



## Case series

## Laparoscopic subtotal reconstituting cholecystectomy in type II & III Mirizzi syndrome: Case series of 5 patients

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## ABSTRACT

**Background:** Mirizzi syndrome Type II & III treatment is a true surgical challenge. The purpose was to determine whether the laparoscopic subtotal reconstituting cholecystectomy can be a safe and effective approach in our institution to treat Mirizzi Syndrome type II and III.

**Case presentation:** We report a case series of 5 patients with Mirizzi syndrome type II and III who underwent laparoscopic subtotal reconstituting cholecystectomy.

**Discussion:** We found only one patient had presurgical diagnosis, average surgical time of 218 min, average surgical bleeding of 230 ml and the mean hospital stay of 3.4 days; one patient presented low volume and auto limited biliary leak; no cases presented biliary injury, major complications, or reintervention.

**Conclusions:** Laparoscopic subtotal reconstituting cholecystectomy is a security and effective technique to treat type II and III Mirizzi syndrome in our context.

## 1. Introduction

Despite its low incidence, Mirizzi Syndrome Type II & III (MSII & MSIII) treatment is a true challenge. According to Csendes, MS type II and III are categorized as a fistula of one third and two thirds of the common hepatic duct circumference, respectively [1]. The difficulty to confirm the diagnosis before surgery, the technical challenge due to the severe inflammatory reaction, the difficult identification of normal structures, the need for advance laparoscopic technics to perform a successful surgery and the absence of evidence on the best surgical technique determines a high rate of conversion, reoperation, and risk bile duct injury [2–4]. This case series shows the outcomes of mexican patients who underwent laparoscopic subtotal reconstitutive cholecystectomy (LSRC) for type II and III MS with the aim of determining whether the procedure can be a safe and effective approach in our institution. This work is reported in accordance with the PROCESS guideline [5].

## 2. Case presentation

We conducted a retrospective study involving all patients who underwent LSRC from January 2019 to December 2021 at the General Hospital 58 of the Mexican Institute of Social Security in México (IMSS). In total, we identified 8 cases of LSRC within the selected timeline; three cases required conversion to open procedure because of adhesions, uncertain anatomy, and bleeding and were eliminated. The five patients included present right upper quadrant pain & jaundice as initial manifestation. In all cases abdominal ultrasound (AUS) showed acute cholecystitis (Fig. 1). One patient presented diabetes mellitus and obesity as comorbidities.

Although a CT scan was performed in all cases (Fig. 2), most patients did not have MS confirmed diagnosis before surgery. No magnetic resonance cholangiography was performed because it is not a routine test for acute cholecystitis in our institution; the first alternative approach considered in four cases was standard laparoscopic cholecystectomy and endoscopic retrograde cholangiopancreatography (ERCP) + standard laparoscopic cholecystectomy in one case. The decision to perform LSRC was made intraoperatively by two board-certified general

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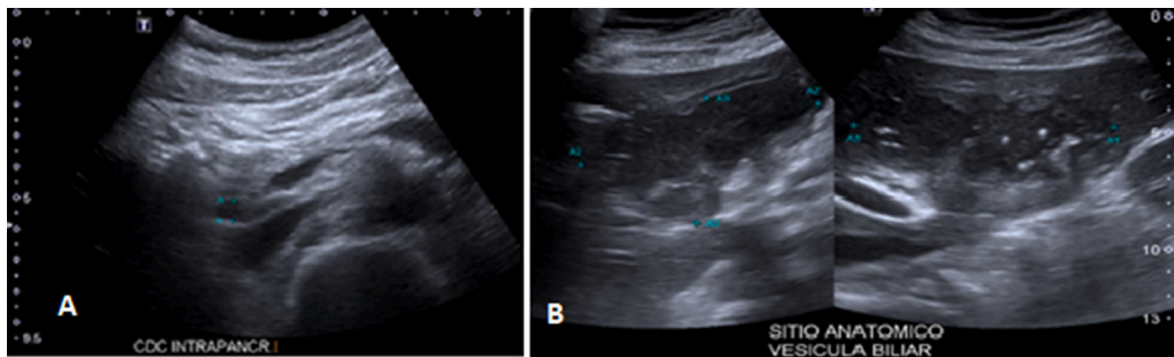


Fig. 1. Abdominal ultrasound shows common bile duct of 9 mm (A), gallbladder with thickened wall, heterogeneous content, and no evidence of MS (B).

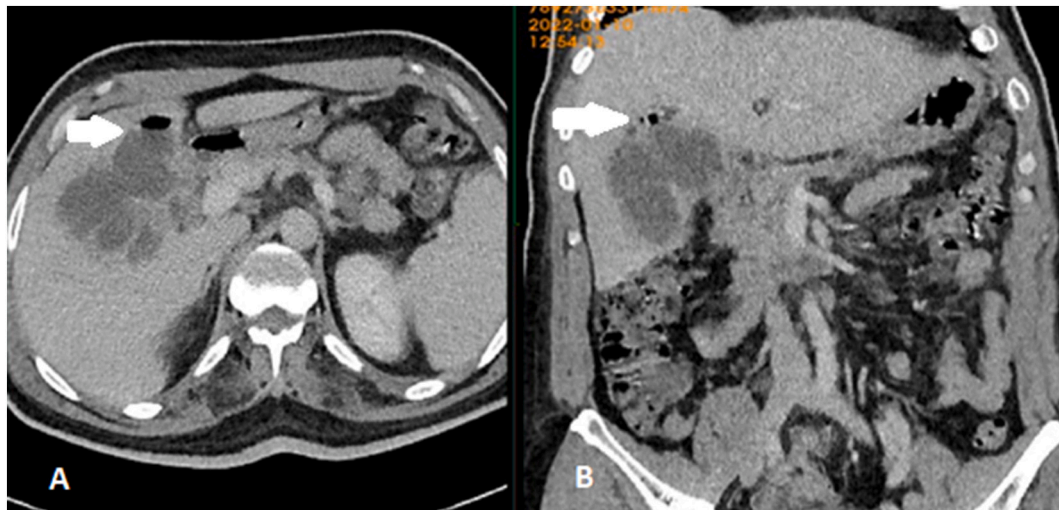


Fig. 2. Abdominal CT shows increased size of gallbladder in transverse (A) and coronal (B) section with liquid and gaseous content (arrow) in one case.

surgeons based on the severity of inflammation, presence of adhesions, difficult anatomy identification and experience.

Surgeon's training is based on a traditional general surgery residency program in México, which include at least 50 laparoscopic cholecystectomies, and one year of minimal invasive surgery program in specialized centers. Surgeon's experience ranges from 4 to 8 years, performing 2 or more standard laparoscopic cholecystectomy per week. All the patients received the same preoperative preparation (anti-coagulation drugs are avoided and prophylactic antibiotic is use). General Hospital 58 IMSS is a public second level center with academic activities associated to the University of Guanajuato Department of Medicine & Nutrition general surgery residency program.

The operative technique starts with the attempt of dissection of the Hartmann's pouch at the peritoneal surface of the distal gallbladder (Fig. 3A). After the impossibility to identify a critical view of safety, the gallbladder was opened near the Hartmann's pouch (Fig. 3B) and content were evacuated with an extractor clamp, suctioned, and irrigated inside the remnant gallbladder until it is free of calculi and detritus. The entrance to the common bile duct was reviewed and an intraoperative cholangiogram (IOC) was performed to assure absence of calculi (Fig. 3C). The remnant distal gallbladder was closed with vycril 2-0 with continuous suture (Fig. 3D). Finally, a 0.5-inch Penrose drain was left in the subhepatic space.

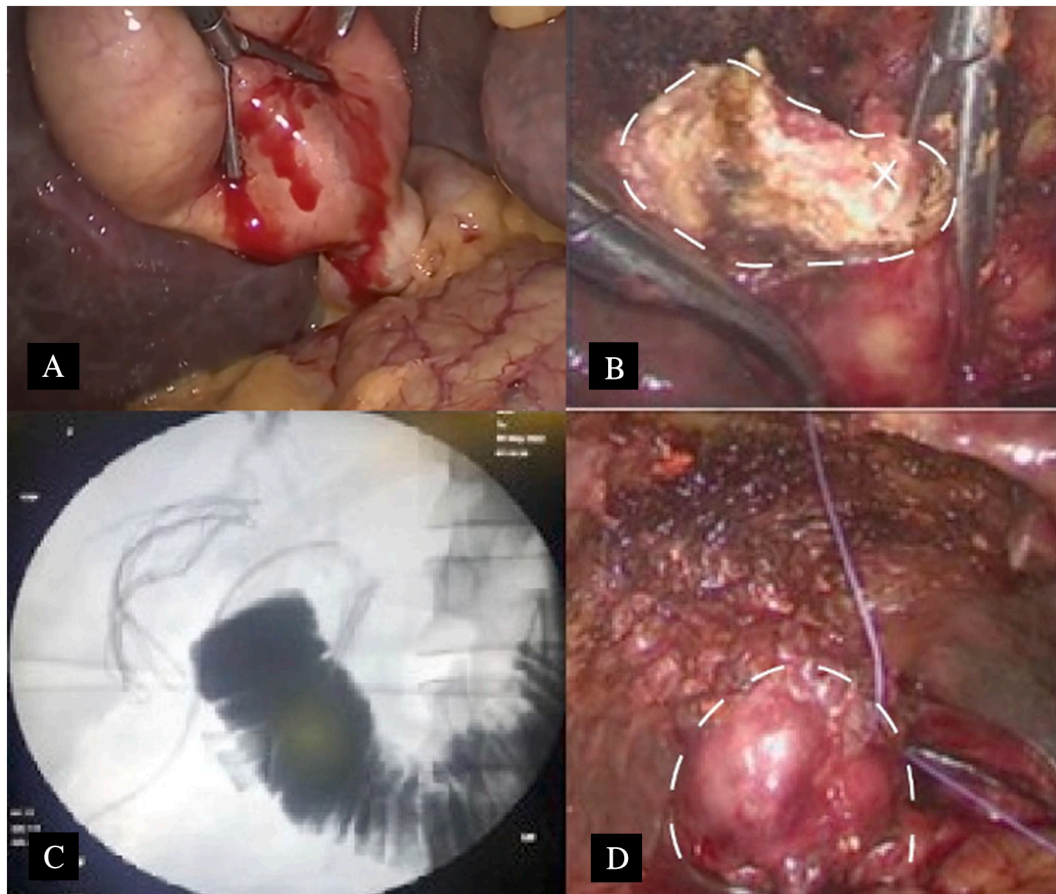
Table I show surgical performance and outcome of LSRC of five case series.

### 3. Discussion

Despite the importance of MS presurgical diagnosis for planning and executing a safe surgery, its confirmation in these series of cases was difficult to achieve, even with routine images studies (AUS, CT & ERCP). We found 80 % of diagnosis were trans-surgical findings, including one patient with presurgical ERCP and no MS evidence. Lui et al. found a preoperative diagnosis can be made only in 8–62.5 % of patients [6] and a systematic review found a preoperative diagnosis rate from 33 % to 100 % when RMI is used. Persistent RUQ pain, obstructive jaundice, WBC and TB elevated, with imagine data of acute cholecystitis should increase suspicious [7]. An early and accurate diagnosis has a major impact on management, morbidity, mortality, and preventing future complications by reducing them to 54 % [8].

We found a LSRC average surgical time of 218 min and the range from 150 to 270 min. Supit et al. found, in a case series of 24 patients with difficult cholecystectomy, a mean operating time of 158.4 min and the range from 60 to 240 min [9]. In this case of series, surgeons had different experience and training in laparoscopic advance skills that may explain the time difference. Technical proficiency is mandatory to perform a safe procedure independently of time required. The mean hospital stay was 3.4 days (range 3–5 days). A systematic review including ten studies found the median hospital stay was 8 days (range 3–13 days) and it shows that as more advance MS type, more length of stay [8]. Because this variable depends on presence of complications, reoperations rate and presence of comorbidities, absence of the first two could diminish our mean hospital stay.

We found average surgical bleeding of 230 ml (120–350 ml). In a



**Fig. 3.** LSRC: severe acute inflammation avoids dissection of critical view of safety (A); resection of the distal portion of the gallbladder -circumferential section at the level of the infundibulum and extraction of stone (B) (x = gallstone, dot line shows gallbladder wall open); an intraoperative cholangiogram was conducted showing contrast free flow from remnant gallbladder and common bile duct to the duodenum -an endoprosthesis was placed previously by ERCP- (C); the remnant part is closed with absorbable suture (D).

**Table I**

Surgical performance and outcome.

	Case 1	Case 2	Case 3	Case 4	Case 5
MS Type	III	II	II	II	III
Diagnostic method	TSF	CT	TSF	TSF	IOC
Surgical time (minutes)	240	270	180	150	250
Surgical bleeding (milliliters)	250	350	120	200	230
Hospital stays (days)	5	2	3	3	4
Complications <sup>a</sup>	None	None	None	None	Bile leak
Re-intervention	None	None	None	None	None

MS = Mirizzi syndrome, TSF = Trans-surgical finding, CT = Computed tomography, IOC = intraoperative cholangiogram.

<sup>a</sup> Complications: Hemorrhage, infection, biliary injury, bile leak, organ perforation, abdominal sepsis, death.

publication including 1086 patients, reported an estimated blood loss of 45 ml (5–200 ml) for laparoscopic subtotal cholecystectomy and 33 ml (5–150 ml) for laparoscopic subtotal cholecystectomy removing only the anterior wall [10]. Surgical skills and experience are important determinants in blood loss during a difficult cholecystectomy, but trans-surgical hemorrhage is not one of the main complications [8].

In terms of security, we didn't find mayor complications for LSRC, such as, bile duct injury, surgical site infection, sepsis, organ injury or death. Only one patient presented self-limited low volume (less than 200 ml per day) bile leak for 5 days, treated only with drain and observation. Publications showed that laparoscopic treatment was associated with an overall complication rate of 16 %, residual stones and

bile duct injury were the most common complications [8]. Bile leak, although a frequent complication, represents a self-limited event in our series of case. LSRC reduces the incidence of postoperative fistula [11].

None of the procedure was converted to open surgery and any of the patients need a reintervention. It means that in these cases, LSRC is effective to treat MSII y III. LSRC, as laparoscopic subtotal “fenestrating” cholecystectomy, had recently been proposed as safe (without biliary injury) and effective (single surgery to solve MS) techniques for difficult operative conditions [3,4,12,13]. There are no studies comparing both techniques in MS Type II & III, but evidence show both procedures prevents conversion and has fewer serious complications [14–17].

However, LSRC technique has a higher incidence of minor complications. Most common complications are bile leak and subphrenic collections [18,19], often treated with a remnant drain and generally with an auto limited course [13,20,21]. LSRC creates a remnant gallbladder, which can result in remitting symptomatic cholelithiasis [11].

It is under discussion which subtotal laparoscopic cholecystectomy type is better. Koo, et al. recommend reconstituting, since they associate the fenestrated with a higher rate of stone retention, subhepatic and subphrenic collections, as well as superficial infection of the surgical site [11,13]. It is probable the best technique may vary depending on the level of advance laparoscopic skills and experience of each surgeon, in every specific scenario.

Henneman, et al. systematically reviewed 520 patients with diverse bile duct diseases treated with laparoscopic subtotal cholecystectomy. This procedure was feasible for approximately 90 % of patients. 10.4 % of them had conversion to open surgery and only one suffered iatrogenic bile duct injury [19].



Finally, it is necessary to execute cohort studies, with a greater amount of patient treated with LSRC, to confirm these results. Also, it is required to perform experimental studies comparing fenestrating and reconstitutive subtotal cholecystectomy to define which one is better in MS. However, this work tries to increase knowledge, in terms safety and effectivity, in LSRC for MSII y III to improve surgical decision-making, mainly in unexpected scenarios of difficult gallbladder.

#### 4. Conclusion

LSRC is a safe and effective technique to treat type II and III MS in our institutions. However, we need randomized controlled trials with a larger number of patients and longer follow-up to ensure this is the first option, especially compared to the fenestrated technique.

#### Sources of funding

- University of Guanajuato, México.
- Society of Gastroenterology of the State of Guanajuato, part of the Mexican Association of Gastroenterologists.

#### Ethical approval

This research has been approved by the Local Commit of Ethics number 1005 of México with approval number R-2021-1008-058. The research was approved to be applied at the Leon General Hospital No. 58 and the High Speciality Medical Unit Bajío at León, Guanajuato, a second and third level hospitals part of the Mexican Institute of Social Security.

#### Consent

Although the Ethical Committee reviewers didn't request informed written 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. Patient's right to privacy is assured because patient's name, initials, hospital numbers are codified and are not shown in the article. The authors signed a Privacy Letter to keep data protected. A copy of the Privacy Letter and the certificate of approval by the Ethics Committee is available for review by the Editor-in-Chief of this journal on request. Images included in the study are essential for scientific purposes and not include any personal information from patients.

#### Author contribution

Gerardo Chávez Saavedra: conception and design of the study, interpretation of data.

Dante Ríos Segovia: acquisition, analysis of data & discussion.

Raúl Hernández Centeno: acquisition & analysis of data.

Nicolas Joaquín Fernández Pérez: Interpretation of data.

#### Registration of research studies

None.

#### Guarantor

Gerardo Chávez Saavedra.

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Not commissioned, externally peer-reviewed.

#### Declaration of competing interest

Society of Gastroenterology of the State of Guanajuato & University of Guanajuato.

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