to the fact that the animals were not permitted to live to the age for production of lung tumours or the animals employed were not sensitive to the development of lung tumours.

Animal experiment has not yet established the cause of lung cancer in the Schneeberg and Joachimsthal miners.

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RAPID DEATH IN BILE PERITONITIS

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Bile peritonitis following operations on the biliary tract is fortunately not a common condition in the experience of most surgeons. It is, however, of some considerable gravity, attended as it is by a mortality of from 30% (Ricketts, 1905) to 50% (Manson and Eginton, 1938). There are, of course, many other causes of bile peritonitis, and it may be of interest to recapitulate the classification given by James (1938): (1) rupture of an infected gall-bladder; (2) traumatic rupture of the biliary passages; (3) spontaneous rupture of a common bile-duct cyst; (4) leakage from unruptured but infected biliary passages, the so-called "biliary dew" of Leriche.

Our purpose here is to present a case of diffuse bile peritonitis following operation on the biliary passages in which the outstanding feature was the rapidity of death.

Case Report

A man aged 51 was admitted to Hammersmith Hospital with a history of having had cholecystectomy performed seven years previously, following which he was perfectly well for eighteen months. He was then suddenly stricken with a stabbing type of pain in the epigastrium which was of such severity that he had to be taken to hospital and kept under observation for four days, during which time he was very nauseated but did not vomit. There was no shivering and no jaundice, but the stools were pale and he suffered from chronic constipation. Thereafter he had many similar attacks, and just prior to admission the dyspepsia which was present before his original operation returned and he was losing some weight. The attacks kept him in bed for two or three days,

and between times he had to be very careful with his food, especially avoiding fats, fish, and condiments.

On examination the patient was a healthy-looking man who never smoked or drank alcohol; temperature and pulse were normal. There was a slight icteric tinge to the sclerae. The abdomen showed the old right supra-umbilical paramedian incision. There was an area of tenderness and rigidity beneath the ninth right costal cartilage. The liver was not enlarged. The examination was otherwise negative. Radiographs did not disclose any evidence of an opaque biliary calculus, and a barium meal revealed no abnormality.

Eight days after admission an exploration of the common bile duct was carried out by G.G.T. The abdomen was opened through the original incision, and by following the scarred area over the gall-bladder fossa the duct was identified without much difficulty. It was somewhat dilated, but not to any great extent, and would not, for instance, admit the tip of the little finger. There was no external evidence of inflammation, nor could calculi be palpated from outside. On incision the escaping bile did not look abnormal and was without odour; unfortunately it was not sent for bacteriological examination. Five small pigment calculi were removed from its lower end by means of the Desjardins forceps, but *in situ* these were stuck together, forming a single conglomerate concretion. No calculi were found in the hepatic ducts. The patency of the lower end of the common duct was established by passing a 9/12 Lister bougie through into the duodenum. With the intention of carrying out cholangiography during convalescence a No. 10 soft rubber catheter, with an additional hole cut in its side, was inserted into the common duct directed towards the duodenum, the incision in the duct being closed round about it by suture. The abdomen was closed in layers without further drainage. From the time the patient recovered from the anaesthetic he had more pain than usual, and twenty-four hours after operation he complained very much of colicky spasms on the right side of the abdomen. There was no vomiting and no distension, and the abdomen was soft on palpation. The pain increased in severity to the point where the patient cried out, and there was no relief from the passage of flatus. Under the influence of morphine he remained comfortable for twelve hours, and then awakened complaining of more severe pain in the upper right quadrant of the abdomen, which was extremely tender but soft. The tongue was moist and there was no vomiting. One ounce of mucus was aspirated from the stomach. The rectum was empty. The wound was dry and there was only a trace of bile from the tube. Nothing abnormal was found in the chest. The pulse rate was 140 and of poor volume, and the respiratory rate 40; the temperature was normal.

The patient rapidly passed into a state of profound shock. Two hours later some rigidity, together with extreme tenderness and dullness, developed in the flanks and intraperitoneal bile leakage was suspected. As a diagnostic procedure an exploratory needle was inserted in the left flank and 75 c.cm. of clear viscid bile removed. The shock was treated by appropriate measures, including blood transfusion. For three hours there was a good response, but while preparations were being completed for an operation to provide drainage the patient died.

It may be useful to recapitulate that the operation was concluded about midday on a Thursday. Except for the unexplained pain the condition was not considered unsatisfactory at midday on Friday. After that time deterioration was rapid, and by midnight the condition was one of profound shock. In spite of an apparent improvement death occurred about eight o'clock on Saturday morning. It was only possible to get permission to open up the abdominal incision, and that not until forty-eight hours after death. There was a low form of plastic peritonitis near the operation area. The pelvis and the left flank contained about a pint each of fluid which was mostly bile; it was slightly brownish rather than yellow, but without offensive odour. The liver was a dirty brown colour, crepitant and friable, and the cut surface looked like a sponge; the appearance suggested infection with a gas-forming organism, and this was confirmed on histological examination. There was no obvious gas in the peritoneum and no sign of gross infection in the wound.

The incision in the common bile duct did not appear to have given way, and the leakage was apparently from a very small space just above the tube. No further examination could be made.

Comment

There is considerable evidence in the literature to indicate that cases of bile peritonitis fall into two groups—those which develop a localized collection of bile shut off from the rest of the peritoneal cavity (Caulfield, 1936; Fifield, 1926), and those in which a diffuse peritonitis ensues (Verrall, 1897; Martin, 1898; Fifield, 1926). It is less easy to find data on the clinical course of post-operative bile leakage. It is apparent that the case we have presented falls into the second category. We have, however, been able to find two cases of post-operative extravasation of bile in which localization occurred. The first was observed by one of us (D. M. D.) while house-surgeon to Mr. C. A. Joll, by whose kind permission the case is quoted.

Cholecystectomy was performed in a woman aged 46 who had complained of attacks of abdominal pain and vomiting for two years. The gall-bladder contained numerous calculi and showed chronic inflammatory change. The patient had an uneventful convalescence except for slight abdominal distension and obstinate constipation. The drainage tube was removed on the tenth post-operative day and the patient was up and in a chair on the eleventh day. On the twelfth day she complained of some abdominal pain. In the evening she collapsed suddenly and was immediately put to bed and died in about fifteen minutes. It was thought likely that the case was one of pulmonary embolism, although no complaint of chest pain had been made. However, post-mortem examination performed by Dr. Charles Bryson did not reveal embolism or thrombosis in the pulmonary vessels. In the right subphrenic space elevating the diaphragm and compressing the lower lobe of the right lung there was a collection of bile which measured about four pints. It was walled off from the general peritoneal cavity by omental adhesions. There was no diffuse peritonitis. There were no other significant findings except for the fact that no bile was present in the duodenum. The course of the extravasated bile could not be determined with certainty because of the adhesions around the bile passages.

The second case followed cholecystostomy and choledochostomy, carried out in the patient's own home by G. G. T. in 1910. The patient was a woman aged 30 who had suffered from attacks of typical biliary colic for a year. The gall-bladder and biliary passages were exposed by a transverse Rutherford Morison incision. Calculi were removed from both the gall-bladder and the common duct and drains inserted. The latter were removed on the fourteenth post-operative day and the wound then healed rapidly. However, she subsequently suffered from vomiting and there was some haemorrhage from the wound. Gradually signs of peritonitis appeared, together with right shoulder-tip pain. When seen some six weeks after the operation the patient was gravely ill. The incision was quite healed, but there was a large fluctuant swelling in the upper abdomen with the characteristics of a collection of fluid in the lesser sac. With a minimum of anaesthetic the anterior end of the incision was opened up and a large quantity of bile at once escaped. After this the patient rapidly improved and drainage ceased in about a fortnight. Thirty years later she was reported to be in good health.

Cause of Death

There appear to be three theories as to the principal factor involved in a fatal outcome, but it is reasonable to suppose that none is mutually exclusive of the others in any given case.

1. The experimental work of Wangensteen (1926) led to the belief that death was due to cholaemia from absorption of bile salts from the extravasated bile.

2. The work of Harkins, Harmon, and Hudson (1936) and of Moon and Morgan (1936) suggests that death is

due to shock from loss of circulating blood volume into congested abdominal viscera.

3. Finally, the third theory, supported by the work of Rewbridge (1931) and Mentzer (1934), seems to indicate that death is caused by a bacterial peritonitis in every way comparable to that which develops in an untreated case of perforation of a peptic ulcer.

In the case we have presented there were many features which resembled shock. Thirty-six hours after the operation the extremities were cold, the pulse imperceptible, and the blood pressure low. Nevertheless the patient was quite conscious and was not aware of the gravity of his condition. The picture was therefore one of peripheral circulatory failure. Further, a definite though transitory improvement took place after blood transfusion.

The question arises whether a clinical picture of this kind could have been produced in such a short time by a bacterial peritonitis. It must be admitted that in the terminal stages of bacterial peritonitis a clinical picture somewhat resembling shock appears. Indeed, it has been suggested that the mechanism of death in both conditions is similar—namely, irreversible peripheral vascular failure (Moon, 1938). But that this should have appeared in thirty-six hours and be followed by a fatal outcome four hours later is unlikely. Further, the post-mortem findings were not those of a fulminating bacterial peritonitis.

It is not possible to say what part absorption of bile salts may have played, but in view of the two other cases cited, in which large collections of bile were present, and of similar cases referred to by Caulfield, we can be reasonably sure that the presence of large quantities of bile in the peritoneal cavity is at least not always incompatible with life, however serious it may be eventually.

So far as treatment is concerned there is agreement that immediate drainage is wise. The figures of Fifield (1926) are convincing. In a series of twenty-eight cases of bile peritonitis the mortality in the late cases which had already developed diffuse peritonitis was 66%, while in the early cases it was only 16.6%.

Summary

A case of post-operative bile peritonitis is presented in which the outstanding feature was the rapidity of death.

The various factors involved in the high mortality of the condition are discussed.

We are indebted to Dr. Allen Daley, principal medical officer of the L.C.C., for permission to report the case admitted to Hammersmith Hospital, and to Mr. C. Rapp, then house-surgeon, for the clinical notes.

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P. Privat (*Thèse de Paris*, 1940, No. 168) states that of the complications caused by beauty cures and cosmetic preparations the most serious are those due to hair dyes and decolouring agents. The largest number of cases of dermatitis are caused by tinctures containing aniline derivatives. The dermatitis is due to individual intolerance, and in every respect resembles the complications of chemotherapy. Prophylaxis consists in the application of a skin test made from twenty-four to forty-eight hours before the use of the tincture. The complications belong to the group of allergic affections whose pathogenesis is still obscure.