

THE RADIOLOGICAL DIAGNOSIS OF THE BLOCKED GALL-BLADDER

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A stone lodged in the cystic duct or in Hartmann's pouch blocking the cystic duct is a serious hazard to the patient. In the more fortunate, the gall-bladder fibroses and atrophies but the liability of an obstructed viscus to infection makes the threat of an empyema of the gall-bladder a real one. A chronically obstructed gall-bladder may present with the symptoms of chronic cholecystitis but the acutely obstructed type may present in its more dramatic form as an acute abdomen.

It is perhaps not sufficiently appreciated how valuable radiography can be in the diagnosis of obstructions of the cystic duct in both the acute and chronic phase. The purpose of this communication is to record its use in 9 such cases.

METHOD

Until the advent of intravenous cholangiographic media, the diagnosis of a 'non-functioning gall-bladder' featured commonly in radiological reports. Multiple-dose technique and other means of fortifying the radiographic shadow helped to lessen the frequency of this diagnosis to some extent but, even so, quite a considerable proportion of such cases were unsolved.

Intravenous cholangiography with biligrafin or biligrafin forte has proved of inestimable value in demonstrating the biliary passages, and in many cases of obstructed cystic ducts the actual site of obstruction in the duct can be seen. It must not, however, be accepted that failure of the dye to enter the gall-bladder up to 2 hours after injection necessarily indicates obstruction of the cystic duct; in one of our cases a demonstrable gall-bladder only became visible 6 hours after injection of the dye. After this lapse of time, if no dye has entered the gall-bladder it may be assumed that the cystic duct is obstructed; it is our practice to continue filming the patient up to this time before accepting the diagnosis of an obstructed gall-bladder. Whilst this time-delay may be accepted in the chronic case, in the acute case all efforts must be made to obtain a diagnosis within 2 hours.

In the acutely obstructed gall-bladder the clinical differentiation from a leaking duodenal ulcer or other acute upper abdominal condition may be difficult. In such cases an injection of 20 c.c. of biligrafin forte may enable an obstructed cystic duct to be demonstrated within 2 hours. One of us,¹ and others,^{2,3} have drawn attention to the value of this method in the differential diagnosis of the acute abdomen. Equally, its negative value must not be overlooked; in as short a period as 30 minutes a normal duct system and early filling of the gall-bladder indicate that gross pathological changes in these structures can be excluded.

Stone formation is not necessarily the cause of obstruction in these cases. In two cases operation showed obstruction of the cystic duct by thick pus and associated oedema of the mucosa; in the other cases mechanical obstruction of the cystic duct by a stone was found.

Radiology

The appearances seen on intravenous cholangiography depend on two factors, viz. (a) the anatomy of the cystic

duct, especially its length, and (b) the site of obstruction in the duct.

With a relatively short cystic duct and a stone lodged in the duct, all that is visualized is the hepatic and common bile-duct. No shadow of the cystic duct is seen.

When the cystic duct is normal in length the dye enters the cystic duct and the site of obstruction can be shown as a crescentic shadow at the end of the dye-filled column.

When the obstruction is caused by a stone lodged in the neck of the gall-bladder (Hartmann's pouch) the dye enters this portion of the gall-bladder and a well-marked filling defect is noted (Fig. 1). If, however, the cystic duct is

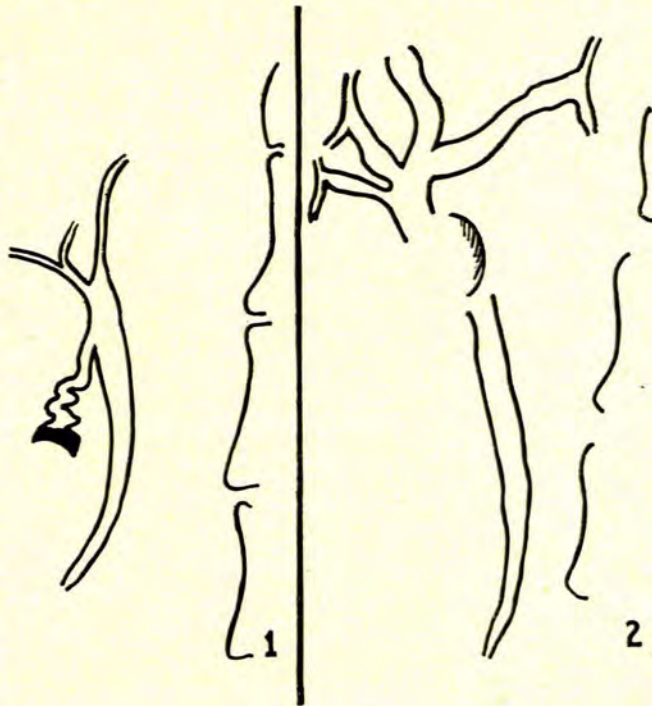


Fig. 1. Line drawing traced from X-ray negative demonstrating obstruction of the gall-bladder in Hartmann's pouch. The crescentic ending of the dye-filled duct is shown. *Reduced.*

Fig. 2. Line drawing traced from X-ray negative demonstrating obstruction of the duct by a stone lodged in Hartmann's pouch and compressing the common hepatic duct, causing dilatation of the intra-hepatic radicals. The stone is outlined by the contrast medium. *Reduced.*

abnormally short the stone lodged in Hartmann's pouch may actually impinge on the hepatic duct and produce well-marked dilatation of the intra-hepatic branches proximal to the site of lodgment of the stone (Fig. 2). Such a feature is not necessarily associated with clinical evidence of obstruction of the common bile-duct.

CASE REPORTS

Case 1

A young married woman, aged 25 years, who complained of an attack of epigastric pain which lasted about 3 days before the examination. A further attack 24 hours later was followed later

again by another attack. The pain was severe and associated with nausea and vomiting but no fever. There was no alteration in the colour of the stools or urine, but there was elevation of temperature and the pulse rate was 82 per minute. Guarding and tenderness was elicited in the right upper abdomen. The clinical diagnosis was acute cholecystitis.

Cholangiography. The liver functioned normally, with normal filling of the hepatic and common ducts. The gall-bladder did not fill, indicating an obstruction of the cystic duct, which was partly visualized as far as the site of obstruction.

Operative findings: Acute cholecystitis with stone in the cystic duct.

Case 2

An elderly woman, aged 70 years, who complained of pain in the right hypochondrium of 2 weeks' duration. Pain came on in attacks lasting a few hours and was associated with vomiting on occasions. She showed no fat dyspepsia and gave no history of jaundice or alteration in colour of stool.

Oral cholecystogram revealed failure of the gall-bladder to concentrate the dye. Cholangiogram revealed good excretion of contrast medium by the liver. A calcified opacity in the right hypochondrium had the appearances of a stone lodged in the cystic duct. There was no filling of the gall-bladder up to 1 hour. The common hepatic and common bile-ducts were dilated. Numerous radiolucent stones were present in the lower end of the common bile-duct.

Operative findings: Chronic cholecystitis with numerous stones in the gall-bladder and common bile-duct.

Case 3

A woman, aged 35 years, who complained of acute epigastric pain radiating to the right hypochondrium of 12 hours' duration. The pain had not been associated with any pyrexia but she had suffered one attack of vomiting. She had noticed dyspepsia after eating fats.

A cholangiogram revealed normal excretion of dye by the liver. The common hepatic duct and common bile-duct were of normal calibre. The cystic duct was normal. No opacification of the gall-bladder was obtained up to 2 hours.

Operative findings: Multiple calculi with a large calculus lodged in Hartmann's pouch.

Case 4

A man, aged 44 years, who complained of belching and wind associated with constant headaches. He also complained of a constant tender spot over the back. The attacks of abdominal pain had been accompanied by vomiting for the last 12 years. He had been relieved by lying on his back. There was no history of jaundice. The present attack started on the previous day and pain still persisted; it was not relieved by posture.

A cholangiogram revealed good excretion by the liver. The common and hepatic ducts were of normal width. Some excretion occurred through the kidneys. Films up to 1 hour revealed no filling of the gall-bladder.

Operative findings: Cystic duct obstructed by inspissated pus and oedema; calibre about 1/32 inch. Gall-bladder thickened and fibrosed.

Case 5

A middle-aged man, who complained of pain in the right hypochondrium for 1 week. Pain had been persistent; associated with vomiting. He had no pain in the back. No antecedent history of dyspepsia was obtained. He had no urinary symptoms. He had suffered from a similar pain 10 years before, for which a normal appendix had been removed under the mistaken diagnosis of appendicitis.

A cholecystogram revealed no opaque calculi. A single dose of oral contrast medium revealed no concentration of contrast medium. *A cholangiogram* (20 c.c. of biligradin forte) showed that the liver excreted the dye normally. The common hepatic duct and common bile-duct were normal in size. There was no filling of the gall-bladder up to 3 hours.

Operative findings: Empyema of the gall-bladder. Stone in the cystic duct. Several further stones in the gall-bladder.

Case 6

A young woman, aged 27 years, who complained of upper abdominal pain for 24 hours, associated with vomiting; the vomitus was bile-stained. Pain progressively worse and later

became constant. No response to pethidine. Previous 6 years' history of epigastric pain. Barium-meal examination of the gastro-intestinal tract 1 year previously had proved negative.

A cholangiogram revealed normal excretion of the contrast medium by the liver. The hepatic and common ducts were of normal calibre. No filling of the cystic duct was noted. The gall-bladder did not fill up to 6 hours.

Operative findings: Acute cholecystitis with 4 large stones in the gall-bladder. One stone lodged in Hartmann's pouch, obstructing the neck of the gall-bladder.

Case 7

A clergyman, aged 55 years, who suffered from an attack of severe abdominal pain localized to the right hypochondrium, unassociated with fever or jaundice. The attack subsided with expectant treatment, but 1 week later, whilst on a holiday visit, symptoms recurred and he suffered from severe colicky pain in the right hypochondrium. On physical examination the patient was found to be relatively well, with no pulse or temperature disturbances.

An intravenous cholangiogram showed that the hepatic duct and common bile-duct filled out normally, but no shadow of the gall-bladder could be seen up to 4 hours.

Operative findings: A large distended gall-bladder was found, with a single cholesterol stone lodged in Hartmann's pouch. The gall-bladder was filled with pus.

Case 8

A housewife, aged 42 years, who complained of attacks of upper abdominal pain starting about 18 months before. Self-induced vomiting relieved the symptoms. A marked fat intolerance was present and fatty foods precipitated the attacks. The present attack was of 6 days' duration and the patient had suffered from constant pain since that time. The temperature and pulse rate were normal.

Cholangiogram. The liver excreted the dye normally and good filling of the common hepatic duct and common bile-duct was noted in the 30-minute film. The gall-bladder did not fill with dye up to 6 hours but no cystic duct stump could be seen throughout the examination.

Operative findings. A grossly thickened and distended gall-bladder was found, with a solitary cholesterol stone in Hartmann's pouch. The common bile-duct was distended but aspiration showed a clear golden bile. The common duct was opened and drained but no stones were found.

Case 9

A woman, aged 45 years, who complained of nagging pain in both right and left hypochondrial regions for several months. In the month preceding the examination she had complained of two attacks of right hypochondrial pain lasting some hours. The attacks had not been associated with pyrexia or jaundice. During the months preceding the examination her appetite had been good, but she had noted some fat dyspepsia.

Cholangiogram. The contrast medium was excreted normally by the liver, and the hepatic and cystic ducts and common bile-duct were normal in calibre. A crescentic shadow was seen in the right hypochondrium, which was considered to represent a small quantity of dye in Hartmann's pouch. A faint suggestion of an oval filling defect impinging on the contrast medium in Hartmann's pouch was noticed, indicating a stone in Hartmann's pouch. No dye entered the gall-bladder up to 5 hours.

Operative findings: Empyema of the gall-bladder with two large gall-stones, one of which was impacted in Hartmann's pouch.

DISCUSSION

In the investigation of upper abdominal pain of possible gall-bladder origin a definite routine is followed. Excluding the case which presents with acute symptoms, oral cholecystography is first performed as a routine survey. This method is used because intravenous cholangiography does not give information about the concentrating power of the gall-bladder. The filling of the gall-bladder appears to be a passive phenomenon and no detectable increase in the shadow of the dye in the gall-bladder is seen to suggest that concentration of the dye occurs.

If the oral cholecystogram fails to demonstrate a gall-bladder shadow intravenous cholangiography is immediately performed. Anatomical lesions in the biliary tree and in the cystic duct are immediately detected by this method. In some cases of cholecystitis the excretion of the contrast medium by the liver is delayed and the shadows of the extra-hepatic biliary tree are not visualized for 1 hour after injection.

It has been our practice to continue the examination up to 6 hours after the injection, because in some instances a visible gall-bladder shadow has only been noted at this time. Furthermore, a failure of the gall-bladder to be visualized by the intravenous method does not necessarily mean that the gall-bladder is completely obstructed; one such case with an apparently completely obstructed gall-bladder was found 6 months later to have a normally functioning gall-bladder.

In the acute case the examination has not been carried out for as long as 6 hours, but in these cases, where the patient's condition warrants it, it is better to continue the examination up to this time before accepting the diagnosis of an obstructed gall-bladder.

In acute cholecystitis without obstruction by stone it is possible for intravenous dye to outline the gall-bladder,

but it must be admitted that in such cases, even without a stone lodged in Hartmann's pouch or the cystic duct, the extent of inflammatory oedema is such as to render it virtually an obstructed gall-bladder.

SUMMARY

1. Intravenous cholangiography provides a method of detecting obstructions in the cystic duct.

2. Its value in the differential diagnosis of gall-bladder lesions in the acute abdomen is emphasized.

3. In the acute abdomen failure of the gall-bladder to fill when the liver excretes the dye normally into a normal duct system implies gall-bladder and cystic-duct disease. In the acute case, however, it must be admitted that the obstruction in the cystic duct is not necessarily due to stones; it may be caused by pus, inflammatory exudate, or even oedema of the mucosa of the cystic duct.

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