be nullified by persistence in the use of tobacco. We therefore insist that our patients should stop smoking.

Summary

1. A further series of cases treated by intermittent venous occlusion has yielded encouraging results.

2. The treatment is especially suitable in cases of obliterative arterial disease with a poor collateral circulation.

We are again indebted to Professors D. M. Dunlop and Sir John Fraser for their interest and help, and to the physicians and surgeons of the Edinburgh Royal Infirmary, who have kindly permitted us to treat their patients. The work was carried out during the tenure of a Syme Surgical Fellowship (J. J. M. B.) and the Shaw Macfie Lang Fellowship (W. M. A.). We also gratefully acknowledge a grant from the Earl of Moray Endowment towards expenses.

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FOOD POISONING*

BY

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To the clinician food poisoning has a definite significance. It refers to a state of ill-health resulting from food which contains some abnormal or noxious content. Although the condition may be brought about by various agents, these are definable and produce manifestations which, within the limits of clinical medicine, are fairly constant for the agent concerned. To the lawyer, on the other hand, the term "food poisoning" has no significance; it is not even a legal expression, though were it not for the legal aspect the whole problem would be less complicated.

Responsibility of the Food Purveyor

The Food and Drugs Administration Act makes it an offence to sell to the prejudice of the purchaser any article of food which is not of the nature, substance, or quality of the article demanded. There are provisions in public health legislation directed against the offering for sale of meat, fish, milk, and other foods which are diseased, unsound, unwholesome, or otherwise unfit for food. Gross conditions such as these come within the purview of the sanitary authorities, which have special machinery for dealing with them, rather than within that of the practitioner. Even if the food be eaten it does not follow that poisoning would result.

The purchase of food implies a warranty that it is fit for consumption. Actions for damages for food poisoning (to use that common but often misused expression) are based either on negligence or on breach of an implied warranty of fitness. The provision in the Sale of Goods Act, 1893, material for this purpose is as follows:

"Sect 14. (1) Where the buyer, expressly or by implication, makes known to the seller the particular purpose for which the foods are required, so as to show that the buyer relies on the seller's skill and judgment, and the goods are of a description which it is in the course of the seller's business to supply . . . there is an implied condition that the goods are reasonably fit for such purpose. . . ."

Whether the case is based on the implied condition that the food is fit for consumption or on the breach of the seller's

duty to his customer to exercise care, damages are recoverable. In so far as the ground is negligence it is now clear that the legal responsibility goes back beyond the immediate supplier of the article of food to its ultimate manufacturer. This was decided in 1932 by the House of Lords in the case of *Donoghue v. Stevenson*, overruling the Court of Sessions in Scotland.

A shop assistant had purchased at a café in Paisley a bottle of ginger beer. The bottle was of opaque glass. She drank some of the contents, and when the remainder was poured into the tumbler a decomposed snail made its appearance. The woman claimed damages from the manufacturer, averring that the nauseating sight, coupled with the impurity of the liquid she had consumed, had caused her shock and gastro-enteritis. The House of Lords decided by three opinions against two that the manufacturer of food, medicine, or the like, sold by him to a distributor in circumstances which prevented the distributor or the ultimate consumer from discovering any defect in it by inspection, is under a legal duty to that consumer to take reasonable care that the article is free from defect likely to cause injury to health.

When the claim is based on the implied warranty it is immaterial that the purveyor of the food could not himself have discovered the defect. He has warranted to supply safe food, and this warranty is absolute. This is established by the case of *Frost v. Aylesbury Dairy Company*, which came to the Court of Appeal in 1905, in which milk was held to contain typhoid germs. The existence of such germs could only have been discovered by prolonged investigation, so that the defect was not discoverable at the time of sale, but the plaintiff's right to damages under the implied condition of fitness was upheld. The question of negligence, therefore, need not arise, and I presume that is why the usual course is to found the claim on implied warranty.

The Wide Field of Possible Complaint

Man must eat to live, and man is one of the few animals with widely variable tastes. Hence arise innumerable possibilities for complainants. There are various illnesses of cryptic origin which puzzle medical men and in which the tendency of the sufferer is to ascribe the blame to a meal just taken, all the more so if the meal included some article of diet, such as mushrooms, lobster, or ice-cream, which the public mind associates with disease. Again, one man's food is another man's poison, and individual idiosyncrasy adds to the difficulty of proof of damage or disproof of causal connexion.

The crux of the question when a person alleges that he has been affected adversely by consuming deleterious food is whether he has actually suffered from such food, and if so whether the defect in the food was due to negligence in its manufacture or supply. Both these are questions of fact, the first essentially, and the second largely, material for the medical witness. The fraudulent claim is common, and often based on the supposition that the big firms are rich and will pay to avoid publicity. At the same time, there is also the individual who honestly believes that he has been made ill by some special article of food. He is perhaps influenced by a chance observation by his medical attendant that he might have taken some food which had upset him. He instantly translates "food upset" into "food poisoning." Sometimes the medical man himself is a credulous person, and accepts the patient's statement of his subjective symptoms—as, for example, diarrhoea and vomiting—without verifying it. Yet the essence of proof of poisoning rests on a detailed investigation in the early stages of the illness.

A legal action once started may drag on for a long time before the case is actually heard, and as time goes on the patient's symptoms, as imagined by him afterwards, tend to multiply. Generally, however, this is to the advantage of the defendant, for the symptoms become so numerous and complicating as to contradict one another. To add to the difficulty, a difference of opinion may arise among the experts called in—a difference apt to lead to the discredit of expert evidence. I suggest that the difference is more

* The substance of a paper read before the Medico-Legal Society on November 25, 1937.

apparent than actual. The fault or the deliberate tactics of counsel may prevent the truth from emerging. For example, it is the truth that food poisoning produces gastro-enteritis, but this must be modified by the undoubted fact that gastro-enteritis results from many different causes besides food poisoning. If medical evidence were given in the form of answers to an intelligent questionnaire there would appear more agreement than disagreement amongst medical experts. But counsel may not desire to achieve such agreement, and the zeal for victory rather than for the elucidation of truth may bring even medical witnesses into unwitting partisanship.

How Foods can Affect Health Adversely

A food may be deleterious either because of its own quality or of the constitution of its consumer. Even unaccustomed foods, good in themselves, or undesirable mixtures of harmless ingredients, may yield the same results as food defective in quality. Unwise drinking or extreme variations of temperature may produce a dyspeptic state without any fault in the food. Certain foods may affect in a specific manner individuals susceptible to them, gastro-enteritis may arise, with urticaria, alarming to the sufferer, but again not poisoning. Idiosyncrasy may manifest itself at any period—a point difficult to make clear to the person whose mind is filled with the suspicion that he has been poisoned by food. Obviously illness due to idiosyncrasy, although technically a form of food poisoning, cannot be laid at the door of the purveyor of the food. Nor is he responsible for the consumer's digestive weakness or his reckless dietary admixtures.

Food poisoning proper is the result of the presence of some noxious agent in the food. In the form in which it comes most frequently to medical attention it is due to the presence of specific germs or toxins originating, if in meat, in the animal from which the meat was taken or from some carrier handling the meat, or from sewage, as in oysters contaminated with typhoid germs, or in milk handled by a carrier of scarlet fever or typhoid, or, as has been learned recently, in pastries and piecrusts infected by a common staphylococcus. Again, there may be contamination of potted meats by a bacillus rare in this country—namely, the *botulinus*—leading to poisoning of a characteristic nature, with acute and rapidly fatal symptoms of paralysis of the nervous system. The medical jurist, however, is concerned with a much wider group than this, and his function is to prove whether a train of symptoms is the result of food unfit for human consumption.

The first inclination is to view the last meal with suspicion; but the last meal may have had nothing to do with the symptoms. Certain foods, such as shellfish, mushrooms, and ice-cream, are often suspect, and the sufferer is apt to go back several meals to locate such an article of diet, but here again the suspicion may be quite unfounded. Surmise is not proof, and it is not right to work on such generalizations as that oysters cause skin diseases or sausages gastro-enteritis. Many other possible causes enter into the story.

Proof of Food Poisoning

The various groups of poisons act in fairly constant ways. Each of the alkaloids produces its own train of symptoms by its selective action on the body, generally the nervous system; for example, strychnine produces spasms and twitchings, nicotine acts on the nerve-endings of the heart, morphine acts on the higher centres in the brain. The toxins of poisonous fungi which are eaten in mistake for mushrooms act directly and with great severity on the nervous system as well as on the gastrointestinal tract, and symptoms of giddiness, stupor, convulsions, and coma are pronounced. I can find no evidence that severe and long-persisting skin diseases have been produced by mushrooms, though that has been the basis of many claims. In one unsuccessful action concerning alleged mushroom poisoning it was stated that the diarrhoea and vomiting had accompanied an erythema multiforme which persisted, but this picture is totally

different from the recognized results of poisoning by toxic fungi. Food poisoning as generally understood is characterized by gastro-enteritis, with pain, vomiting, and diarrhoea. It is an acute illness, ending rapidly, generally without fatal result, and leaving no after-effects.

The causes of gastro-enteritis are numerous, and therefore it is essential that proof of the food eaten and its causal connexion with the symptoms should be obtained in the early stages. The previous condition of the patient, the onset of the illness, and the time elapsing since the suspected food was taken are all-important. These circumstances should indicate whether there is a suspicion of a bacterial infection. Bacterial food poisoning has an incubation period during which the bacteria form toxins, and therefore several hours elapse before symptoms are manifested, though if the toxins are already present in the food before it is eaten the symptoms appear more rapidly.

It is important to know whether severe diarrhoea and vomiting occurred, also the nature of the flux. On two occasions I have been called to a case of alleged food poisoning following an unusual meal. Fortunately there remained some of the vomitus and diarrhoeic flux, which were typical of haemorrhage from a peptic ulcer, but it was difficult, in the absence of previous symptoms of ulcer, to persuade the patients of the seriousness of the illness and to get them to absolve the food. In another case of vomiting and later intractable diarrhoea the practitioner, without seeing the excreta, diagnosed food poisoning, but it came out in consultation that the claimant had been treated for many months at hospital for ulcerative colitis, which is not associated with food poisoning.

Cases occurring in Groups

A number of cases occurring together in similar circumstances is, of course, highly suggestive of food poisoning. But here again it is well not to jump to conclusions.

In one instance cream was alleged to be the cause of scarlet fever. Two ladies who had partaken of the cream were affected, and their two men companions, who did not partake, did not suffer. But it was found that the same cream was liberally used in sauces of which they all partook. Further inquiry showed that one of the ladies had just left a scarlet fever case, and it was suggested that she transmitted the infection to the other in her greeting kiss, while the men were not so exposed.

Unusual conditions must also be borne in mind in dealing with outbreaks. Recently in London there have been several scattered outbreaks of diarrhoea and vomiting due to the Sonne bacillus of dysentery. Epidemics of sickness and vomiting have also occurred, described under the name of *nausea epidemica*, which cannot be traced to food poisoning. Sometimes agonizing pain is an outstanding symptom, accompanied by vomiting and perhaps some diarrhoea, and as it follows a meal away from home the food is incriminated. But a careful history and examination will point to gall-bladder trouble or some other colic, which may indeed have been aroused by an unusual meal, but here again the purveyor of the food is not blameworthy.

On what grounds, then, can an uncontrovertible diagnosis of food poisoning be made? The symptoms can only point to food as suspect, the suspicion becoming stronger if more than one case occurs and a common origin can be suggested. Proof absolute would be demonstration of the toxic virus itself, and here we have a recognized procedure, often, but not always, successful. This includes the finding of the germs in the excreta and if possible in the remainder of the food, and administration experimentally to laboratory animals. It often happens, however, that the remaining food, or even the excreta, is not obtainable; then a test may show that the infected individual forms in his blood, after such infection, demonstrable antibodies. In a recent case in which pork chops were alleged to be the cause of the disease, it was on the demonstration of the agglutinins to Gaertner's

bacilli in the blood that the action was decided. There are certain reservations to be made in drawing conclusions from such tests. Previous infections may leave agglutinins in the blood for a varying period, but the discussion of this matter is for the expert. I would stress only the importance of duplication of tests to avoid errors in technique, and the tests should be carried out in laboratories specially equipped for the purpose, or, better still, in a central laboratory, where the stock strains are of recognized accuracy. It must also be remembered that laboratory tests may fail at times owing to long delay in beginning the investigation. That errors can arise owing to the refinements entailed in identification of the bacteria and their products was impressed upon me whilst investigating an outbreak of sore throats following a banquet.

Some sixty of the diners went down with sore throats, in some cases followed by scarlet fever. At first a streptococcus isolated from the throat of the chef was thought to be the causal organism, but later reports from the Ministry of Health laboratories showed that the streptococcus so obtained was not the one associated with the conditions in question. Cream or ice-cream was suggested as the cause of this outbreak, but no bacteriological corroboration was forthcoming. It is obvious that when gatherings take place in a crowded banqueting hall the atmosphere may be such as to encourage the spread of any infection, and I could find no reason to blame the food despite the coincidence of so many cases.

Popular Fallacies about Food Poisoning

It is desirable to rebut certain popular fallacies. Bacteria are not necessarily noxious, nor is decomposing food necessarily poisonous. Many foods are eaten, from choice, in a high state of decomposition. It is a fallacy that poisoned food has a bad taste; it is the decomposing food which tastes, and indeed the decomposition is a safeguard, preventing stale food from being eaten, for in stale food dangerous germs may have had time to form their toxins before cooking takes place.

Ordinarily, food poisoning is an acute illness in which the patient gets rid of the poison by vomiting and diarrhoea and is better within a few days, suffering no after-effects. Cases due to toxins which attack the nervous system take a more fatal course, as, for example, in the fatal outbreak of botulism in 1922 at Lochmarea, when all the eight persons who had eaten sandwiches made of potted wild duck paste died.

The source of the infection is important in making investigations. It may come from the animal itself (and if the animal be diseased the whole carcass will be infected, so that there will be widespread incidence of food poisoning); from butchers and others who handle meat actually infected or are themselves carriers of disease germs; or from the fouling by vermin such as rats and mice of cooked food improperly stored.

The bacilli are destroyed by heat and cooking, but the toxins remain unaffected and potent for danger. Hence delay in the canning process after slaughter will allow of toxins being developed and conveyed in the sterilized food. A debatable point has been raised in court as to whether the temperature of cooking is sufficient to destroy bacteria in the depths of meat. Some experiments which were carried out for me appeared to demonstrate that possibility. Minor questions arise such as whether a portion of tinned meat can be infected and not the rest of the meat in the tin. This has been taken to explain an isolated case and the immunity of others who shared from the same container, but I regard it as unlikely in view of the process of canning.

"Psychological" Food Poisoning

Many claims are based upon the discovery of a foreign body in the food, as, for example, a piece of glass or a nail, a slug in a salad, or, as in the case already mentioned, a decomposed snail in a bottle of mineral water. Cases of this kind need looking into very closely. It

is not unknown for a cockroach to be produced from a match-box and placed in the soup by the prospective claimant. One case is on record in which a rat's tail had been introduced into a meat pie. This proved unfortunate for the claimant, however, for it was shown in the laboratory that the tail had not been cooked in the cooking of the pie. In one case which I investigated the claimant had been twice successful in contending that he had inadvertently swallowed pins found in food, and it turned out that the failure to expose his fraud was due to a too trusting radiologist. The radiologist, believing the man's story, and seeing the pins in various positions in successive radiographs, which had been taken only in one plane, was completely deceived. Apparently the man knew enough to place the pins on his back in appropriate positions to suit the time intervals. The swallowing of foreign bodies may, of course, be attended by harm, but in most cases the glass or pins are passed through the bowel without damage, and so the matter should end; but it may not so end if a large firm or insurance company is concerned and can be regarded as "fair game" by some claimants.

If a woman finds a slug in a salad and discards it without having tasted any of the food, does that constitute a just claim for damages? It is an unpleasant occurrence, but not enough to cause illness. Had she found the slug while preparing a salad in her own kitchen, would she not have removed it and served the salad? But apparently it is a more expensive slug which makes its appearance at restaurants!

In one case with which I had to do a woman tasted three mouthfuls of a chop, which she said was "tainted," but she followed it with fruit salad and cream, and then came the usual story of vomiting and diarrhoea, pains, and in this case an urticarial eruption with nausea. Her practitioner argued that, although this was not specific food poisoning, the tasting of tainted food by a highly sensitive woman caused an upset of digestive functions of a psychological nature.

Is this possible? And, if such sensitive persons exist, can the food purveyor be justly held responsible for their susceptibilities? Carried to a logical conclusion, such people would be equally upset by the presence of a deformed person or a person of unpleasant countenance in the restaurant. I am inclined to think that if such susceptibility exists it is in no way different from susceptibility regarding certain foods, and should be the entire responsibility of the individual unfortunate enough to possess it.

Medical experts differ regarding these quaint cases of what may be called psychological food poisoning, but to me it seems unfair that damages should be given in such circumstances. I hesitate to dwell upon the medical and legal possibilities if at a modern restaurant crowded with sensitive, fragile, twentieth century females the old nursery rhyme were re-enacted:

"Four and twenty blackbirds, baked in a pie.

When the pie was opened, the birds began to sing."

But perhaps the writer of a "Song of Sixpence" properly assessed the amount of the damages!

After-effects of Food Poisoning

A final word must be said on the after-effects of food poisoning. I have referred to a case of ulcerative colitis alleged to have followed poisoning by food, and I have notes of a case in which an attack of appendicitis was said to have followed the eating of tinned salmon. In this case it was obvious that the whole of the symptoms ascribed to the tinned salmon were actually due to the appendicitis. In the case mentioned above in which a woman had merely tasted a tainted chop, it was said that recurrent attacks of urticaria supervened, and for this she demanded compensation, with the proviso that she be allowed to reopen the case at any time within the next ten years.

I regard food poisoning as an acute illness from which the patient makes a rapid recovery, and I cannot believe that chronic states of skin disease and intestinal trouble can follow even an actual case of food poisoning, let alone an imaginary one.

The problems are numerous, and I have touched only on some of them. Each case must be dealt with on its merits. It is obvious that the medical expert called in to weigh evidence must approach the subject in a different manner from the clinician. On the medical expert falls the onus of discovering proof. His outlook must be wider, and he must be careful lest he, too, like possibly the patient or claimant, become the victim of credulity. In view of possible sequels in court he should be prepared to produce all the proofs of his investigations and all the clinical deductions, bearing in mind that in this field especially the time factor is of importance because of the rapidity with which the evidence may disappear.

Clinical Memoranda

Weil's Disease following a Motor-car Accident

Although cases of Weil's disease have been reported in increasing numbers in recent years, it has been suggested (Maxwell, 1935) that all sporadic cases be put on record. I am therefore contributing the following case.

CASE RECORD

X. Y., a man of 55, was driving a saloon motor-car containing two other people and a dog. He failed to take a turning over a canal bridge properly, and crashed into the canal—the Fosdyke Navigation Canal, which is the oldest canal in Britain, being a relic of the Roman occupation. The car came to rest upside down, with only the wheels visible above the water. Bystanders on the canal bank dived in immediately to the rescue. The two passengers—an old lady and her husband, who was partially paralysed—were rescued first, and then the driver, who was therefore immersed for a few minutes, as the doors of the car had to be forced open under water. Artificial respiration was applied to all three on the canal bank, and it was some time before they came round. As soon as they could be moved they were taken by ambulance into Lincoln County Hospital—a distance of about six miles. The two older people were carried in on stretchers, but X. Y. had by that time so far recovered as to walk in. They were all treated for shock and partial drowning. The male passenger made an uneventful recovery. His wife also fully recovered, but for some time was very ill with bronchopneumonia. The driver of the car, whose case is here recorded, improved gradually. He stated that he had swallowed a good deal of the canal water, and often asserted during his illness that he kept on tasting it. Five days after admission he complained of severe cramp-like pain in his legs. On being questioned he gave a history of phlebitis, and said that he had had similar pains before. Except for these pains he continued to be quite well, and was considered fit enough for discharge ten days after admission. On that day he complained of sickness and malaise, and his temperature for the first time was above normal. Two days later he began to vomit, and jaundice was noticed. The next day he was very jaundiced, and complained of pain in his chest and epigastrium. In two days' time herpes appeared on the upper lip, and epistaxis occurred the following day; the jaundice meanwhile continued to deepen. A clinical diagnosis of Weil's disease was made. He died twenty days after admission, fifteen days after first complaining of cramp-like pains in the legs and six days after the appearance of jaundice. The urine contained bile, albumin, pus cells, epithelial cells, and coliform bacilli. The van den Bergh reaction was biphaseic.

At necropsy the liver was found enlarged and friable. The left kidney was very soft and friable, and there were haemorrhages into the suprarenals. On naked-eye examination nothing abnormal was found in the stomach, intestines, heart, or spleen. The lungs showed a few old healed tuberculous lesions at the apices and some terminal hypostatic congestion. Microscopical examination of sections from liver, kidney, and spleen showed *Leptospira icterohaemorrhagiae*. The organism was not seen in sections from the lungs.

Discussion

The above was a typical case of Weil's disease with a fulminating course. The incubation period was five days if the first complaint of pain is taken as denoting the onset, and ten days if the sickness and malaise are considered the first symptoms. Schüffner (1934) found that in cases where the patient fell into infected waters the incubation period varied between four and nineteen days. A case following bathing has been reported (Lendrum, 1936) in which the incubation period was only two days.

Bathing in, or falling into, infected waters is a fairly common mode of infection. Alston and Brown (1937), in a series of 142 cases, found that it was the fourth largest group. Bewley and Wilson (1937) note that the disease occurs in a greater proportion of those who fall into infected waters than of those who bathe in them. This is borne out by the above case, as the canal is used for bathing by very many people during the summer. Schüffner points out that this greater incidence is due to the fact that an unpremeditated immersion often causes violent struggling, so that water enters the respiratory tract. Infection usually occurs through broken skin or through the mucosa of the nose, mouth, or upper respiratory tract. No organisms in the above case were found in sections from the lungs, but they were plentiful in sections from the liver; and infection seems to have been from the swallowed water. It is unusual for infection to occur through the gastro-intestinal tract, as the antiseptic action of the acid in the stomach and the bile is sufficient to destroy the organisms. Carnot and Weil (1934), however, report the case of a woman who, attempting suicide in the Seine at Paris, swallowed a large quantity of contaminated water. She developed spirochaetal jaundice; profound anorexia ensued, and death took place from inanition.

In the clinical course the above case followed the classical description, except that it was a fulminating one. The fatality rate in Weil's disease varies from 5 per cent. to 50 per cent. (Alston and Brown, 1937). The disease may be very mild and jaundice is not always present, diagnosis depending on serological reactions. Many cases may therefore be missed, being of subclinical types. This accounts for the differences in mortality rates.

Summary

A case of Weil's disease is described, and the incubation period, mode of infection, and mortality rates are discussed.

I have to thank Mr. G. C. Wells-Cole, senior surgeon, Lincoln County Hospital, for permission to publish this case.

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