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# The strategy for Mirizzi syndrome type II with laparoscopic surgery: A case report

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## ABSTRACT

**INTRODUCTION:** Mirizzi syndrome is an unusual condition involving gallstones. Laparotomy is recommended for the treatment of Mirizzi syndrome type II due to the risk of biliary duct injury. We herein report tips for performing laparoscopic surgery for Mirizzi syndrome type II as a treatment option.

**PRESENTATION OF CASE:** A 72-year-old woman was admitted to our hospital due to abdominal pain and a fever. The diagnosis of Mirizzi syndrome type II was made. Therefore, an endoscopic retrograde biliary drainage tube was placed, and laparoscopic surgery was performed. During the operation, the gallbladder wall was excised at the Hartmann's pouch, and a gallstone was extracted. A fistula between the gallbladder and bile duct was confirmed, and the diagnosis of Mirizzi syndrome type II was made. Partial resection of the gallbladder was performed, and the neck of the gallbladder was sutured. The postoperative course was uneventful.

**DISCUSSION:** The preoperative diagnosis is important for Mirizzi syndrome, and the combination of various modalities, including endoscopic retrograde cholangiopancreatography, can increase the diagnostic rate. It is often difficult to recognize the anatomy during surgery for Mirizzi syndrome due to severe inflammation. Therefore, it is best to dissect the gallbladder from the bottom, perform excision at the Hartmann's pouch, remove the gallstone and suture the gallbladder wall. Replacement of the biliary tube can aid in recognizing the anatomy and bile duct.

**CONCLUSION:** Laparoscopic surgery for Mirizzi syndrome is a viable treatment option following an accurate preoperative diagnosis and the recognition of the anatomy during the operation.

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## 1. Introduction

Mirizzi syndrome is a condition that causes inflammation to the common bile duct due to an impacted gallstone in the neck of the gallbladder or cystic duct. It occurs in about 1 %–2 % of patients with cholelithiasis [1,2]. Although there are many classifications of Mirizzi syndrome, the Csendes classification is the most commonly used globally.

According to the Csendes classification [3], Mirizzi syndrome is classified into five types. Type I is characterized by the compression of the common bile duct due to stones of the gallbladder neck or cystic duct, and types II–IV are characterized by fistula formation in the gallbladder and common bile duct, with the detailed classification depending on the circumference rate of the fistula. Due to the risk of biliary duct injury and in case of the need for choledochojunostomy, open surgery is usually recommended for types II–IV [4–6]. However, with advances in laparoscopic surgery, including

technique and devices, laparoscopic surgery for Mirizzi syndrome type II has been successfully performed recently [7,8].

Treatment for Mirizzi syndrome type II is still controversial. We therefore report a case that was successfully treated with laparoscopic surgery and describe the utility of laparoscopic surgery for Mirizzi syndrome type II, along with the presentation of treatment strategies.

This work has been reported in line with the SCARE criteria [9].

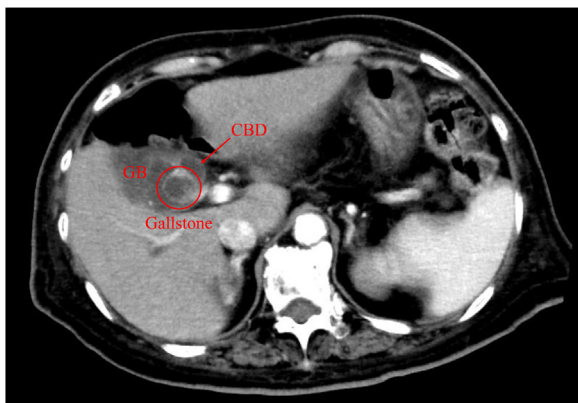
## 2. Presentation of case

A 72-year-old woman was admitted to our hospital with a high fever and abdominal pain. The patient has a history of mental retardation.

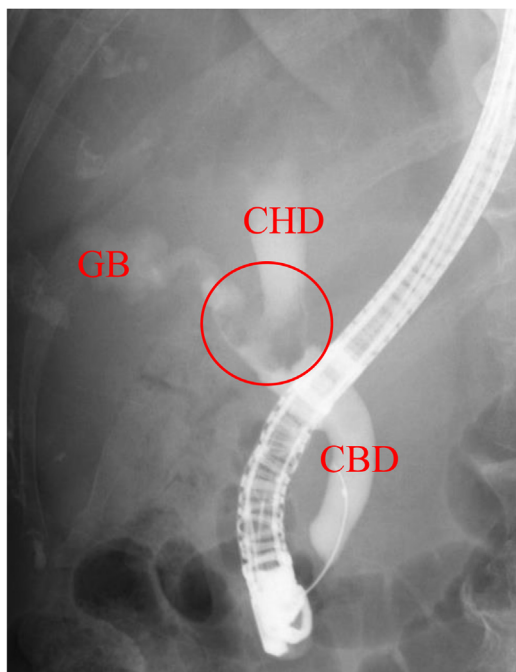
Blood tests showed elevated inflammatory findings (white blood cells:  $6.7 \times 10^3 /\mu\text{L}$ , C-reactive protein: 22.48 mg/dL) and hyperbilirubinemia (total bilirubin: 9.4 mg/dL, direct reacting bilirubin: 7.5 mg/dL). Abdominal computed tomography (CT) revealed a gallstone that had eroded into the common bile duct. The gallbladder wall was enlarged and thickened, and the common bile duct was dilated (Fig. 1). Magnetic resonance

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**Fig. 1.** Abdominal computed tomography showed a gallbladder stone compressing the common bile duct. CBD: common bile duct, GB: gallbladder.

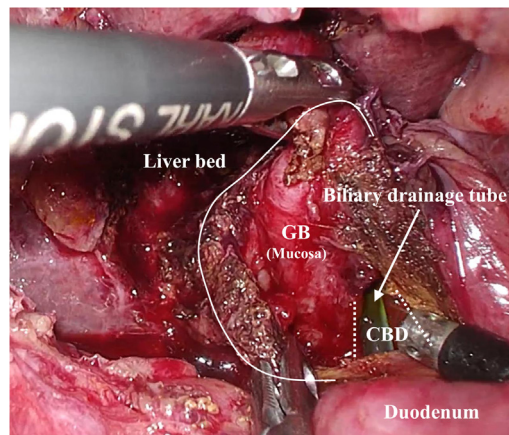


**Fig. 2.** Endoscopic retrograde cholangiopancreatography showed a defect at the confluence of the bile duct. CBD: common bile duct, GB: gallbladder, CHD: common hepatic duct.

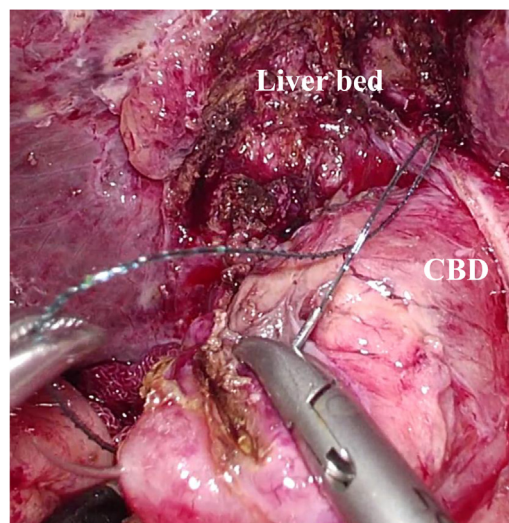
cholangiopancreatography (MRCP) and endoscopic retrograde cholangiopancreatography (ERCP) depicted a round-shaped defect at the common bile duct. Based on the imaging findings, Mirrizi syndrome type II and obstructive jaundice due to the gallstone were diagnosed.

An endoscopic retrograde biliary drainage (ERBD) tube was inserted (Fig. 2), and antibiotics were given. After the improvement of jaundice and cholangitis, surgery was performed. The operation was initially started with four ports. However, due to the severe inflammation and in order to maintain a good operative field, an additional port was needed. The greater omentum was adherent to the gallbladder. The gallbladder neck had strong inflammation and was difficult to dissect, so the fundus of the gallbladder was gradually dissected from the liver. After isolation of the gallbladder, the anterior wall of the gallbladder was longitudinally incised at the body and then excised at the Hartmann's pouch. The stone was then removed.

Observation of the gallbladder lumen revealed Type II Mirrizi syndrome, and the ERBD tube in the common bile duct was con-



**Fig. 3.** The endoscopic retrograde biliary drainage tube was seen in the common bile duct after removal of the stones. CBD: common bile duct, GB: gallbladder.



**Fig. 4.** Subtotal cholecystectomy was performed, and the wall of the gallbladder was sutured. CBD: common bile duct.

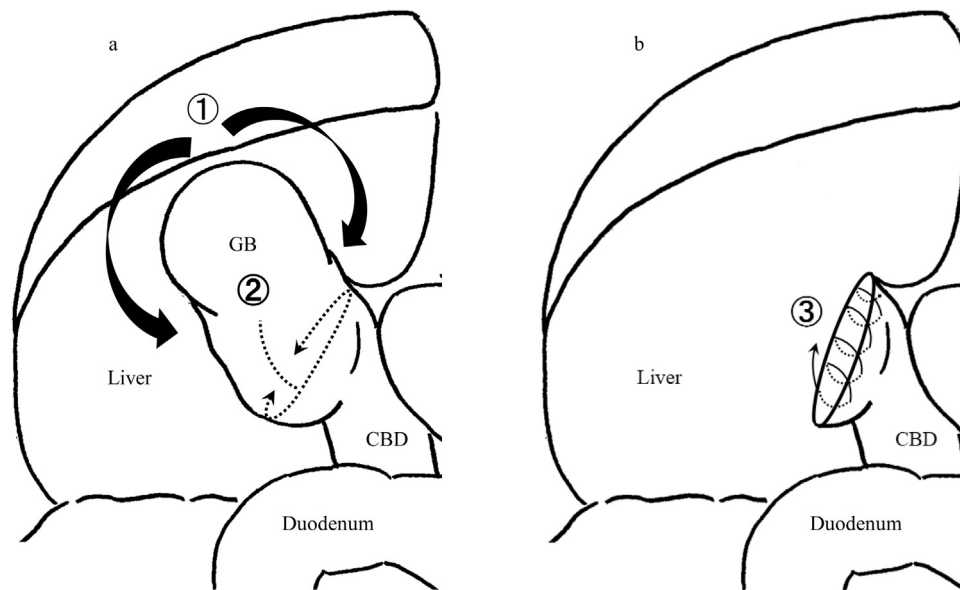
firmed (Fig. 3). The gallbladder wall was cut off at the neck of the gallbladder, and subtotal cholecystectomy was performed. To avoid injuring the common hepatic and bile duct, the gallbladder wall at the Hartmann's pouch was sutured using a barbed V-Loc™ absorbable wound closure device (Fig. 4). The operation time was 3 h and 20 min, and blood loss was slight.

The postoperative course was uneventful. The patient was discharged from the hospital on the 11th day after surgery. ERCP performed 48 days after the operation revealed good passage with a normal caliber of the bile duct. The ERBD was therefore removed.

### 3. Discussion

Mirrizi syndrome, proposed by Pablo Milli in 1948, is a condition in which choledochitis is caused by excretion of the common bile duct due to stones in the gallbladder neck and cystic duct [10]. According to the Csendes classification of Mirrizi syndrome, types II-IV are defined as fistulae formed in the gallbladder and common bile duct. Our case showed a common bile duct circumference corresponding to  $\leq 1/3$  of the usual circumference, so the diagnosis of Mirrizi syndrome type II was made.

The preoperative diagnosis of Mirrizi syndrome is very important in order to avoid bile duct injury. Indeed, previous reports showed that the rate of intraoperative bile duct injury in patients



**Fig. 5.** Schematic illustration of the operative procedure. a: 1. Dissection of the gallbladder fundus first from the liver. 2. The gallbladder body was incised longitudinally, and the gallbladder was excised at the Hartmann's pouch. b: 3. Short-axis sutures at the gallbladder neck.

with Mirizzi syndrome who could not be diagnosed preoperatively reached 17 % [11]. Modalities for making the preoperative diagnosis include ultrasound, CT, MRCP and ERCP. The diagnosis rate for Mirizzi syndrome is reported to be 0%–50% by ultrasound, 25%–31% by CT, 50%–63% by MRCP and 58%–76.2% by ERCP [6,12,13]. By combining modalities, the preoperative diagnosis rate of Mirizzi syndrome can range from 29.6%–85.9% [6,14–16]. ERCP has a high preoperative diagnostic rate, but it can cause serious complications, such as pancreatitis and perforation of the bile duct or duodenum. If stenosis of the bile duct is suspected, ERCP should be performed and an ENBD placed in order to avoid bile duct injury during the operation. In the present case, because of the patient's history of mental retardation, an ERBD was placed to avoid self-extraction of the ENBD tube. ERBD tube replacement may thus be useful as a landmark of the common bile duct during surgery. If the ENBD tube could be easily replaced, intraoperative cholangiography would be more helpful for obtaining information on the passage of the bile duct and bile leakage [17].

The most serious complication associated with laparoscopic cholecystectomy in Mirizzi syndrome is bile duct injury. Bile duct injury sometimes requires choledocho-jejunostomy and results in an impaired quality of life. In Mirizzi syndrome, it is often difficult to recognize the boundary between the gallbladder and common bile duct due to severe inflammation. Therefore, it is important to dissect the gallbladder fundus first from the liver and following excision of the gallbladder at the neck. Understanding the anatomy might be difficult due to inflammation and thickening of the gallbladder wall. Thus, the incision of the gallbladder wall should be placed as far from the gallbladder neck as possible in order to avoid injuring the common bile duct (Fig. 5a). After making the incision, removal of the impacted gallstones and confirmation of the fistula status can be performed. If an ENBD or ERBD tube is placed, it is easy to recognize the common bile duct. When subtotally removing the gallbladder, the gallbladder should be separated with a small amount left in order to obtain seam allowance, and short-axis sutures should be placed so as not to cause stricture of the common bile duct (Fig. 5b). Regarding Mirizzi syndrome type II, recent reports have shown the successful completion of laparoscopic surgery, including partial resection and choledochoplasty [12,17]. The surgical procedure should be determined based on the proficiency in laparoscopic surgery of each facility.

#### 4. Conclusion

We experienced a case of laparoscopic treatment for Mirizzi syndrome type II. Laparoscopic surgery may be considered depending on the details of the case and the facility's proficiency in performing laparoscopic surgery.

#### Declaration of competing interest

The authors declare that they have no competing interests.

#### Funding

None.

#### Ethical approval

This case report is not a research study, so this approval is not applicable in this case report

#### Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the editor-in-Chief of this journal on request.

#### Author contribution

All of the authors helped diagnose and treat the patient. Hirofumi Sato and Masatsugu Hiraki helped draft the manuscript. Atsushi Miyosi and Toshiya Tanaka edited the manuscript. Toshiya Tanaka and Kenji Kitahara supervised and made the final approval of the manuscript. All authors read and approved the final manuscript.

#### Registration of research studies

This case report is not a research study.  
Name of the registry:

Unique identifying number or registration ID:

Hyperlink to your specific registration (must be publicly accessible and will be checked):

#### Guarantor

Dr. Kenji Kitahara.

#### Provenance and peer review

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