AN OUTBREAK OF FOOD-POISONING DUE TO *CL. WELCHII*

BY

A. BECK, M.D., L.R.C.P.&S.Ed.
Group Pathologist

A. W. H. FOXELL, M.B., B.S.
Senior Registrar

North-Western Group Laboratory, London, N.W.3

AND

W. C. TURNER, M.D., D.P.H., D.I.H.
Deputy Medical Officer of Health, Royal Borough of
Kensington

It has been shown that heat-resistant *Cl. welchii* may be the cause of food-poisoning (Oesterling, 1952; Hobbs *et al.*, 1953). The clinical picture of this condition is described by these authors as that of a pure lower-bowel affection—that is, diarrhoea and griping—without the vomiting and general symptoms, such as pyrexia and headaches, seen in food-poisoning due to staphylococci and salmonellae. The usual medium of infection is a meat dish which has been prepared the day before being consumed and has been kept under conditions favourable to the multiplication of bacteria. The relatively mild and short course of this illness and the fact that it is caused by an anaerobe which will escape detection in the usual tests for intestinal pathogens probably explain why this type of food-poisoning has attracted little attention before.

Description of Outbreak

We recently had an opportunity of investigating such an outbreak in a general hospital in which 44 persons were affected—39 patients and 5 staff. The number of persons at risk was approximately 360. The cases were distributed among seven wards of the 450-bed hospital. The persons affected fell ill about 8–16 hours after consumption of some roast pork served for lunch. The pork had been cooked the day before and was allowed to cool for about three to four hours in the open before being stored in the refrigerator. The next morning it was sliced in the kitchen, and freshly prepared hot gravy was added before it was distributed in closed hot trolleys to the wards.

The same night a number of patients fell ill with diarrhoea and acute abdominal pain; the stools were watery and only occasionally some mucus was present; one person had blood in the stool. There was no vomiting, but some patients complained of slight nausea; no pyrexia was noted. Most of the patients recovered by the following midday or evening.

Bacteriological Investigations

Stool samples of all persons affected and of the kitchen staff were cultured. In addition a remnant of the suspected roast pork and 12 random samples of raw pork from the kitchen refrigerator were examined; the latter were taken from joints which were derived from five different sides; the side from which the remnant of roast pork came could not be identified. None of the gravy was left. The faeces, in addition to being subjected to the routine examination for intestinal pathogens, were inoculated into bottles of meat broth; these were steamed for one hour, incubated overnight, and then subcultured on to anaerobic blood-agar plates. In positive cases an almost pure growth of *Cl. welchii* was obtained. The colonies had the characteristic appearance of this organism except for the initial absence of haemolysis, which, however, developed after a few days' standing. They gave a positive Nagler reaction which was suppressed by *Cl. welchii* type A antitoxin.

Smears prepared from the remnant of roast pork and the samples of raw pork revealed numerous Gram-negative and Gram-positive bacilli, some of the latter containing sub-terminal spores. Portions weighing about 1 g. were removed from the inside and outside of the pork and after being minced were suspended in 10 ml. of meat broth. The suspensions were plated direct on to aerobic and anaerobic blood-agar plates and then incubated overnight. Next day the meat-broth cultures were heated for five minutes at 80° C. and then subcultured on to anaerobic blood-agar plates.

Results

The stool specimens were somewhat slow in coming in, so that on the first day only 14 samples were examined; 10 of these were found to contain *Cl. welchii*. Specimens from 26 other patients were examined during the following two weeks and of these only eight were positive. None of the kitchen staff was found to carry this organism.

A small number of *Cl. welchii* colonies were found in the direct anaerobic culture from inside the roast pork. They were heavily outgrown by coliforms and some anthracoid bacilli; there were also some coagulase-positive staphylococci present. A better growth of *Cl. welchii* was obtained after overnight enrichment of the roast pork in meat broth.

The strains isolated from the faeces and pork were submitted to Dr. Hobbs, who kindly typed them. She reports that 6 out of 17 faeces strains and the two cultures isolated from the remnant of the roast pork served belong to her provisional type 1. The remaining 11 faeces strains do not fall into any of her types 1–10. Two strains isolated from the 12 random samples of raw pork belonged to type 6 and 10, and one strain was not typable. Dr. Hobbs suggests that this outbreak might have been due to a mixed infection with at least two types which she occasionally has observed (Hobbs *et al.*, 1953: outbreaks 6, 13, and 14 in Table 2).

Discussion

The high incidence of heat-resistant *Cl. welchii* found in faeces, particularly in the early specimens, and the recovery of organisms of the same serological type from the faeces and roast pork leave little doubt about the aetiological significance of this bacterium in the present outbreak. The proportion of positive findings would probably have been higher still if more specimens had been examined earlier. On the other hand, the recovery of heat-resistant *Cl. welchii* in 8 out of 26 patients up to 14 days after the symptoms had subsided serves to demonstrate that some bacteriological evidence of the nature of the outbreak can be obtained even one to two weeks after the acute illness. Owing to difficulties in obtaining repeat specimens no precise information is available on the duration of the excretion of this organism. Five out of 10 patients were, however, found to be carrying it three weeks after the onset of disease, and two gave a positive repeat culture after five and six weeks respectively.

It is not possible to state with certainty at which stage of preparation the meat became infected, and, unfortunately, owing to the method of marketing, the pork could not be traced beyond the slaughterhouse. The pork consumed on the day of the outbreak was derived from three and a half sides which formed part of a consignment of five sides kept in the hospital cold store. The origin of the remnants of the raw and roast pork could not be traced, as all the meat had been jointed the day before the outbreak. The finding of serological types in the raw meat different from that found in the roast meat probably indicates that the latter was derived from a different side. The recovery of *Cl. welchii* in 3 out of 12 samples of raw pork is in agreement with the high incidence (20%) reported by Hobbs and her collaborators. The absence of *Cl. welchii* carriers among the kitchen staff exonerates them from having contaminated the meat. It is therefore likely that the pork was already infected in the raw state with *Cl. welchii* and that the spores, which, owing to their great heat-resistance (Hobbs *et al.*, 1953) survived heating in the centre of the joint, germinated under the favourable temperature conditions during the

prolonged cooling. There was further opportunity for bacterial multiplication on the following day, when the sliced pork was warmed with hot gravy.

The disproportion between the high number of persons apparently at risk and the number of people affected may be due to chances of distribution of contaminated and non-contaminated joints, or to variations of individual susceptibility as observed by McClung (1945).

The evidence presented emphasizes the danger of consumption of meat dishes prepared the previous day. Ideally, meat should be eaten on the day it is cooked. When this is not practicable provision should be made for rapid cooling after cooking, adequate refrigeration, and speedy serving of the meat after removal from the refrigerator.

Summary

An outbreak of food-poisoning due to heat-resistant *Cl. welchii* is described.

The organism was recovered from roast pork which had been consumed and from the faeces of 18 out of 40 persons affected.

Cultures isolated from the roast pork and from 6 out of 17 stools were of identical serological type. Other evidence, however, suggested that the outbreak was due to a mixed infection with at least two serological types.

The risk involved in the serving of meat dishes prepared the day before their consumption is emphasized.

We are indebted to Dr. Betty Hobbs for carrying out the typing of the cultures isolated from this outbreak. Our thanks are also due to Dr. M. W. Hutchings for help in following up these cases and to Mrs. E. Arnold for valuable technical assistance.

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Medical Memoranda

Multiple Mongolism in a Family

Mongolism as a rule occurs only sporadically in family pedigrees, and it was formerly believed that there was never more than one mongol born in a family. This theory usually holds good, as Warner (1949) could collect from the world literature only 42 families in which two siblings were affected, excluding instances when twins were involved.

The birth of three mongoloids in one generation of a family is rarer still, and we have failed to find a previous instance in British literature. The first description of such an occurrence was that of Herrman (1917). Reports by van der Scheer (1919), Fantham (1925), Malkin (1928), Bixby (1940), and Benda (1947) followed. Recently the following came to our notice.

FAMILY HISTORY

The father, a farm cowman, was born in 1905, and the mother, formerly a domestic servant, was born in 1909. They married in 1925, and are known to belong to the dull group of a rural population, the maternal family being of poorer stock than that of the father. There is no consanguinity or history of mental disease in the ascendants. Both parents are virtually feeble-minded and are unable to remember the year of their marriage, the dates of birth of their children, or the years in which three children died. They could recall the sequence of the children's birth only with mutual prompting and with the assistance of one of their daughters. The mother has had five miscarriages,

but is uncertain when two of them occurred. Known miscarriages took place in 1939, 1942, and 1946.

The birth order of the children is as follows: girl, D, 1926; girl, B, 1930; girl, K, 1931; girl, E, 1932; boy, H, 1934; girl, M, 1937; girl, F, 1941; girl, P, 1943; boy, R, 1945; girl, C, 1948. Of these, the girl, P, died at the age of 14 months from tuberculous peritonitis and the boy, R, at 6 months from pneumonia. Apparently no unusual symptoms were experienced during any of the pregnancies.

H is now employed as a cowman, K and B as factory hands in semi-skilled work, and F attends school, having an intelligence quotient of 101. D, who was admitted to a certified institution in 1933, is a mongol imbecile with an intelligence quotient below 30. M was admitted to the same institution in 1941, and is likewise a mongol imbecile, with an intelligence quotient of 30. E was recognized as a typical mongol by the family practitioner shortly after birth and died aged 4½ months, the cause of death being certified as mongolism and bronchitis.

COMMENT

Such families have aroused interest from two aspects. Firstly, it was hoped that their study might lead to an eventual elucidation of the condition, and, secondly, they should be borne in mind when the mother of a mongol seeks advice about whether future pregnancies may result in the birth of further mongol children.

This case well illustrates the contention that hereditary factors indicative of germinal inferiority are evident in the majority of instances of multiple mongolism. It further supports the thesis that in such cases there is an increased tendency to miscarriages; indeed, some of these may be abortions of mongols. It is suggested that if advice is sought by the mother of a mongol child and the family background and medical examination of both parents prove satisfactory, then the "mother can be encouraged to have more children without risk" (Benda, 1947).

Our thanks are due to Dr. T. W. E. Royden, the family practitioner, for his help in the study of this family.

J. V. MORRIS, M.D.

R. C. MACGILLIVRAY, M.B., F.R.F.P.S., D.P.M.

Little Plumstead Hospital, Norwich.

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Chlorcyclizine Hydrochloride Poisoning in an Infant

Toxic effects with antihistamine drugs are common in adults, but are seldom severe enough to require hospital treatment. Children have frequently been the subject of acute accidental poisoning by these drugs, probably because of the attractive presentation of the pills, and the effects have often been extremely serious. A number of fatal cases have been described. The main clinical feature of them all has been convulsions. The increased liability to fits in epileptics taking diphenhydramine hydrochloride ("benadryl") and tripeleennamine hydrochloride ("pyribenzamine") was shown in E.E.G. studies by Churchill and Gammon (1949). In large doses the antihistamines appear generally to act as central convulsants.

Rives *et al.* (1949), in their fatal case due to methapyrilene hydrochloride, reported the occurrence of cerebral oedema with petechial haemorrhages, which might account for this clinical picture. Their case also showed an acute nephrosis. Tobias (1949) reported the first fatal case in this country. It showed similar clinical features to the present case, but the patient died in three hours. There was no necropsy report. In two cases the necropsy findings were confined