# Stone in the Left Hepatic Duct Causing Jaundice *

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THE OCCURRENCE of stones in the hepatic bile ducts in association with multiple stones in the common bile duct is of reasonable frequency, but the finding of a single stone in a hepatic duct is unusual. The study by Norman [1] of a series of 919 patients upon whom operative cholangiography had been performed revealed 46 patients who had stones in the hepatic ducts, verified by operative removal; in three of these patients there was but a single stone. It has been suggested by Norman and by others before him that the symptoms of biliary tract dysfunction which may follow choledocholithotomy could be, on occasion, due to an overlooked residual intrahepatic duct stone. The occurrence of jaundice in association with such a single stone in a hepatic duct was not mentioned by Norman, nor have the authors been able to find a reference to such. The literature on biliary tract calculi is voluminous, however, and the authors of this report make no claim of having achieved a complete review.

In 1950, one of us (E. S. S.) was called to see and treat a patient with mild jaundice. Following the removal of a single stone from the left hepatic duct the jaundice cleared and has not recurred. At the time of the operation it seemed most surprising that obstruction of the left hepatic duct caused jaundice, but no other explanation was brought forth. A similar experience during the past year has led to this report.

## Case Reports

**Case 1.**** **J. M.**, #547244, a white married female aged 70, entered the Johns Hopkins Hospital August 15, 1950, complaining of stomach trouble of 5 months duration. Her family was notable for longevity; her own past health had been generally excellent save for acute appendicitis at the age of 31, treated by appendectomy. During the past 2 years, however, she was thought to have symptoms of cardiac insufficiency, including exertional dyspnea, and had been taking digitalis daily. She did not use tobacco nor imbibe alcoholic beverages. Her two daughters were living and well.

The symptoms of her present illness included a gnawing sensation in the upper right abdomen, anorexia, and loss of 25 pounds in 5 months. During the 2 weeks prior to admission she had felt nauseated and had vomited a few times. She had noted that her stools were light in color, while the urine seemed dark. Her daughters considered her eyes to be "a little yellow."

On admission the patient was thought to be sallow but jaundice was not noted clinically. All of her teeth were absent save for 6 in the lower jaw. The blood pressure was 190/100, the heart was enlarged to the left, and a to-and-fro diastolic and systolic murmur was described. The abdomen was flat. No fluid wave was found. Resistance to pressure was noticed over the right upper abdomen, with slight tenderness, and the liver dullness extended down to the umbilicus. The preliminary clinical diagnosis was carcinoma of the pancreas.

Numerous laboratory examinations were made; the significant findings included a sedimentation rate of 27 (corrected), icterus index of 25, serum bilirubin of 2.3 mgm.%, and alkaline phosphatase of 18 units. The cephalin flocculation test was negative and the thymol turbidity was measured at 1.2 units. There was retention of 3.3 mgm.% of bromsulfalein in 30 minutes. The S.T.S. was

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** Referred by Dr. Alan Bernstein.

FIG. 1. (Left) Case 1. Calcified hepatic duct stone.

FIG. 2. (Right) Case 2. Operative cholangiogram; the left hepatic ductal system is not visualized.

negative. Radiologic studies revealed a calcific nodule in the right upper abdomen (Fig. 1), thought to be either in gallbladder or kidney.

At operation (E. S. S.) on August 21, 1950, the stomach, duodenum, gallbladder and pancreas appeared to be normal. The liver was moderately enlarged but its appearance was not of diagnostic significance. An enlarged lymph node above the duodenum and a small piece of liver were removed for study; these were reported at once as not showing carcinoma. The common duct was opened and a probe could be passed readily downwards through the ampulla into the duodenum and upwards into the right hepatic duct; the probe, however, could not be passed into the left hepatic duct. A hard, calcified stone, somewhat under one cm. in greatest diameter, was found and removed; it was imbedded in the wall of the duct so that a defect resulted from its removal. A small caliber T-tube was placed in the common duct so that one arm extended up the left hepatic duct beyond the defect. No attempt was made to close the defect in the hepatic duct.

The postoperative course was uncomplicated. Cholangiograms (dye introduced through the T-tube) made 8 days after operation were read as showing a normal appearance of the hepatic and common bile ducts. The serum bilirubin fell to 1.2 mgm.%, and subsenquently to normal levels. The patient was discharged 13 days after operation, the T-tube having been removed previously. The wound was healed.

The patient has been seen repeatedly since this operation. She underwent left radical mastectomy for carcinoma on February 19, 1953. On November 17, 1956, cholecystectomy was necessitated by an attack of acute cholecystitis. The gallbladder contained one large stone which was certainly not present in 1950. On this occasion the icterus index was but 6. The patient is well at the present time.

**Case 2.** R. deS., #435957, a white widow aged 75, was admitted to the Johns Hopkins Hospital August 28, 1956, with the complaint of epigastric pain of several days duration. She, too, came of stock notable for longevity. Her only illness in the past, other than emotional instability, had been an attack of gallbladder disease. This was treated in the same hospital in 1932; a partial cholecystectomy was carried out, with removal of multiple stones.

Six weeks before admision she began complaining of right upper abdominal pain. A considerable weight loss was noted. Shortly before entering the hospital the pain had been more severe and she had vomited a few times.

On entering the hospital the patient was febrile ($102^R$), and was thought to be jaundiced. The liver was felt just below the costal margin and

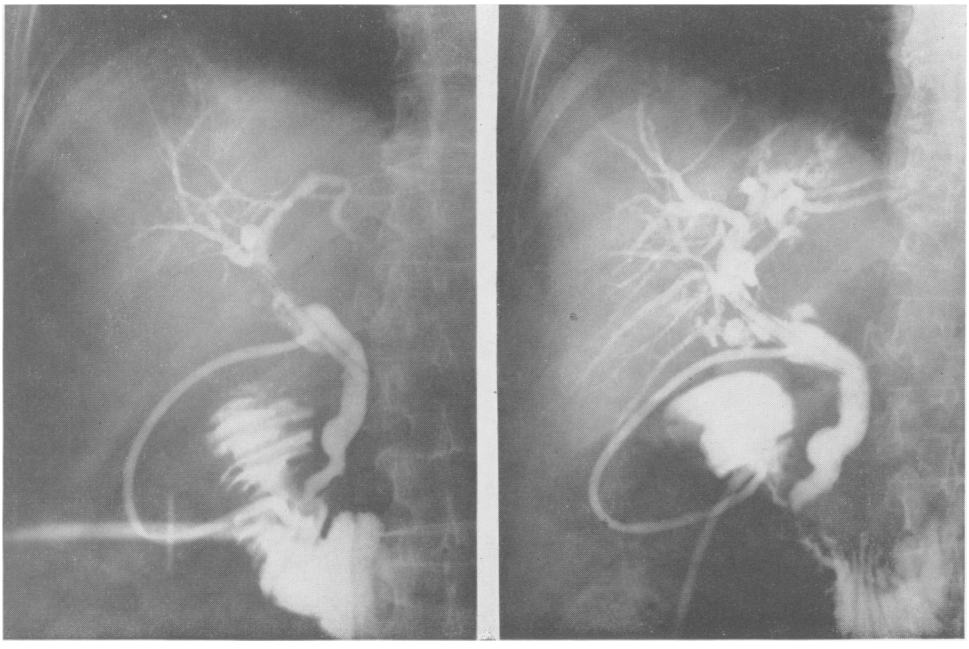

FIG. 3. (Left) Case 2. Operative cholangiogram after removal of left hepatic duct stones.

FIG. 4. (Right) Case 2. Postoperative control cholangiogram. The ductal system now appears normal.

was slightly tender. Despite evidence of widespread arteriosclerosis the blood pressure was only 120/76. Those examining the patient believed that there was evidence of a failing heart, so digitoxin was given. The preliminary clinical diagnosis was recurrent acute cholecystitis and choledocholithiasis.

Laboratory test results included a serum bilirubin of 2.2 mgm.%, alkaline phosphatase of 24.6 Bodansky units and normal cephalin flocculation and thymol turbidity. An intravenous cholangiogram was interpreted as demonstrating a normal common duct.

After digitalization and a period of rest the patient seemed to improve and the jaundice cleared. Operation was undertaken (J. P. I.) on September 15, 1956. It was apparent that the original cholecystectomy was more complete than had been thought. A supraduodenal lymph node was removed, but on frozen section no carcinoma was seen. Because of the scarring from the previous operation the operator opened the duodenum, exposing the ampulla, in order to insert a probe into the common duct for purposes of identification. Bile flowed freely out of the ampulla; probes and a catheter were readily passed but no stones found. The common duct was then opened and cholangiograms made. These indicated no visualization of the left hepatic duct (Fig. 2). The duct was explored with forceps and three 8 mm. stones were found tightly wedged in the intrahepatic duct. A second cholangiogram now showed complete filling of the ductal system (Fig. 3). A T-tube was placed in the common duct; the duodenum and the abdominal wound were closed.

The patient did well after operation at first. Cholangiograms (per T-tube) indicated a patent biliary tract without residual calculi (Fig. 4). After several days of improvement the patient became apathetic. The maintenance of adequate nutrition posed a problem; finally the patient was tube-fed. Twenty days after operation the patient suddenly went into shock, following which acute abdominal signs appeared. Exploration a few hours later revealed infarction of the entire right colon. The patient died later on the same day. At autopsy a large pituitary adenoma was discovered, suggesting that the patient probably had suffered from hypopituitarism in addition to her other ailments.

It has been long established that the liver possesses considerable reserves of function. Total left lobectomy in man is not regularly followed by jaundice. How then could jaundice have been caused in the two patients here reported? One may assume that the reserve power of the liver to clear bilirubin from the blood was not

adequate to the task when the left lobe was obstructed. There were no indications of increased blood destruction in these two individuals, nor any evidence of infectious hepatitis. However, in each case there were certain similarities. Both women were aged, both had mild heart failure, and in both there was calculous obstruction of the left hepatic duct. It is probably significant that the jaundice in the second patient was observed to clear following digitalization and several days of rest, prior to removal of the obstructing stones. It may be reasonable to conclude, therefore, that obstruction of the left hepatic duct in an aged individual with reduced hepatic reserve due to mild cardiac insufficiency can produce a moderate degree of jaundice.

That a stone in the hepatic duct can and does cause other clinical symptoms is also apparent. Both patients had right upper abdominal pain, anorexia, weight loss, nausea, and vomiting. These symptoms are not pathognomonic, but it would seem that their occurrence in patients without other significant symptoms or signs should lead to a surgical exploration which includes operative cholangiography when the surgeon does not find an obvious cause of the patient's symptoms.

It is not the purpose of this report to discuss the technical details of operative cholangiography nor to generalize upon the indications for or the value of that diagnostic procedure. Of interest, however, is the obvious fact that a certain number of hitherto unsuspected intrahepatic duct stones are thus discovered. In a series of 100 operative cholangiographies studied by one of us (J. P. I.), one instance (Case 2) of single hepatic duct stone was discovered.

## Summary

The case histories of two patients who had calculous obstruction of the left hepatic duct accompanied by mild jaundice are reported. Both of these patients were old and had evidences of heart failure. Operative cholangiography was useful in discovering the obstruction in the second case. The hypothesis is advanced that jaundice occurred in these two patients because the functional reserve power of the liver suffered a double impairment from blockage of the left hepatic duct and heart failure.

## Reference

1. Norman, O.: The Hepatic Ducts in Cholangiography, Acta Radiol., Suppl., **84**; 1951.

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### Discussion

Dr. Harry J. Warthen: I welcome this opportunity to say a few words about Dr. Stafford's excellent paper. In the first place, it is a subject of considerable general interest to me, and in the second place, I understand that I did the first operation on one of these patients, in 1932.

Dr. Stafford raises the question as to why jaundice should occur with obstruction of only one hepatic duct. I think the factors he mentioned are certainly the major ones, that is, the general condition of the patient, the obstruction to the left hepatic duct, and also the cardiac status of the patient. There may be one other consideration in the second case. This patient had a temperature of 102° on admission, so it may well be that inasmuch as this patient had the major degree of jaundice there may have been an associated cholangiitis which involved both radicles and may have caused some blockage in both lobes of the liver.

I think that operative cholangiography offers more in the case of stones in the hepatic ducts than in any other condition in the biliary tree. As a rule the surgeon can identify stones distal to the point that the T-tube has been inserted in the common duct. But those stones proximal may easily be overlooked unless cholangiogram has been done.

Dr. George Crile, Jr.: With the permission of Dr. Stafford I am going to make a little twist to his title of "Stone in the Left Hepatic Duct" to "Stones Left in the Hepatic Duct," because having practiced routine cholangiography for many years