feces</td>
<td>Cooks (repeat 2)</td>
<td>15</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Feces</td>
<td>Cooks (repeat 5)</td>
<td>26</td>
<td>5</td>
<td>nil</td>
</tr>
<tr>
<td>Rectal Swabs</td>
<td>Men not at risk (Controls)</td>
<td>4</td>
<td>17</td>
<td>nil</td>
</tr>
</tbody>
</table>

ACKNOWLEDGMENTS

I am much indebted to Dr. C. R. Peck, of the Public Health Laboratory, Newcastle General Hospital, who did the bacteriological work involved in this investigation. Without his willing co-operation and advice it would not have been possible to prepare this paper. I am also grateful to Dr. J. P. Duguid of Edinburgh University for his constructive criticism and encouragement. For permission to publish this account, I am grateful to the Director-General, Army Medical Services.

REFERENCES