Remarks

ON

THE INDICATIONS FOR CHOLECYSTECTOMY.

A PAPER READ BEFORE THE MANCHESTER MEDICAL SOCIETY.

BY

K. W. MONSARRAT, F.R.C.S. EDIN.,

SURGEON TO THE NORTHERN HOSPITAL, LIVERPOOL; LECTURER IN OPERATIVE SURGERY IN THE UNIVERSITY.

If we may judge by their writings, it cannot be said that the minds of surgeons are yet made up as to whether removal of the gall bladder should be the normal operation in cases of cholecystitis. I quote from two papers, both written by a surgeon of high repute, and both published in the same year. In one, speaking of cholecystostomy, he says "this operation saves this valuable organ for future function." In the other he writes: "Practically all cases of cholecystitis and 80 per cent. of cases of gall-stone disease should be treated by cholecystectomy." In a recent textbook I read: "There is much divergence of opinion on the question of cholecystostomy *versus* cholecystectomy even among the writers of this volume, some preferring cholecystectomy whenever it can be done, others limiting its use to cases in which the gall bladder is small and shrunken." Examples of the same divergence of opinion might be multiplied.

The question has to be considered from physiological, pathological and clinical standpoints. From the physiological point of view it has to be asked, what is the function and functional value of the gall bladder? It is not found universally among mammals; of the domestic mammals the solipeds, the horse tribe, are without it. The horse has a single ductus choledochus which opens into the duodenum by the way of an ampulla of Vater. The ox, the pig, the dog and the cat possess it. It is present in birds, but in them there are two or more bile ducts, the gall bladder being a diverticulum on that which leads from the right lobe to the duodenum. Physiologists are for the most part silent as to its function, but down to recent years it has been an accepted doctrine that by periodic contractions it floods the duodenum with bile when food passes from the stomach into this part of the intestine. There are difficulties in the way of accepting this theory. It has been pointed out that the amount of bile excreted in the human subject is from thirty to fifty ounces in the twenty-four hours, and that the capacity of the bladder being but one ounce it can hardly be considered a reservoir. This is true for man, who feeds habitually at four or five hour intervals, and whose duodenum contains food at corresponding intervals. Under these conditions the gall bladder can hardly have much functional value as a reservoir determining the admixture of bile with food.

In other animals, continuous feeders, the pylorus is relaxed at frequent intervals to allow the passage of food, and in them there may be a mechanism associating this passage of food into the duodenum with contractions initiated in the gall bladder. The reservoir theory is not to be lightly thrown aside because it does not appear to work in with the habits of man; if it is the true explanation of the function of the gall bladder, then in man this organ is of little value physiologically.

Mr. W. J. Mayo has adopted another theory, that the gall bladder "takes the tension from the common and hepatic ducts, and that the mucus it produces reduces the chances of pancreatic and other complications." This may be called the "safety-valve" theory. It supposes the development of an organ as a safeguard against a possible pathological condition. Such an event cannot be brought into line with any theory of the development of organs of which I am aware. An extraordinarily clumsy way this of avoiding regurgitation of bile into the pancreatic ducts when the other path, the dissociation of biliary and pancreatic ducts, was developmentally open and obtains in many vertebrates.

In the horse, which possesses no gall bladder, subacute pancreatitis has been described only as a consequence of the penetration of foreign bodies; acute pancreatitis has only once been described in the horse, three times in the dog, according to Hutyrá and Marek. These figures are of course too small to reason from, but at any rate attention

may be drawn to the fact that these authors are only able to put on record one case in the horse, which has no gall bladder, in which the cause may possibly have been regurgitation of bile into the pancreas, and the horse is one of the domestic animals whose morbid conditions have been most thoroughly investigated by veterinary medicine. The "safety-valve" theory practically receives its quietus when we find that in the solipeds the bile duct and the pancreatic duct are associated in an ampulla of Vater, yet there is no gall bladder, whereas in the large families of which the ox and the pig are examples a gall bladder is present, but the ductus choledochus and the ductus pancreaticus open separately into the intestine. There is no real alternative to the reservoir theory, which supposes periodic contractions associated with pyloric relaxation. The dietetic habits of man have, however, rendered this reflex of no physiological value to his digestive system.

The gall bladder is a diverticulum with a very narrow neck, the average diameter of the cystic duct is about one-eighth of an inch. It is, therefore, a diverticulum in which stagnation may readily occur. In its normal content, bile and mucus, most types of micro-organism can be cultivated, and under conditions of stagnation virulence and multiplication are increased. The source of infections in the bile channels is the portal circulation. Under conditions of health bacteria carried to the liver from the alimentary canal and other abdominal viscera are destroyed there or so attenuated as to be innocuous. Under pathological conditions this destruction or attenuation is subnormal, and infections of the bile channels may result. Infections of the urinary passages occur under analogous conditions. When infections of the bile channels occur the gall bladder is the site where they tend to persist. One result of the infection may be the formation of gall stones, but the primary condition is that of infection. Whether gall stones form and complicate the infection depends upon the relative proportions of cholesterol and bile salts. Cholesterol is a pure excretion, it is insoluble in water but soluble in solutions of bile salts; when the amount of the latter is insufficient relatively, cholesterol passes out of solution. Cholesterol is thrown off in increased quantity from tissues which are undergoing pathological changes, and concretion formation is a consequence of the rise in the relative amount of cholesterol in bile following infection.

The problem in the treatment of cholecystitis, whether associated with gall stones or not, is to arrest the infection and obviate its recurrence. For anatomical and pathological reasons it appears only remotely possible that a gall bladder that has suffered infection and inflammatory reaction can be trusted to remain quiet. We are becoming increasingly acquainted with a group of cases in which, without any gross inflammatory reaction in the gall bladder itself, the patient's health is undermined by a chronic cholangitis the nidus of which is the gall bladder, recovery from the chronic cholangitis following cholecystectomy. Some of these patients, if watched over long periods, may show an occasional transient gall-bladder distension and tenderness, but this phenomenon does not always occur. These cases do not come within the scope of this note, and I mention them only to illustrate the fact that even the structurally normal gall bladder may harbour an infection sufficient to disorganize liver function and produce chronic ill health. The chances that a bladder and cystic duct structurally damaged by inflammation can be reasonably expected to cease to harbour and engender infection would seem to be small.

The test of a successful operation for cholecystitis is whether the infection of the bile channels clears up, the liver function returns to normal, and the patient does not suffer from symptoms referable to adhesions between neighbouring viscera nor from other symptoms arising from recurrent inflammatory reaction in the operation area. My own experience is that a considerable proportion of cases of cholecystitis treated by drainage fail to pass this test. Admitted that when gall stones are associated with the cholecystitis a return of concretions is unusual when cholecystostomy is performed, a considerable number of patients so treated suffer ill health of one kind or another referable to the persistence of the gall bladder as a centre of infection—ill health due to persistent chronic cholangitis with chronic pancreatitis, recurrent attacks of pain and tenderness in the

neighbourhood of the wound, gastric distension, spasm and sometimes vomiting due to angulation of the pylorus and duodenum by adhesions.

To avoid these complications, to get rid of a potential source of recurrent infection in the biliary channels, it appears advisable to remove a gall bladder which has been attacked by cholecystitis of whatever type. The contraindications are not local but general. In a small proportion of cases it may be advisable, in view of the patient's age or feebleness, to limit the operative procedure to the somewhat less exacting cholecystostomy after removal of calculi if present. With this exception, cholecystectomy should be the rule in acute, subacute and chronic cases. It is necessary to make certain that after its removal no obstruction will remain in hepatic and common ducts. If this is demonstrated beyond doubt, there is no need, even in cases where there is jaundice, to provide external drainage of one or other of these ducts; the indication for external drainage is an associated pancreatitis, and if this is present it is necessary to drain the common duct externally by rubber tube.

Patients who have had the gall bladder removed do not suffer any demonstrable disadvantage from its absence; in the case of calculous cholecystitis they are relieved of the double risk of the re-formation of stones and the persistence

of bile duct infection; in the case of cholecystitis without calculi they are relieved of a diverticulum which would in all probability prove the source of a recrudescence of their intoxication.

An operation field which permits a proper examination of the bile ducts is adequate for cholecystectomy. The operation may present considerable difficulties when the gall bladder is shrunken and lies embedded in adhesions—it is in this condition that its removal is most necessary if recurrent attacks of infection are to be avoided. Under other circumstances its removal is simple. The raw surface left can often be obliterated by suture, or sometimes an omental graft is useful for the purpose. If this is done, and the stump of the cystic duct touched with the cautery, a clean operation field is left in which adhesions are unlikely to form. The operation is altogether a cleaner performance than cholecystostomy in which the gall bladder is opened *in situ*, and some infection of the wound is difficult to avoid. If it is true that the gall bladder is of no particular functional value in the human subject, that it is the nidus of persistent infections in the biliary channels, that its removal is not a more serious operative risk than cholecystostomy, the argument for cholecystectomy as the normal operation in cholecystitis is overwhelming.

ASTHMA AND ANAPHYLAXIS.*

BY
FRANK COKE, F.R.C.S.

THE whole subject of anaphylaxis is of very recent origin; it is also very complex. It will therefore be well to have some general description of this strange phenomenon before passing to the claim that asthma be considered as a symptom of anaphylaxis or protein poisoning, and not otherwise a separate entity.

Charles Richet,¹ in 1902, injected a dog with a dose of poison derived from the tentacles of the actiniae and with no harmful effect whatever. Twenty-two days later he reinjected the dog with exactly the same dose, expecting to reach larger doses later and a condition of prophylaxis to the poison. To his surprise, hardly had he finished the injection when the animal became extremely ill and died in thirty-five minutes. This being the exact opposite of prophylaxis, he called it anaphylaxis.

Numerous experimenters in many countries have since investigated this question; detailed accounts may be found in the books of Richet,¹ Besredka² and Danysz.³

Apart from Richet's experiments, an explanation is found for many curious facts noted previously by Hyman⁴ and others, even by Magendie in 1839. It is found that any form of protein, serum, white of egg, milk, or cereal, has the power of rendering an animal sensitive to another dose of the same protein, which, when given, will instantly produce the anaphylactic syndrome—even to the point of death—in seconds. The next peculiar point is the absolutely specific nature of anaphylaxis. An animal sensitized with horse serum will not react to an injection of beef or any other serum except that from a horse. But no matter what kind of protein is used for the sensitizing and exciting dose, the anaphylaxis resulting is always the same.

The symptoms of anaphylaxis vary in the different animals. The typical picture, applicable even to man, appears as follows:

Provided a sensitizing dose has been given, and a sufficient incubation period of about ten days has elapsed, at the second

or exciting dose the animal is in trouble almost before the injection is finished. It becomes restless, scratches its muzzle as if irritated; the respiration is quickened, then difficult; vomiting takes place, especially in dogs; there is diarrhoea, with the passage of blood; micturition occurs; tetanic spasms and somersaults give place to paralysis and collapse; cessation of breathing brings death. There is marked eosinophilia and other blood changes.

There is at present no complete explanation of this remarkable syndrome. A diagram will serve to visualize the whole subject and to give a rough working explanation of many of the points in connexion with anaphylaxis.

The diamonds, A, B, C, D, represent varying quantities of antigen, horse serum, which are injected into the guinea-pig, E to F, below, such antigen being marked by horizontal lines. The body—that is, the blood and cells—is incapable of making use of this raw protein, or of eliminating it as such in the urine, nevertheless it disappears in the blood. Therefore it must undergo some change of a digestive nature inside the blood or cells. (There is no room for exceptions to rules in a short article.) The lower thin line, at F, denotes the potentiality of the blood to produce this internal digestive mechanism and, may be, this is in normal working order to deal with infinitesimal quantities

of undigested (by the bowel) proteins that pass through into the blood and cells from time to time or arrive there through the lungs. Under the stimulus of the protein injected (A), this mechanism (vertical lines) becomes active as it has never been before, and the protein disappears, G to H, until a time comes at the end of some ten days, H, when this digestion is finished and abruptly ceases. An excess of this digestive substance, J, then passes freely into the blood, whilst the further formation of

it sinks to normal, a mere potentiality, as shown by the thin line, K.

There is certainly a moment in the diagram, about H, possibly, too, in the real anaphylaxis it is meant to portray, when there must be antigen and antibody, protein and digestive substance, present together enough to cause a small anaphylaxis. It is at this moment when the serum rashes appear. Is this possibly their explanation?

The blood then contains the antibody or the toxogenin of Richet, the sensibilisin of Besredka, the precipitin of Friedberger, or more simply (here) a digestive substance. The animal is now sensitive. A further injection, B, of antigen horse serum meeting the antibody, J, in the correct proportion, and meeting it suddenly, will immediately cause the anaphylactic syndrome to take place, the large black bar, L. It is now apparent why no anaphylaxis occurs until the incubation period is over. If more antigen is injected during the incubation period, all that will occur is that the time when sensitization

*The substance of a lecture delivered to the Tunbridge Wells Division of the British Medical Association, November 25th, 1920.