Case Report

Laparoscopic therapy for Mirizzi syndrome: A case report with review of literature

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ABSTRACT

Mirizzi syndrome (MS) is a rare entity and is due to extrinsic biliary compression. It is a rare complication of cholecystitis and chronic cholelithiasis. The impacted calculi at the infundibulum of the gall bladder or cystic duct lead to compression of the adjacent biliary structures, resulting in total or subtotal obstruction of the common hepatic duct (CHD). This leads to liver dysfunction. We, herein, present one such case of a 50-year-old female patient who was diagnosed to have MS. During surgery, at laparoscopy, she was unexpectedly also found to have a cholecysto-duodenal fistula. Both conditions were successfully treated laparoscopically.

Key words: Cholecystobiliary fistula, Cholecysto-duodenal fistula, Extrinsic biliary compression, Impacted calculus, Laparoscopy, Mirrizzi's syndrome

Mirizzi syndrome (MS) was first described in 1948 as a repeated inflammation of the gallbladder due to an impacted gallstone in the cystic duct or Hartmann's pouch, which may cause intermittent or persistent mechanical obstruction in the common bile duct (CBD) [1]. It was first described by Pablo Mirizzi, who first described it as a benign condition in which a stone in the cystic duct or in the Hartmann's pouch impinges on the CBD, leading to mechanical obstruction by the stone itself or by secondary inflammation. Pathophysiologically, the impacted stone causes an inflammatory process, secondarily leading to a pressure ulcer. This can cause first external compression of the bile duct and eventually erode into the bile duct, evolving into a cholecysto-choledocal fistula (CCF) with different degrees of communication between the gallbladder and bile duct. The rationale for reporting this case is the inherent rarity of this condition and to underscore the feasibility of its total laparoscopic therapy.

CASE REPORT

A 50-year-old female presented with complaint of abdominal pain for the last 5 days. The pain was acute colicky in nature, in the right hypochondriac region, and was typically precipitated by the ingestion of food. She first reported it to her family general practitioner. He started her on anti-spasmodic medicine (Tablet Buscopan), which caused temporary symptomatic improvement but no lasting relief. Thereafter, he referred her to the surgery outpatient department (OPD).

On presentation, her blood pressure was 110/50 mmHg, her pulse was 92 beats/min, and she was febrile (37.7°C). She had mild icterus but no external lymphadenopathy. A per abdomen examination revealed severe tenderness in the right hypochondriac region and a positive Murphy's sign.

Laboratory investigation revealed deranged liver function tests (total bilirubin: 3.6 mg/dL, alkaline phosphatase: 200 IU/L, serum glutamic-oxaloacetic transaminase: 68 U/L, serum glutamic pyruvic transaminase: 66 U/L). Her white blood cell count was 12,500 WBCs/high power field. Abdominal ultrasonography (USG) revealed multiple calculi in the gall bladder (GB) lumen, with the largest measuring 11.5 mm, which was impacted at the neck of the GB. Also, the GB wall was thickened. Magnetic resonance cholangiopancreatography (MRCP) showed a large calculus impacted at the neck of the gallbladder, along with multiple smaller calculi within the lumen of the GB. There were no calculi in the CBD. It also reported an extrinsic compression of the CBD by the distended GB. She was taken up for laparoscopic cholecystectomy.

At laparoscopy, she was incidentally found to additionally have a cholecysto-duodenal fistula (CDF) as well (Fig. 1a). She then first underwent a transection of the CDF (Fig. 1b) and suture

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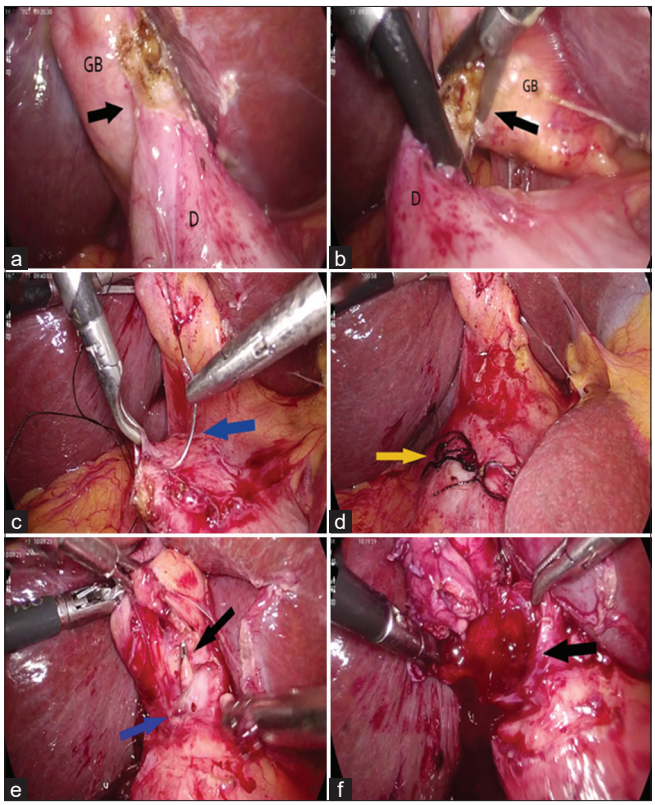

Figure 1: (a) Cholecysto-duodenal fistula (black arrow) noted after initial dissection, (b) C-D fistula being divided (black arrow), (c) Duodenal defect being suture closed (blue arrow), (d) Completed duodenal suture line (yellow arrow), (e) Cholecysto-choledochal fistula (black arrow) being carefully hydro-dissected (blue arrow), (f) Opening of Hartmann's pouch (black arrow) during dissection

closure of the duodenal opening (Fig. 1c and d). Gentle attempts were then made using hydro-dissection to separate the merged Hartman's pouch from the CBD (Fig. 1e). However, these did not yield any results. The Hartman's pouch was then opened, and the culprit impacted stone was delivered out (Figs. 1f, 2a and b). The Hartman's pouch was then oversewn and sutured closed using 3-0 PDS (Fig. 2c and d). The duodenal suture line was further buttressed by an omental overlay patch suture fixed into place by using the long ends of the duodenal sutures (Fig. 3a). The cholecystectomy was then completed (Fig. 3b). A 32 French tube drain was kept *in situ* in Morrison's pouch (Fig. 3c). She had a smooth initial post-operative recovery. She was kept nil by mouth for 3 days. After she passed flatus, she was started on clear liquids, which she tolerated.

On post-operative day (POD) 3, she was started on thick liquids and then, subsequently, on a soft diet by POD-4. Her nasogastric tube was removed on POD-4. Her per-urethral catheter and abdominal drain were removed, and she was discharged on POD-5. On her POD-10 OPD follow-up visit, all her wounds had healed well. At the time of writing this paper, a telephonic interview was conducted with the patient. Thirty-four months post-surgery, she remains symptom-free.

DISCUSSION

MS was first described by Pablo Mirizzi, who initially described it as a benign condition in which a stone in the cystic duct or

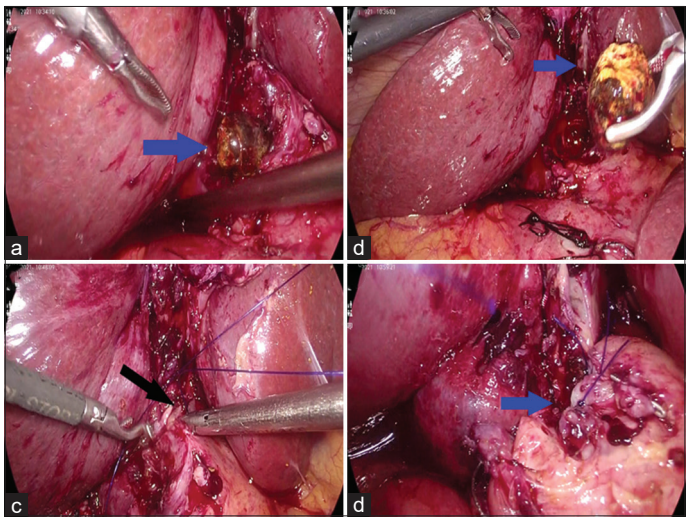

Figure 2: (a and b) The culprit impacting stone being retrieved, (c) Hartmann's pouch edges being suture closed (black arrow), (d) Completed suture line (blue arrow)

Table 1: Csendes-Beltran classification (2008) [3,4]

Type I	External compression of the bile duct
Type II	Cholecystobiliary fistula—up to 1/3 circumference of the bile duct wall erosion
Type III	Cholecystobiliary fistula—up to 2/3 circumference of the bile duct wall erosion
Type IV	Cholecystobiliary fistula—complete destruction of the bile duct wall and fusion with gallbladder
Type Va	Cholecystoenteric fistula
Type Vb	Cholecystoenteric fistula with gallstone ileus

in the Hartmann's pouch impinges on the CBD, leading to a mechanical obstruction by the stone itself or by secondary inflammation [1]. Pathophysiologically, the impacted stone causes an inflammatory process, secondarily leading to a pressure ulcer. This can cause first external compression of the bile duct and eventually erode into the bile duct, evolving into a CCF with different degrees of communication between the gallbladder and bile duct. In 1985, McSherry *et al*. classified MS into two types based on ERCP findings: type I when there is extrinsic compression of the common hepatic duct (CHD) and type II when the gallstone erodes the CHD wall, resulting in a CCF [2]. In 1989, Csendes *et al*. proposed a new classification in order to clarify the definition of cholecystobiliary fistula and to further establish an appropriate surgical treatment [3]. In 2008, Beltran *et al*. suggested that MS may further get complicated with a superimposed cholecystoenteric fistula [4]. Thus, a modified classification was proposed (Table 1). Our patient had both a CCF and a CDF without any gallstone ileus. Thus, the patient had MS type Va, according to the latest classification.

MS is relatively rare and is detected in just 0.06–5.7% of patients during cholecystectomy and in 1.07% of patients undergoing endoscopic retrograde cholangio pancreaticography (ERCP) [5]. There may be an increased occurrence in the older population, but there has not been a predilection for either male or female patients [6]. It is rare to establish a confirmed

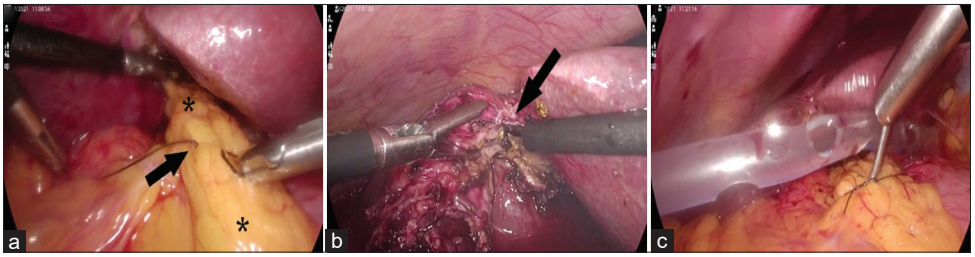

Figure 3: (a) Omental patch (black asterisks) being suture-fixed into place over duodenal suture line using its long ends, (b) Cholecystectomy (black arrow) in progress, (c) Tube drain kept in situ in Morrison's pouch

Table 2: Review of recent literature on Mirizzi syndrome

Authors	Type of Study/Period/No. of patients	CDF/CGF/CCF	Mirizzi Type	Surgical approach
Lampropoulos *et al*. [11]	Case report/2010	CEF	Mirizzi Type Va	Open
Gonzalez-Urquijo *et al*. [12]	Case series/2015 to 2018/ 15	15 CEF (10 CDF, 4 CCF and 1 CGF)	Mirizzi Type Va	4/10 CDF converted to open, 3 of 4 CCF converted to open
Huang *et al*. [13]	Case series/2011-2022 /29	17 of 29 CDF 6 of 29 CCF 3 of 29 CGF 1 of 29 CDF+ CGF	Mirizzi Type Va-15 Type Vb- 12	21/29-Lap, 8 converted to open
Senthil Kumar and Harikrishnan *et al*. [14]	Case series/2022/4	All CDF	Mirizzi Type Va -2 Type Vb- 2	Open
Rizzo *et al*. [15]	Case report/2021	CCF	Mirizzi Type Va	Open

pre-operative diagnosis of MS. USG and abdominal computed tomography (CT) disclose a dilated CBD above the gallbladder neck and an abrupt disruption of the CHD with a decompressed gallbladder and stones within it [7]. Laparoscopic US and CT scanning can rule out a tumor mass [8,9]. MRCP is an important imaging tool for the diagnosis of MS as it can demonstrate precisely the presence and degree of a dilated biliary tree and can also visualize the extrinsic narrowing of the CHD, as well as anatomical variations.

ERCP remains the gold standard for pre-operative diagnosis of MS in jaundiced patients, although it often cannot delineate the presence of a fistula. It provides indirect signs such as lateral filling gap of the CHD, central dilatation of the biliary tree, and insertion of the cystic duct at the point of obstruction, and/or complete obliteration of the cystic duct [10].

Laparoscopic cholecystectomy is the preferred surgical therapy, but a more elaborate operation may be needed if the condition is advanced. In patients with more advanced disease, a partial cholecystectomy can be considered. This would involve removing the body of the gallbladder along with gallstones and leaving Hartman's pouch. This will lower the incidence of injury to the porta hepatis and bile ducts. If a fistula is present, then an open or laparoscopic cholecystectomy with bilio-enteric anastomosis, possibly with a Roux-n-Y loop, has been shown to be effective. In inexperienced hands, the laparoscopic approach for MS is associated with significant chances of iatrogenic injury to the bile duct.

There are multiple reported cases of standalone CDF and CCF. However, this is one of the very few reported cases in the world literature where concurrent CCF and CDF were successfully managed by laparoscopy. A brief review of the literature on recently reported cases of MS is summarized in Table 2.

CONCLUSION

As seen in this report, laparoscopic management of MS is feasible in an advanced setup complemented by the requisite advanced laparoscopic surgical skills. Though not a common occurrence, every now and then, surgeons will encounter this condition. Also, as seen here, it may or may not be diagnosed pre-operatively.

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