Gastrointest Radiol 8:249–253 (1983)

Gastrointestinal Radiology

Radiology of the Mirizzi Syndrome: Diagnostic Importance of the Transhepatic Cholangiogram

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Abstract. The essential feature of the Mirizzi syndrome is partial common hepatic duct obstruction due to an impacted cystic duct stone. This entity has rarely been reported but is apparently more common than previously thought. Our review of the world literature shows 42 proven cases in 18 publications from 7 different countries. We are adding 11 further cases with surgical proof.

The preoperative x-ray diagnosis of the Mirizzi syndrome was established in 10 of the 42 previously reported cases. This diagnostic problem was probably due to limitations of plain film and intravenous cholangiography techniques. The preoperative diagnosis was possible in 8 of our 11 cases, primarily with the use of transhepatic cholangiography. The preoperative diagnosis is important and can lead to a decrease in surgical complications, particularly if stone penetration, fistula formation, and adjacent inflammatory masses are demonstrated.

Key words: Biliary tract, calculi – Mirizzi syndrome.

The abnormality underlying the Mirizzi syndrome consists usually of a large impacted gallstone in the neck of the gallbladder or in the cystic duct (Fig. 1). This may result in partial mechanical obstruction of the common hepatic duct by the stone or from the associated inflammation. Intermittent cholangitis and jaundice are usually associated. Fistula formation may result from erosion of the impacted stone. Dietrich [1] and Koehler et al. [2] have reviewed the history of the Mirizzi syndrome which was originally described in 1948 [3].

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Radiologic Investigation

A large gallstone impacted in the neck of the gallbladder or in the cystic duct may be calcified and laminated, thereby detectable on plain film radiography. If a large single stone is noted close to the porta hepatis, the presence of the Mirizzi syndrome can be suspected, particularly if the patient has symptoms of intermittent cholangitis or jaundice. However, there have been no reports of a preoperative diagnosis from plain radiographs alone.

Oral cholecystography has nothing to add to the investigation of patients with suspected Mirizzi syndrome, particularly if the stone obstructs the cystic duct or if jaundice is present. The deviation and narrowing of the common hepatic duct will not be apparent by this method.

Intravenous cholangiography has been successful in some cases for the preoperative diagnosis, particularly if tomography is added to this technique. The large stone in immediate proximity to the common hepatic duct with deviation of this structure should suggest the diagnosis (Fig. 2). However, if jaundice is present, intravenous cholangiography is contraindicated and will be unsuccessful. Clemett and Lowman first demonstrated the lateral pressure defect from the cystic duct stone on the common hepatic duct by this technique [4]. Dilatation of the duct proximal to the narrowed common hepatic duct was noted. It has been stated that a similar curved impression on the common hepatic duct may be noted due to metastatic tumor in the porta hepatis [5]. We do not believe that intravenous cholangiography is any longer of practical use in the roentgenographic diagnosis of the Mirizzi syndrome.

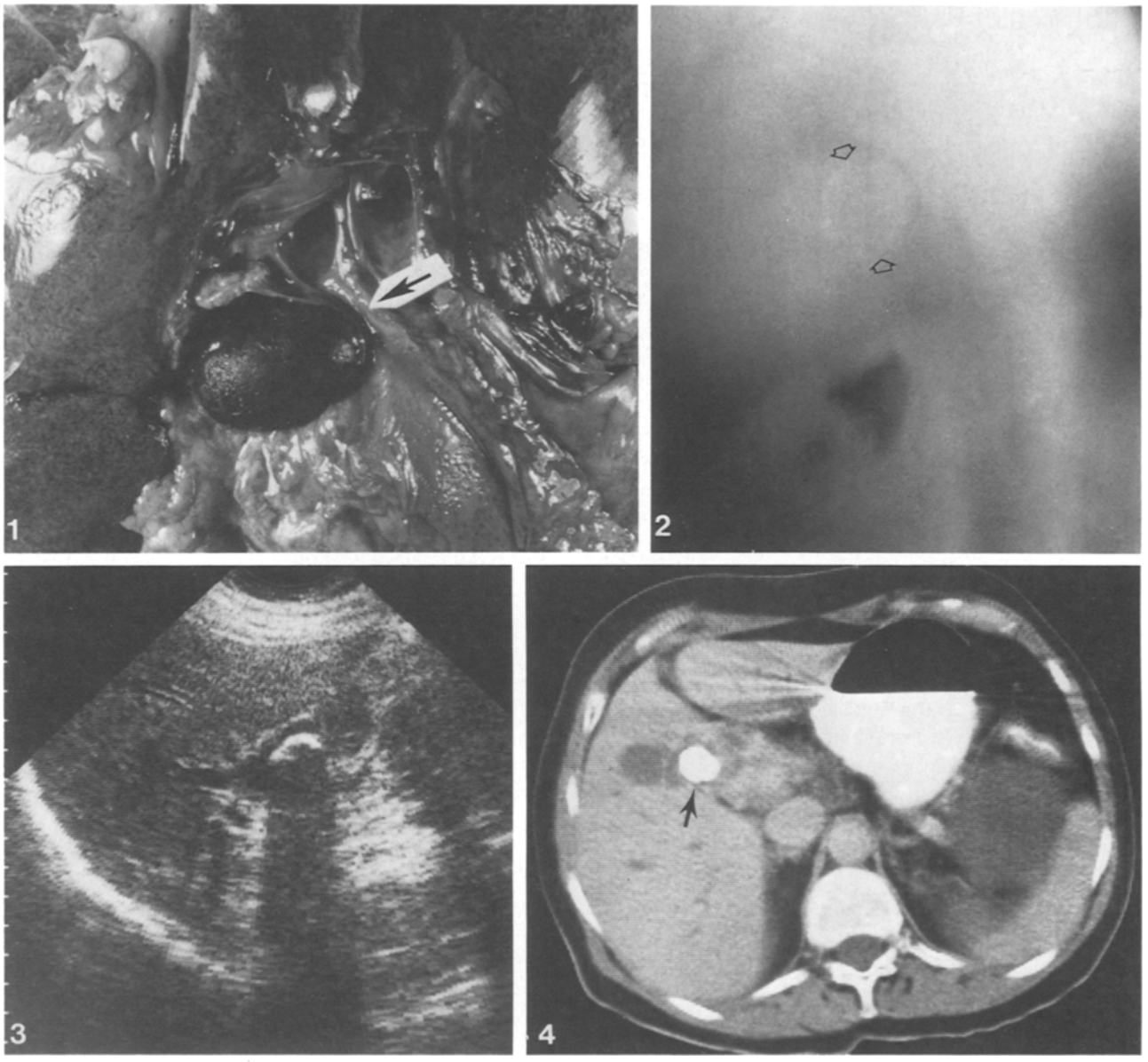


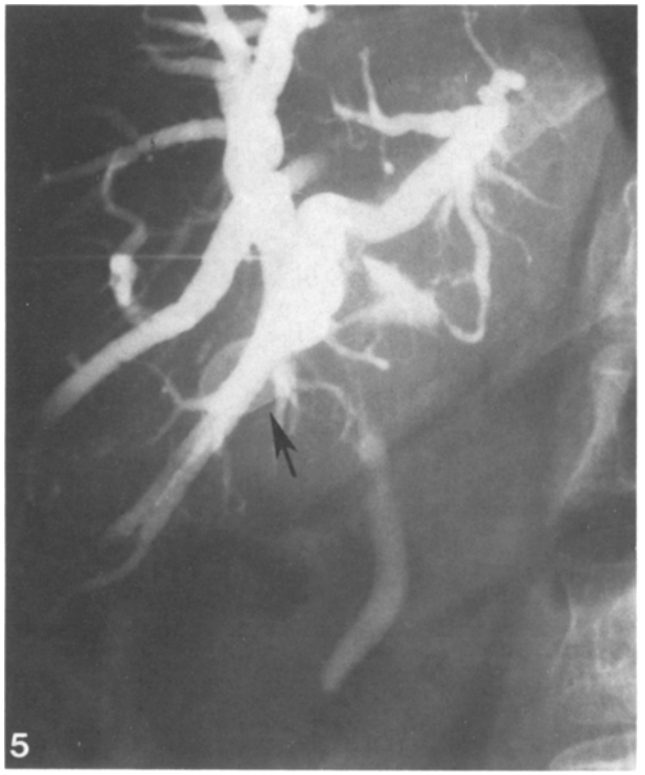
Fig. 1. Post mortem specimen demonstrating the characteristic findings in the Mirizzi syndrome: a 4.5-cm large gallstone impacted in the gallbladder neck and compressing the common hepatic duct (*arrow*)

Fig. 2. Calcified gallstone (*arrows*) dividing the common hepatic duct medially on intravenous cholangiography in the patient with characteristic findings of the Mirizzi syndrome at surgery

Fig. 3. Longitudinal scan during real-time ultrasonography at the level of the porta hepatis shows a dilated common hepatic duct. Just inferiorly to it is a large impacted gallstone with acoustic shadowing in another patient with confirmed Mirizzi syndrome

Fig. 4. CT of the abdomen demonstrating a calcified stone (*arrow*) in the neck of a small gallbladder with an adjacent inflammatory mass in the porta hepatis. Moderate dilatation of intrahepatic biliary radicals was present in this patient with Mirizzi syndrome

Ultrasonography, a more recent radiologic imaging technique, is most useful as the initial methodology in investigating patients with suspected Mirizzi syndrome. A large gallstone in a high position, the narrowing or deviation of the common hepatic duct, and the dilatation of bile ducts proximal to it can be demonstrated (Fig. 3). Features of the Mirizzi syndrome as seen on ultrasound examination were first described by Dewbury in 1969 [6].



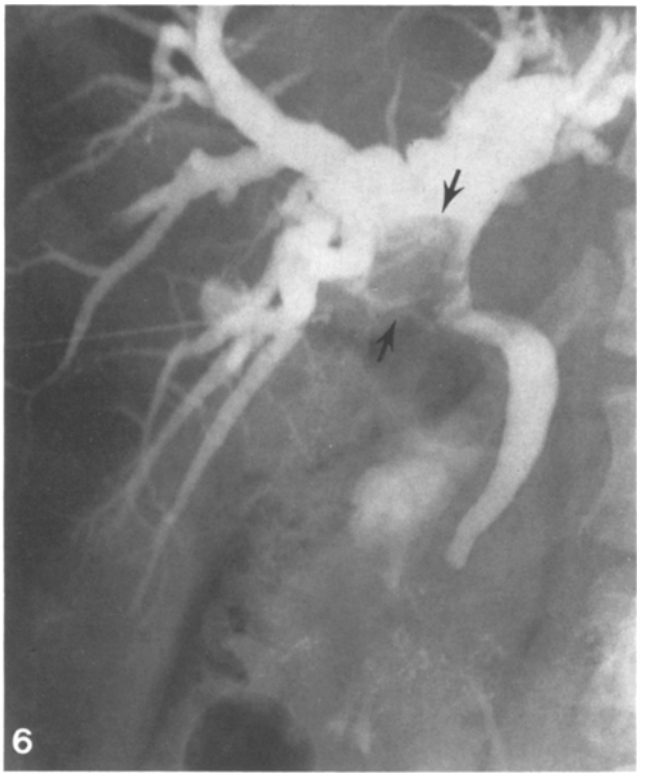


Fig. 5. Transhepatic cholangiography shows dilated intrahepatic duct system and pronounced narrowing of the common hepatic duct by a calcified impacted gallstone (*arrow*). This permitted the correct preoperative diagnosis of the Mirizzi syndrome

Fig. 6. Filling defect in the common hepatic duct seen on transhepatic cholangiography is due to a large gallstone penetrating from the cystic duct (*arrows*). This patient with the Mirizzi syndrome was jaundiced and demonstrated a fistula from the neck of the gallbladder to the common hepatic duct at surgery

In 2 of our 11 patients, sufficiently characteristic findings on ultrasonography permitted a preoperative diagnosis, but both patients underwent transhepatic cholangiography for confirmation. We believe that real-time ultrasonography is the method of choice for investigation. The large gallstone in a high position can be differentiated from other masses of noncalculous origin.

Computed tomography will show calcification in the large gallstone to better advantage than plain film radiography (Fig. 4). CT, however, is rarely indicated if ultrasonography raises suspicions of the Mirizzi syndrome, because the definitive next step of investigation would be transhepatic cholangiography. If the position of the large stone and its relation to the common hepatic duct are not clear by ultrasonography, CT may then be of help for better anatomic evaluation.

Transhepatic cholangiography, in our opinion, is the radiologic method of choice for the preoperative diagnosis of the Mirizzi syndrome. It will clearly show the partial obstruction of the common hepatic duct (Fig. 5). It will also demonstrate if the gallstone is eroding into the duct system and whether or not fistula formation has already occurred (Fig. 6). Transhepatic cholangiography permitted definitive preoperative diagnosis of the Mirizzi syndrome in 8 of our 11 patients. The preoperative diagnosis was established in 1 patient from intravenous cholangiography and the diagnosis was missed in the 2 remaining patients.

Transhepatic cholangiography not only permits preoperative diagnosis of the Mirizzi syndrome, but also outlines the anatomy, aiding the surgical approach and reducing operative complications.

If transhepatic cholangiography is unsuccessful, endoscopic retrograde cholangiography (ERCP) should be undertaken, although it will be less likely to delineate abnormalities above the common hepatic duct compression.

Discussion

The Mirizzi syndrome is considered to be a rare occurrence. Our review of the literature showed

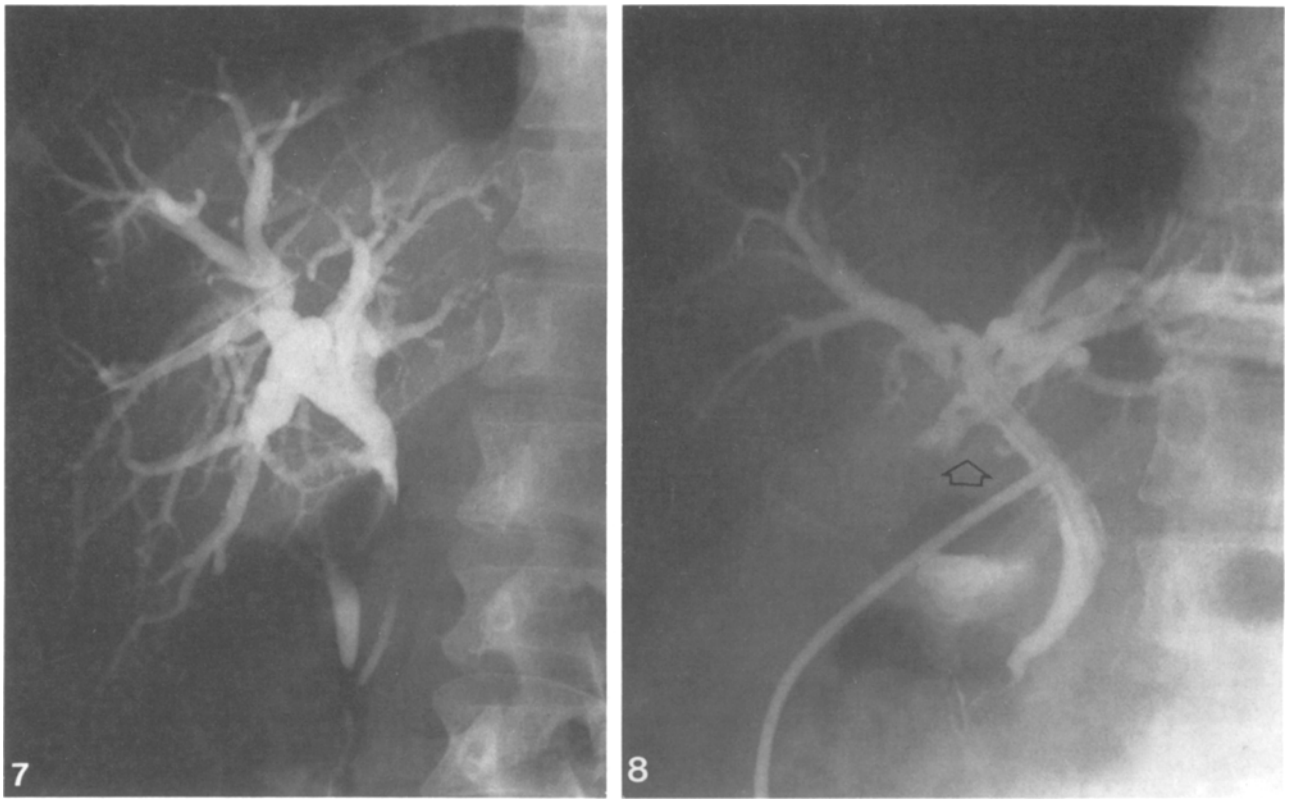


Fig. 7. Diagnostic transhepatic cholangiogram in a patient with the Mirizzi syndrome. The compression defect on the extrahepatic duct is located more inferiorly than usually seen, due to a low insertion of the cystic duct.

Fig. 8. Postoperative T-tube cholangiogram in a patient with Mirizzi syndrome and plastic repair of a fistula from the gallbladder neck to the common hepatic duct. The proximal portion of the fistula has not been closed and is filling with contrast media (*arrow*)

42 proven cases in publications from 7 different countries [1–18]. The preoperative radiologic diagnosis was rendered in only 6 of 42 cases, primarily with the use of intravenous cholangiography. Now that transhepatic cholangiography is more widely used, the preoperative diagnosis should be possible in most instances. Cornud and his collaborators in 1981 were the first to point out the advantages of transhepatic cholangiography [7]. In our opinion, ultrasonography is the initial radiographic modality of choice, to be followed by transhepatic cholangiography for definitive preoperative diagnosis.

It has been postulated that an anomalous and more parallel course of cystic duct to the common hepatic duct is one of the criteria for development of the Mirizzi syndrome [1]. This appears unlikely to us since almost all cystic ducts run parallel to the common hepatic duct in their distal segment. The cystic duct is usually in a common sheath with the common hepatic duct at this point. The cystic duct entrance into the extrahepatic ducts may be high or low. This variation explains why most patients with the Mirizzi syndrome show a high external impression on the common hepatic duct, but partial obstruction more distally due to a cystic duct stone may also occur (Fig. 7).

The radiologist must be familiar with the salient features of the Mirizzi syndrome as seen on various imaging techniques. If the radiologist is aware of this entity, we believe that the preoperative diagnosis of the Mirizzi syndrome will be more commonly made. We also believe that the Mirizzi syndrome is not as rare as previously thought.

It is certainly more difficult at the time of operation to make the diagnosis of the Mirizzi syndrome, particularly if fistula formation or massive adhesive changes are present, making exploration difficult. Intraoperative cholangiography before common duct exploration is then indicated. If the preoperative diagnosis of the Mirizzi syndrome is known to the surgeon, this should significantly shorten and facilitate operative correction. If the stone has penetrated or has caused a fistula in the

duct system, stone removal is more easily accomplished and the fistula is then patched with a segment of the shrunken gallbladder. This plastic surgical correction usually does not eliminate the entire fistulous tract and it may remain visible on postoperative studies. If radiologists are not familiar with the occurrence, they can misinterpret the persistence of a fistula (Fig. 8).

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Received: August 2, 1982; accepted: October 8, 1982