

TRAUMATIC RUPTURE OF THE BILE DUCTS

KENNETH M. LEWIS, M.D.

NEW YORK, N. Y.

RUPTURE of the bile ducts is an interesting and rare complication of traumatism of the right upper quadrant of the abdomen. Rudberg,¹ in 1921, reviewed the subject and collected 41 cases. Garrett,² in 1900, reported a case, and Walter Spencer,³ in 1898, also cited an instance. Since 1921, we have been able to find only six additional cases reported (Long,⁴ Anderson,⁵ Just,⁶ Leclerc,⁷ Wallace and Spiro,⁸ and Edington⁹). These six cases with the 41 collected, in 1921, by Rudberg, bring the total number of cases in the literature, to date, to 47.

Etiology.—The cause of rupture of the bile ducts is practically always a crushing trauma to the right upper quadrant of the abdomen in the region of the costal margin. Why the hepatic or common bile duct should be torn without any associated laceration in the liver, as is the situation in most of the cases reported, is difficult to understand. The explanation that seems logical is that the force is applied in such a direction as to crush the ducts between the liver and the bodies of the vertebrae at that level. The absence of fractures of the ribs or of injury to any of the hollow viscera in the abdomen is difficult to explain. In the case herewith reported, the trauma consisted of the patient's being crushed between two automobiles, and this cause was also noted in the case reported by Long.

Clinical Findings.—In most of the case histories reviewed, it has been noted that the patients were in rather profound shock at first, and complained of severe pain in the region of the liver. The shock was usually of rather short duration, and was recovered from within a few hours. At the end of from one to ten days, considerable increase in the size of the abdomen was noted, which in all cases was found to be due to fluid. Associated with this fluid accumulation in the abdomen, the patients developed increasing jaundice, clay-colored stools, bile in the urine, and in most instances a gradually rising temperature with a progressive toxemia. They usually appeared critically ill, and complained of profound exhaustion, which had rapidly increased in degree.

In our own case, we were somewhat confused by signs of consolidation at the base of the right lung, which developed 24 hours after the injury. Pneumonia has not been a frequent complication; and the diagnosis of rupture of the biliary ducts should readily be made if the cardinal signs of rapidly increasing fluid in the abdomen, jaundice and clay-colored stools are borne in mind. There can be no other intra-abdominal condition which can simulate these findings, but if a question of differential diagnosis does arise,

paracentesis will yield large quantities of pure bile from the peritoneal cavity. Fortunately, the bile remains uninfected, and whereas all of the abdominal organs become deeply bile stained, the finding of a real suppurative peritonitis has so far not been reported.

Treatment.—Exploratory celiotomy is, of course, primarily indicated, preferably through a right, upper rectus muscle-splitting incision. Upon opening the peritoneum, there is an escape of large quantities of pure bile from the peritoneal cavity, seven quarts being aspirated through the abdominal incision in our case.

Exploration of the right upper quadrant will show the tear if it is situated in the common or cystic ducts, but if in the hepatic duct, it frequently cannot be seen. The diagnosis in such a case may be made by the constant stream of bile which may be seen pouring down from the region of the hepatic duct, high up under the liver. In most of the cases operated upon, the primary treatment has usually been conservative, as the patients are usually profoundly ill and cannot withstand any extensive surgery. Simple drainage by means of a cigarette drain down to the site of the tear is to be recommended, without any attempt at suture repair, even in those cases where the tear is visible. Repair of a rupture of the hepatic duct is usually technically impossible due to its inaccessibility. Closure of the abdominal wound in layers, followed by adequate postoperative supportive measures, particularly the administration of large amounts of fluid, both by vein and hypodermoclysis, is indicated. If the patient has been operated upon before the toxemia has become too profound, recovery from the immediate condition usually ensues. There is a drainage of bile from the abdominal wound for a period varying from several weeks to several months. At the end of this time the tear in the bile duct usually heals spontaneously and the biliary fistula closes. A stenosis of the duct at the site of the tear may occur, which complication unfortunately occurred in our case. If the original tear and the subsequent stenosis are in the common duct, secondary operation with a cholecysto- or choledochoduodenostomy or a cholecysto- or choledochogastrostomy may be performed, but if the tear is situated high up in the hepatic duct, the relief of the ensuing jaundice due to the stenosis is a most difficult problem.

Case Report.—F. S., male, age 49, truckman by occupation, was admitted to the Fourth Surgical Division of Bellevue Hospital, July 30, 1931, with a history of having been crushed between two trucks shortly before admission. The trauma involved the right upper quadrant of the abdomen in the region of the costal margin. When first seen by the ambulance surgeon, the patient was in moderate shock, which had, however, subsided by the time he was admitted to the hospital, although considerable pain in the region of the right costal margin was complained of. He refused to stay in the hospital, and as immediate examination revealed no apparent serious injury, he was allowed to go home with the right side of the chest strapped with adhesive plaster. On August 1, 1931, two days later, the patient returned to the hospital, complaining that there had been a progressive increase in the pain in the right upper quadrant of the abdomen. He had developed a cough, vomited once, and his temperature was 101° F. He appeared acutely ill, was quite weak, and was in a profuse perspiration.

Physical Examination revealed a distended abdomen, with marked tenderness and rigidity in the right upper quadrant. Examination of the lungs disclosed dulness, bronchial breathing, and showers of fine crepitant râles at the right base. A diagnosis of right lower lobar pneumonia was made. The patient's temperature ranged between 101° and 104° F.; pulse, 100 to 130. The distention of the abdomen grew progressively more marked each day, which was thought at first to be the result of a paralytic ileus, consequent to the pneumonia. On the fourth day it was noted that there was a large amount of fluid in the abdomen. At this time the patient also first began to become jaundiced, and bile was found in the urine. Twenty-four hours later, or seven days after the injury, the jaundice had become very marked, the stools were clay-colored, the abdominal distention had increased tremendously, and the urine showed large quantities of bile. There was persistent localized tenderness over the right upper quadrant of the abdomen, and the pneumonia in the right chest showed signs of resolution. Diagnosis of rupture of one of the bile ducts was made.

Operation.—August 9, 1931, 11 days after the injury: The abdomen was opened through a right upper rectus incision, and was found to contain an enormous amount of free bile. About five quarts were aspirated, and it was estimated that another two quarts were lost in spillage. All the abdominal contents were deeply bile-stained. Exploration showed no tear in the liver, gallbladder, cystic or common ducts. A constant stream of bile was seen to be seeping from the region of one of the hepatic ducts, but the actual tear in the duct could not be identified. In view of the patient's poor condition, further exploration was deemed inadvisable. A cigarette drain was inserted into Morrison's pouch, and the wound closed in layers.

Postoperative Course.—Convalescence was somewhat stormy for the first few days. There was a profuse drainage of bile from the wound, which continued unabated for about ten days. The jaundice gradually disappeared, but the stools continued to be clay-colored. The bile gradually disappeared from the urine. On September 4, 1931, 27 days after the operation, the patient was discharged, with a small sinus still draining bile, and with the stools still clay-colored, but with the other symptoms having disappeared. One month later the sinus had healed, the discharge of bile had ceased, and normal color had returned to the stools. In November, 1931, two months later, the patient was again admitted to the hospital with a history that during the preceding month, he had become gradually more and more jaundiced and that the stools had again become very light in color. Icteric index at this time was 35; the urine showed a large amount of bile. It was felt at this time that the patient's original injury had been a laceration of the common hepatic duct, that the laceration had spontaneously healed, and that, unfortunately, the scar tissue healing had contracted down with a resulting stenosis. The patient was kept under observation in the hospital for one month, during which time repeated biliary drainages would produce a temporary flow of bile into the duodenum, but at no time did the jaundice entirely disappear. Further exploration of the abdomen was decided upon in an attempt to relieve the stenosis.

Second Operation.—January 16, 1932: A right upper rectus incision was made, excising the original scar. The gallbladder, duodenum, stomach and transverse colon were found matted together by extremely firm, dense adhesions. These were separated by both blunt and sharp dissection with great difficulty. The common bile duct was finally exposed, and was followed upwards beyond its junction with the cystic duct, into the sulcus in the liver. Scar tissue could then be felt in the common hepatic duct, high up under the liver, but it was impossible to expose the stricture so that it could be seen. In view of its inaccessibility, and the fact that any reconstruction operation would not be feasible, it was decided that it would be unwise to proceed further. The wound was closed in layers with a cigarette drain left in, in case there was any oozing which might take place from the raw surfaces.

Postoperative Course.—Five days postoperative, a duodenal fistula developed, probably as a result of necrosis where a ligature had been applied to the anterior duodenal

wall to control bleeding from an adhesion. This condition proved to be quite stubborn, but ultimately healed after a period of five weeks' continuous suction of the fistulous tract. The jaundice spontaneously subsided, and it had entirely disappeared by April, 1932. As a result of the infection of the wound from the duodenal fistula, a ventral hernia developed, which was repaired in May, 1933.

Follow-Up.—The patient has now been kept under observation for a period of over six years. Duodenal drainages are instituted once or twice a week, and if these are persisted in, the patient remains quite comfortable. There is always a residual jaundice which becomes intensified if the biliary drainages are allowed to lapse. Normal color returned to the stools shortly after the second operation. The biliary drainages always produce a good quantity of golden-yellow bile, but no concentrated green bile is ever found.

About once every six months the patient has an attack of severe pain in the right upper quadrant of the abdomen, associated with a sudden increase in the intensity of the jaundice and a lightening in the color of the stools. There is usually a rise in temperature to 102° or 103° F. These attacks are relieved by hypodermics of morphine sulphate grains one-quarter, plus an icecap to the gallbladder region, followed shortly thereafter by duodenal drainage. One would assume that on these occasions the bile may become somewhat inspissated at the site of the stricture, causing a sudden complete obstruction with back pressure on the hepatic radicals in the liver. The attacks are always over within a day or two and do not recur with any great frequency.

Further exploration of the abdomen in this case has been considered, but in view of the experience at the second operation at which the adhesions were found to be so dense and extensive, and because of the inaccessibility of the site of the stricture, together with the fact that the patient gets along fairly comfortably with the use of the biliary drainage twice a week, it has been decided to treat the case conservatively.

COMMENT.—In the case reported by Long,⁴ the patient, a white woman, age 40, was crushed between two automobiles; the right upper abdomen and the right lower chest receiving the brunt of the trauma. She was unconscious at the time of injury, but shortly thereafter rallied and remained in comparative comfort for five or six days, by which time, she had become jaundiced; the abdomen had become progressively enlarged; the patient was very weak; the urine contained bile; and the feces were clay-colored. Paracentesis recovered 4,500 cc. of thin bile. After several days' observation the patient was operated upon, at which time more than a gallon of bile was found in the abdomen, and a wound of the hepatic duct near its junction with the liver was identified. A drainage tube was inserted down to the site of the rupture and the gallbladder was also drained. One month after operation the drainage of bile from the wound had ceased; the jaundice had disappeared; and the stools were normal in color. She was discharged six weeks postoperatively, since which time she has remained entirely well.

Wallace and Spiro⁸ report the case of a male, age 47, who was crushed between two automobiles, suffering trauma to the right costal region. When first seen, he was in profound shock and complained of pain in the right hypochondriac region. On examination, there was external tenderness over the gallbladder area, and the right upper rectus muscle showed marked rigidity. Liver dullness was normal. A tentative diagnosis of "rupture of the liver" was made. The shock was treated and the patient rallied within a few hours. Twenty-four hours after admission, it was noted that he was slightly jaundiced, and this became progressively more marked from day to day. Two days after admission, bile was found in the urine. During the following 48 hours, the jaundice had become very intense, stools clay-colored, and the urine was deeply stained with bile. Nine days after admission it was noted that the abdomen showed some general distention, which was recognized as being due to an accumulation of fluid. By this time the patient's general condition was much worse; pulse rapid, tongue dry and coated, and he was growing rapidly very much weaker. Eleven days after the injury, the patient's abdomen was opened through an upper midline incision, and about three pints of bile were evacuated from the peritoneal cavity. At this point in the operation, the patient suddenly stopped breathing, and all means of artificial respiration were of no avail. An autopsy showed several small tears on the anterior surface of the liver, all of which were healing. There was a large rent in the anterior layer of the lesser omentum near the attachment of the transverse fissure and, by careful dissection, a tear in the hepatic duct, which would admit the blunt end of an ordinary lead pencil, was found. The edges of the hepatic duct were everted and there was some organization of the surrounding blood clot. Unfortunately there was no note made of the condition of the heart muscle, which would have been of considerable interest, as it has frequently been claimed that profound jaundice causes some degree of myocarditis.

Edington⁹ reports the case of a male, age 24, who, on September 16, 1931, was struck in the right upper quadrant of the abdomen by another man's head. The patient suffered a profound shock which

subsided rapidly within the course of a few days. Jaundice was notably shortly thereafter, together with pain in the lower abdomen. The jaundice gradually faded during the ensuing three weeks and the pain became much less. He returned to his occupation but found he was unable to work full time because of extreme weakness and lassitude; and at the end of the third week, it was noted that his abdomen was growing progressively larger. His stools by this time had become clay-colored. On the fourth day after resuming work, which was about three and one-half weeks after the accident, he felt a sudden snap as though something had given way in the epigastrium. From this time on, the enlargement of the abdomen progressed very rapidly. At examination, after this episode, the patient was found to be jaundiced, the abdomen was distended but the flanks were tympanic. A fluctuant mass could be felt in the epigastrium. The diagnosis of "collection of fluid in the lesser sac" was made. Operation on October 15, 1931, one month after the injury, disclosed a large collection of fluid walled off behind the omentum, probably in the lesser sac. This cyst-like collection contained a large amount of dark greenish, bile stained fluid. The edges of the cyst wall were marsupialized to the skin and the wound packed with iodoform gauze. A profuse and persistent discharge of bile followed the operation. The gauze pack was removed on the fifth day and the wound allowed to contract down to a fistula. Thirty-three days after the operation, bile was still discharging, and it was decided that a rupture of one of the bile ducts had occurred. The patient was reoperated upon and the fistulous tract, which led down to the region of the common duct, was dissected free and anastomosed to the anterior surface of the stomach. The wound healed by primary union, and from that time on the patient made an uneventful recovery. He was seen for the following nine months, during which time there was no recurrence of the symptoms and no evidence of stricture formation.

These reports could be continued, but they practically all show the same picture. The injury is always caused by crushing trauma to the right upper abdomen and the right lower chest. The patients are always in a marked degree of shock immediately after the accident, which, however, spontaneously subsides within a few hours and is followed by a period of relative freedom from symptoms except for localized pain for several days. Jaundice is usually the first secondary sign to appear, and is noted usually within the first three days. Bile in the urine also appears at about this time. Within the next week the stools have usually become clay-colored, and there is a progressive and marked increase in the size of the abdomen, which on physical examination is found to be caused by an accumulation of fluid. By the end of the first week or ten days, the patient shows progressive loss of strength with a rapidly rising pulse, marked exhaustion and a moderate elevation of temperature. This picture, once seen, cannot be forgotten, and is pathognomonic of a laceration of one of the bile ducts. If there is any doubt, a paracentesis will disclose free bile present in the peritoneal cavity.

Treatment should consist of early celiotomy, before the patient has become too weak; evacuation of the bile; and simple drainage down to the site of the lacerated bile duct. Practically all of these lacerations heal spontaneously without necessity for repair, and in only a few instances have permanent strictures developed.

REFERENCES

- ¹ Rudberg, H.: Traumatic Rupture of Common Bile Duct. *München. med. Wchnschr.*, **68**, 1650-1651, 1921.
- ² Garrett, Richard W.: Traumatic Rupture of Bile Duct. *ANNALS OF SURGERY*, **31**, 227-234, 1900.
- ³ Spencer, Walter: A Case of Rupture of the Common Bile Duct. *London, Lancet*, **1**, 100-101, January 8, 1898.
- ⁴ Long, LeRoy: Traumatic Rupture of the Bile Ducts. *Southern Med. Jour.*, **22**, 236-239, March, 1929.

- ⁵ Anderson, L.: Contusion Injuries of Biliary Apparatus. Stockholm, Acta Chir. Scandinav., **59**, 380-414, 1925.
- ⁶ Just, E.: Case of Subcutaneous Total Rupture of Choledochus. Berlin, Arch. f. klin. Chir., **140**, 518-527, 1926.
- ⁷ Leclerc, G.: Rupture Traumatique des Voies Billiaires: Choleperitoine Localize; Intervention; Guerison. Bull. et Mem. Soc. Nat. de Chir., pour 1926.
- ⁸ Wallace, S. A., and Spiro, A.: Traumatic Rupture of the Hepatic Duct. Brit. Jour. Surg., **13**, 582, January, 1926.
- ⁹ Edington, G. H.: Traumatic Rupture of Bile Ducts: Drained: Cholefistulogastrostomy. Brit. Jour. Surg., **20**, 679, April, 1933.