Discussion

The outbreak caused two deaths, and at least twenty-one persons were infected by *B. enteritidis*, yet scientifically the food conveying the infection was not traced. However, there is little doubt that the canned mutton was responsible. The reasons for this belief are:

1. Every inmate taken ill had eaten the mutton.
2. All inmates who had not eaten the mutton were unaffected.
3. Every other article in the dietary was used in the hospital block, and no cases occurred there.
4. All kitchen maids showed a positive agglutination reaction to *B. enteritidis* except one, and she was absent on the day that the mutton was in the kitchen.

It is actually impossible to say what the source of the infection was, but an attempt can be made to deduce it. Savage and Bruce White state that there are three possible primary reservoirs:

1. A habitat outside the animal (including human) body.
2. Infection from a human case—infected sufferer or passive carrier.
3. Infection from an animal source—
 - (a) Specifically infected animal used for food.
 - (b) Sound food infected by a person suffering from a *Salmonella* infection or acting as a carrier of such bacilli.

1. Savage and White maintain that while this source is possible suspected material has always yielded negative results, and in this outbreak I find it difficult to admit the possibility.

2. This source can be discounted fairly certainly, as no illness at all suggestive could be discovered.

3. There was no evidence to show that the mutton could have been infected from an animal source in the institution. The food was traced from the tin to the wards, and it seems certain that it could not have been infected. Thus we are left to consider:

- (a) Was an infected animal used for the food—that is, ante-mortem infection?
- (b) Was the animal originally healthy and the meat infected post mortem?

If (a), then the bacteria survived the "cooking" process, which is unlikely. Moreover, a primary *B. enteritidis* infection of sheep is very rare. Does (b) appear to be a more likely source of the infection? From the number ill and proved to have been suffering from a *B. enteritidis* infection and the number who partook of the canned mutton—that is, twenty-three out of over 700—it is reasonable to suggest that one tin only was infected. Two wards (M2 and F2) supplied thirteen out of the twenty-three cases. The cases at the time of the outbreak were classified as mild, moderate, and fatal. There were nine mild cases, twelve moderate, and two fatal cases. Ward M2 had eight moderate and two fatal cases, and ward F2 showed four moderate cases. Thus it seems that the portion of the can most heavily infected went to ward M2 and the next most heavily infected to ward F2. The average incubation period in ward M2 was twenty hours and in ward F2 thirty-one hours. It is therefore reasonable to say that there was no uniform infection of the meat in the can, as might be expected from an ante-mortem infection, but a grading from one portion to another, as might be expected if one portion was originally infected before sealing of the tin and spread gradually by con-

tinuity of the material. This suggests, therefore, the probability of a post-mortem infection rather than an ante-mortem infection.

Summary

1. An outbreak of gastro-enteritis in which two persons died and twenty-one persons were victims was found to be due to *B. enteritidis*.

2. It is suggested that canned mutton was the food involved.

3. By probability only, and by no scientific proof, it is suggested that the mutton was infected in some manner, and was not taken from an infected animal.

I wish to thank Dr. Sidney Davies, medical superintendent, for permission to record this outbreak and for his untiring help, and also Dr. Scott of the Ministry of Health for his bacteriological reports. I am greatly indebted to Dr. W. G. Savage, county medical officer of health, Somerset, for his constructive criticism.

TREATMENT OF DEPRESSED FRACTURES OF THE MALAR BONE

BY

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A fracture which is becoming common is that in which the malar bone is pushed into the antrum. Sir Harold Gillies informed me that it is becoming particularly common in England, as the almost universal use of safety glass in cars is causing this fracture to replace the former facial cuts in automobile accidents, but even in Australia, where safety glass is only now coming into common use, it is often seen.

In this fracture the orbital, antral, and zygomatic attachments of the malar bone are fractured and the body of the malar bone is pushed partly or wholly into the antrum. The malar bone being strong is rarely comminuted, but not so the lateral wall of the orbit and the infra-orbital margin of the maxilla. If the case be seen soon after the accident the diagnosis is easily made, but even if seen after several hours the depression of the malar bone is rarely masked by the superficial swelling. When there is much swelling an alteration in the shape of the lower edge of the orbit is generally such as to make the presence of this fracture highly probable. The diagnosis in difficult cases is made by x-rays, and especially by one taken vertically of the side of the head from below upwards (Stone's position—Gillies, Kilner, and Stone, 1927), when the prominence of the zygomatic process on the affected side will be absent.

Often the fracture causes loss of sensation over the area of distribution of the infra-orbital nerve. As a rule the antral cavity is filled with blood clot.

Difficulties in Treatment

Treatment by the usual methods is unsatisfactory, the multitude of methods advocated indicating this. The advice generally given is to make an incision under the lip similar to that made in a Caldwell-Luc antrostomy and to open the antrum and elevate the malar bone. The reduction of the fragment is easy by this method, but no facilities are provided for retaining the bone in the correct position, and no allowance is made for drainage of the antrum. Such drainage should be instituted after an antrum full of blood clot has been opened into the buccal cavity, which carries such an infective flora.

To reduce the displacement Silverman uses tenaculum forceps, which seize the malar bone through the substance of the cheek, but the amount of superficial swelling or the degree of displacement into the antrum would often preclude this method, whilst at any time such treatment of the cheek savours of the barbarous.

Another method described by Mead (1933) is to screw a corkscrew into the malar bone through the cheek. A better method than this would be to drill a hole into the malar bone through a small incision in the cheek and to tap a thread, into which a tool could be screwed which would allow reduction either alone or combined with some form of extension apparatus.

The various other methods do not merit mention except the most ingenious method of Gillies and Kilner (1927), in which an elevator is passed through a small incision above the hair line in the temporal region. This is manoeuvred down on the surface of the temporal muscle under the root of the zygomatic process, which is then levered outwards. This method is often an excellent one, but it does not always succeed in retaining the bone in the corrected position. Neither does it provide for drainage of the blood clot in the antrum. If the antrum is not opened into the mouth at the operation such drainage is not absolutely necessary, for if left alone such a collection of blood clot rarely suppurates; but one of the most noticeable things about the method to be described is that those cases with moderate or severe pain nearly always get immediate relief as soon as the pressure caused by the clot is relieved by the establishment of drainage.

The Author's Method

Dissatisfaction with the accepted methods of dealing with this fracture has led me to experiment with methods of reducing the displacement by working through an intranasal antrostomy opening. Such a method has for some time now been standardized and is giving great satisfaction.

The operation is performed by making a vertical incision in the nasal fossa from immediately above and in front of the anterior extremity of the inferior turbinate

FIG. 1.—Instrument for transantral elevation of depressed malar bone.

bone to well on to the floor of the nose. The incision is carried as deep as the antro-medial border of the maxilla, which is then bitten away with strong Jansen-Middleton forceps as in the Denker operation and the bony opening is carried backwards into the inferior meatus. The clot in the antrum is displaced by packing the antrum with vaseline gauze, and when it has been displaced the gauze is withdrawn. An elevator which has

been made for me by Elliott Brothers of Sydney (see Fig. 1) is then inserted and the body of the malar bone is elevated into position (see Fig. 2). In the event of such an elevator not being available, the handle of a teaspoon with a narrow upper end can be used unless impaction is unusually firm. The end of the spoon handle is inserted into the antrum so that its surface is horizontal

FIG. 2.—Showing how, if the opening is made at the junction of the nasal and anterior walls of the antrum, the depressed malar bone can be elevated with a comparatively straight instrument.

with the patient in the anatomical position. It is then turned so that the surface is vertical. Previously I used a more posterior antrostomy opening, but this necessitated a much more curved elevator. In this older method the tip of the hook-like elevator was used to perform the reduction, but with the later modification the use of a straighter elevator is possible, and the reduction is performed with the side of it instead of the top, as formerly.

After-treatment

Usually the displacement has no tendency to recur, and this is what one would expect as no important muscles are attached to the bony fragment, but where the edges of the opening into the maxilla are badly comminuted the malar bone is pressed back into the antrum by the weight of the cheek. This is easily controlled by packing the antrum through the opening made with a long piece of 3/4-inch-wide vaseline gauze. This is removed after two days and would be replaced if required, but so far this has not been called for. Antral lavage is carried out a few times during convalescence.

Advantages of the Method

This method provides an easy and certain means of reduction and retention of the fragment in position. It also usually makes the patients quite comfortable as soon as the drainage is provided. Even in the few cases where packing has to be left the patient is usually not more uncomfortable than before operation.

The main objection to the method in the eyes of the general surgeon is that assistance must be sought from those used to intranasal manipulations, but as the method is so much more satisfactory than any other described, this should not exclude it.

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