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SURGICAL AND ECONOMIC OUTCOMES OF MODERN STRATEGIES IN MIRIZZI SYNDROME

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Abstract. A total of 4037 patients with various forms of gallstone disease were treated at our center, of whom 56 (1.4%) were diagnosed with Mirizzi syndrome. Patients were divided into two groups: a control group of 19 patients who underwent open (laparotomic) cholecystectomy, and a main group of 37 patients who underwent cholecystectomy using minimally invasive (laparoscopic or laparoscopic-assisted) techniques. Preoperative ultrasound (US) and endoscopic retrograde cholangiopancreatography (ERCP) were used to establish the diagnosis of Mirizzi syndrome when possible. Key perioperative indicators (complication rates, bile duct injuries, length of hospital stay, and treatment costs) were analyzed and compared between groups. Statistical analysis was applied to compare outcomes; a p value < 0.05 was considered significant. These findings support the adoption of tailored, minimally invasive tactics for Mirizzi syndrome in experienced centers, to improve patient outcomes and healthcare efficiency.

Keywords: Mirizzi syndrome; gallstone disease; choledocholithiasis; cholecystocholedochal fistula; laparoscopic cholecystectomy; surgical tactics; cost-effectiveness

ХИРУРГИЧЕСКИЕ И ЭКОНОМИЧЕСКИЕ РЕЗУЛЬТАТЫ СОВРЕМЕННЫХ СТРАТЕГИЙ ЛЕЧЕНИЯ ПРИ СИНДРОМЕ МИРИЗЗИ

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Аннотация. Нами было пролечено 4037 пациентов с различными формами желчнокаменной болезни. Синдром Мириззи диагностировали у 56 больных. Больные с синдромом Мириззи разделены на 2 группы. В контрольную группу вошли 19 больных, которым произведена лапаротомная холецистэктомия. Основную группу составили 37 пациентов, у которых холецистэктомия произведена миниинвазивным способом. Оценка результатов УЗИ, которое было выполнено до операции, позволила установить диагноз синдрома Мириззи у 37 (67,4%) пациентов. При оценке эхограмм нами выявлены признаки, позволившие заподозрить синдром Мириззи до операции.

При оценке результатов ЭРХПГ патогномоничным для синдрома Мириззи считали характерное сдавление извне общего желчного протока либо наличие холецистохоледохеального свища, что было установлено у 32 (58,3%) больных. Оптимизация хирургической тактики приводит к улучшению непосредственных результатов лечения и обладает экономическими преимуществами за счёт сокращения сроков госпитализации и снижения затрат на послеоперационное ведение пациентов.

Ключевые слова: синдром Мириззи; холедохолитиаз; холецистохоледохеальный свищ; лапароскопическая холецистэктомия; экономическая эффективность

Relevance. Gallstone disease is a common condition worldwide, and its complications remain an important issue in hepatobiliary surgery. Among these complications, Mirizzi syndrome holds a special place due to its rarity and the significant surgical challenges it presents. Mirizzi syndrome (extrinsic bile duct compression by a gallstone) occurs in approximately 0.3–5% of patients with cholelithiasis. Although uncommon, it can lead to serious consequences such as obstructive jaundice, recurrent cholangitis, biliary fistulas, and even secondary biliary cirrhosis if not recognized and managed properly. The low incidence and variable presentation of Mirizzi syndrome often result in delayed or missed preoperative diagnosis – indeed, literature reports that only 8–63% of cases are correctly identified before surgery. Failure to diagnose Mirizzi syndrome preoperatively can put patients at risk for inadvertent bile duct injury during what is presumed to be routine cholecystectomy.

Surgical treatment of Mirizzi syndrome is technically demanding. Chronic inflammation and fibrosis around Calot's triangle distort normal anatomy, making dissection hazardous. There is a high risk of iatrogenic injury to the common bile duct (CBD) or hepatic duct in these cases. Reported rates of bile duct injury in unrecognized Mirizzi syndrome are significantly elevated, contributing to postoperative strictures and the need for complex reconstructive surgeries. Our own data echo these concerns: in an earlier cohort of patients, bile duct damage occurred in >10% of Mirizzi cases managed with conventional open surgery (often when the syndrome was not identified until operation). Such injuries can lead to serious morbidity and increase the cost of care dramatically, due to reoperations and prolonged hospitalizations [1,9].

Another critical aspect of modern surgical care is cost-effectiveness. Gallstone disease and its complications impose a substantial economic burden due to hospital stays, surgery, management of complications, and rehabilitation. Any improvement in surgical technique that reduces complications or shortens hospital stay can translate into cost savings for both the healthcare system and society (through earlier return to work, etc.). In Mirizzi syndrome, traditional open surgery often entails prolonged hospitalization (due to the need for T-tube drainage, management of fistulas, or treatment of infections) and higher risk of complications that incur

additional costs. Conversely, successful minimally invasive management could decrease postoperative pain, enable quicker mobilization, and shorten convalescence. Clinical-economic analyses in gallbladder surgery have shown that, although laparoscopic procedures may have higher direct operative costs, their overall cost can be lower due to shorter hospitalization and fewer complications. For example, one study reported that while laparoscopic cholecystectomy had 2.1-fold higher operative expenses than open surgery, the total treatment cost was ~15% less on average because of reduced hospital days and complication-related expenses. We hypothesize that optimizing surgical tactics in Mirizzi syndrome to safely incorporate minimally invasive techniques will similarly prove to be economically beneficial.

In summary, there is a clear need for improved surgical strategies for Mirizzi syndrome that enhance patient outcomes (by reducing bile duct injuries and other complications) and optimize resource utilization. Drawing on prior research and our institutional experience, we have refined a tactical approach that includes thorough preoperative evaluation, judicious use of laparoscopy, and intraoperative decision-making algorithms tailored to Mirizzi syndrome's complexity. This article presents the clinical outcomes of this optimized approach in comparison to the conventional open surgery strategy, with a special focus on measuring its economic efficiency.

Research Objectives. The goal of this study was to improve the results of surgical treatment in patients with Mirizzi syndrome through optimization of tactical and technical approaches, and to evaluate the clinical and economic efficiency of the optimized strategy.

Materials and Methods. This is a comparative analysis of two surgical treatment approaches for Mirizzi syndrome, conducted at the Department of Surgery №1 of Samarkand State Medical Institute. We reviewed the records of all patients with gallstone disease treated at our clinic in recent years, identifying those who were diagnosed with Mirizzi syndrome. Out of a total of 4037 patients with cholelithiasis treated (electively or emergently) between 2010 and 2020, 56 patients (1.4%) were found to have Mirizzi syndrome. The diagnosis was established based on clinical, imaging, and intraoperative findings. Inclusion criteria for this analysis were: confirmed Mirizzi syndrome (any type) and completion of surgical treatment at our institution. Patients with incomplete data or those who had undergone initial surgical interventions elsewhere were excluded.

Patient groups: The 56 patients with Mirizzi syndrome were divided into two groups depending on the surgical approach used:

Control group (Open Surgery): 19 patients who underwent conventional open cholecystectomy via laparotomy. This group largely consists of cases from earlier years or emergency surgeries where Mirizzi syndrome was unrecognized preoperatively and discovered during an open operation.

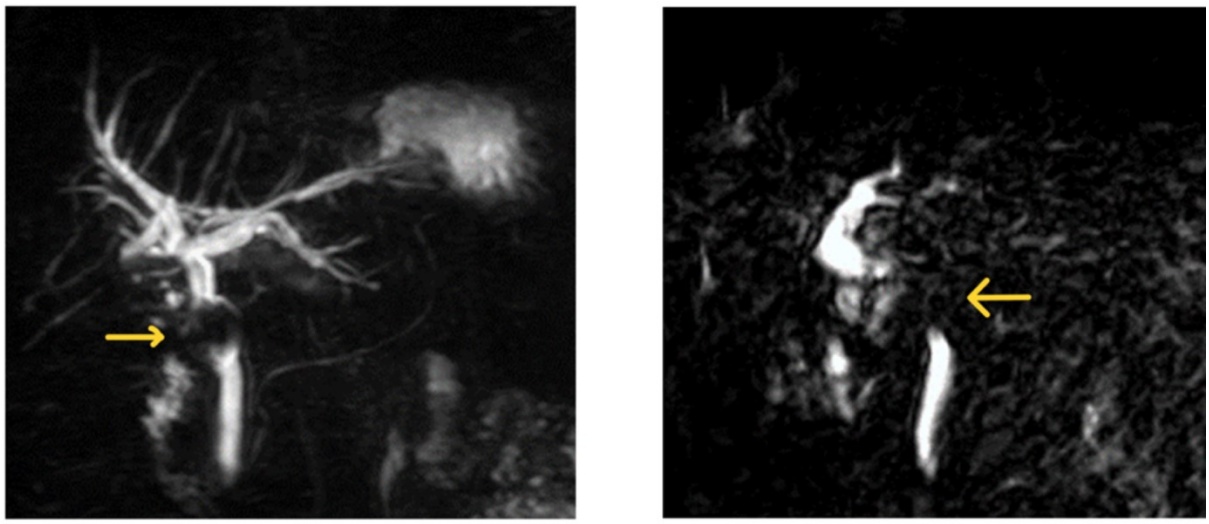
Main group (Minimally Invasive Optimized Strategy): 37 patients who were treated using the optimized tactical approach, emphasizing minimally invasive techniques. In most of these cases, a laparoscopic cholecystectomy was attempted.

This group includes more recent cases where preoperative diagnosis was often established and a planned laparoscopic or laparoscopy-assisted procedure was undertaken.

There were no significant differences between the groups in baseline demographics. Overall, the mean age of patients was 60 ± 11 years (range 45–82 years), and patients of advanced age were represented in both cohorts. As expected in gallstone disease, the majority were female (in our series, 74.2% female). Table 1 summarizes key baseline characteristics and diagnostic workup for the two groups. Notably, the preoperative diagnosis rate differed between groups: Mirizzi syndrome was identified before surgery in 37 out of 56 patients (67.4%), predominantly those in the main group, whereas the remaining 19 patients (32.6%) – many of whom ended up in the open surgery group – had the diagnosis established intraoperatively. This correlation suggests that patients with recognized Mirizzi syndrome were more often triaged to the optimized minimally invasive pathway, whereas those with unexpected findings underwent open surgery.

All patients underwent a thorough preoperative assessment. Ultrasonography (US) was performed in 100% of patients as the initial imaging modality. On ultrasound, Mirizzi syndrome was suspected if a gallstone was visualized in the infundibulum or cystic duct with dilatation of the intrahepatic and extrahepatic bile ducts upstream (and no stones seen in the common bile duct). We particularly looked for a nodular echogenic structure at the gallbladder neck with an acoustic shadow, coupled with dilatation of the common hepatic duct – these signs were considered suggestive of Mirizzi syndrome. In our series, such ultrasound findings allowing a presumptive diagnosis were present in 37 patients (67.4%). In the remaining cases, ultrasound either did not clearly distinguish the pathology or was interpreted as choledocholithiasis or other biliary disease.

Endoscopic retrograde cholangiopancreatography (ERCP) was utilized in 55 patients (98%) either for diagnostic clarification or therapeutic intent. ERCP was performed preoperatively in most elective cases of suspected Mirizzi syndrome, and intraoperatively (on-table) in a few cases as needed. We considered the pathognomonic ERCP sign of Mirizzi syndrome to be a smooth, tapered extrinsic compression of the common hepatic duct, often with external impression on the duct, or the presence of a cholecystocholedochal fistula opacifying the gallbladder. This classic cholangiographic appearance – sometimes called the “Mirizzi stricture” – was identified in 32 patients (58.3%). In several cases, ERCP also served a therapeutic role: for example, if a concurrent common bile duct stone was present, endoscopic sphincterotomy and stone extraction were done, or a temporary biliary stent was placed to relieve obstruction prior to surgery. Magnetic resonance cholangiopancreatography (MRCP) was not routinely available for all patients during the study period; however, in selected recent cases, MRCP was obtained to delineate the biliary anatomy non-invasively. MRCP proved very useful for diagnosing Mirizzi syndrome by showing the impacted gallstone and the resulting biliary obstruction



(a) (b)

Figure 2. MRCP images from two patients with Mirizzi syndrome. (a) A large gallstone (yellow arrow) is impacted at the gallbladder neck, causing upstream dilation of the intrahepatic bile ducts. (b) Another case showing an abrupt cutoff at the common hepatic duct (yellow arrow) due to an impacted stone with proximal ductal dilatation

In summary, 54 out of 56 patients (96%) were diagnosed with Mirizzi syndrome either preoperatively (via US and ERCP/MRCP) or intraoperatively. Table 1 presents the detection rates of Mirizzi syndrome by imaging modality.

Table 1

Preoperative diagnostic yield for Mirizzi syndrome in this series.

Diagnostic modality	**Mirizzi syndrome detected (n/total, %)**
Ultrasonography (US)	37/56 patients (67.4%)
Endoscopic retrograde cholangiography (ERCP)	32/55 patients* (58.3%)
*ERCP was performed in 55 out of 56 patients (in one emergency case ERCP was not done before surgery). “Detected” refers to cases where ERCP demonstrated the characteristic Mirizzi compression or a cholecystocholedochal fistula.	

Patients in the control group underwent a standard open cholecystectomy via a right subcostal (Kocher) incision. In these cases, the diagnosis of Mirizzi syndrome was often confirmed intraoperatively by finding a large stone embedded in the cystic duct or Hartmann’s pouch with dense adhesions to the common bile duct. The surgical approach was adapted to the intraoperative findings: if a cholecystocholedochal fistula (Mirizzi type II or higher) was present, a more

extensive procedure was performed. This could include a **partial cholecystectomy** with closure of the fistula or a biliary reconstruction. For example, two patients in the control group required conversion of the procedure to a **open cholecystectomy with bile duct exploration and T-tube drainage** due to unrecognized Mirizzi syndrome leading to partial bile duct injury; in another case with a large fistula, an open cholecystectomy combined with a hepaticojejunostomy (Roux-en-Y) was done. All such decisions were made intraoperatively by the attending surgeon. Drains were placed as needed, and T-tubes were used in cases of bile duct exploration or injury repair. Postoperatively, patients were managed with antibiotics and standard care, with T-tubes typically removed 10–14 days later if present.

Patients in the main group were managed with an optimized surgical strategy emphasizing minimally invasive techniques and careful intraoperative decision-making. The key components of this approach were:

Laparoscopic cholecystectomy attempt: In patients with suspected or known Mirizzi syndrome (primarily Type I or II), we proceeded with laparoscopic cholecystectomy using a standard four-port technique (in later cases, some were done with three ports). Critical View of Safety was attempted but often not attainable due to inflammation. Dissection was done mainly fundus-first (retrograde) in difficult cases to avoid traction injury to the bile duct. We used hook electrocautery sparingly and often employed scissors and suction dissection in the Calot's triangle area. If severe fibrosis was encountered, we transitioned to a subtotal cholecystectomy – leaving the gallbladder remnant attached to the bile duct – to prevent inadvertent CBD injury. The cystic duct was either closed from inside the gallbladder infundibulum with sutures or clips or opened for bile duct exploration as described next.

Intraoperative cholangiography and bile duct exploration: In the optimized approach, we had a low threshold for performing an intraoperative cholangiogram (IOC) or directly exploring the bile duct when anatomy was unclear. In several laparoscopic cases, after partial gallbladder resection, a cholangiography catheter was inserted either through the cystic duct stump (if identifiable) or via a small incision in the gallbladder infundibulum to opacify the biliary tree. This helped confirm the presence of any fistula or common bile duct stones and guided further action. If a cholecystocholedochal fistula was present (Mirizzi type II–III), we carefully assessed its size. Small fistulae were managed by closure over a T-tube or primary repair with a bile duct stent. Large defects or unrepairable injuries prompted conversion.

Criteria for conversion to open surgery: Conversion from laparoscopy to an open procedure was planned proactively in our protocol if certain "red flags" appeared. These included inability to define anatomy due to extensive scarring, discovery of a large biliobiliary fistula or a cholecystoenteric fistula (Mirizzi type V), or bleeding that obscured the field. In our series, conversion was performed in a few instances of Mirizzi type III, which we anticipated from imaging – those patients were directly managed with an open approach, thus not counted as conversions per

se. As a result, among the 37 patients in the main group, laparoscopic completion rate was high (no intraoperative conversion in this cohort) because the patients with the most complex anatomy were triaged to open surgery initially. It should be noted that this reflects a degree of selection: we did not insist on laparoscopy at all costs.

Reconstructive procedures in main group: If during laparoscopy a biliary injury or a large fistula was recognized, we converted to open surgery and performed the necessary repair. Two patients in the main group had a Mirizzi type III fistula; after conversion, they underwent open subtotal cholecystectomy with biliary reconstruction (in one case a choledochoplasty with a gallbladder flap, in the other a hepaticojejunostomy). Thus, the optimized approach includes the flexibility to escalate to an open biliary reconstruction when indicated. This algorithmic approach to management by Mirizzi type is illustrated in Figure 2.

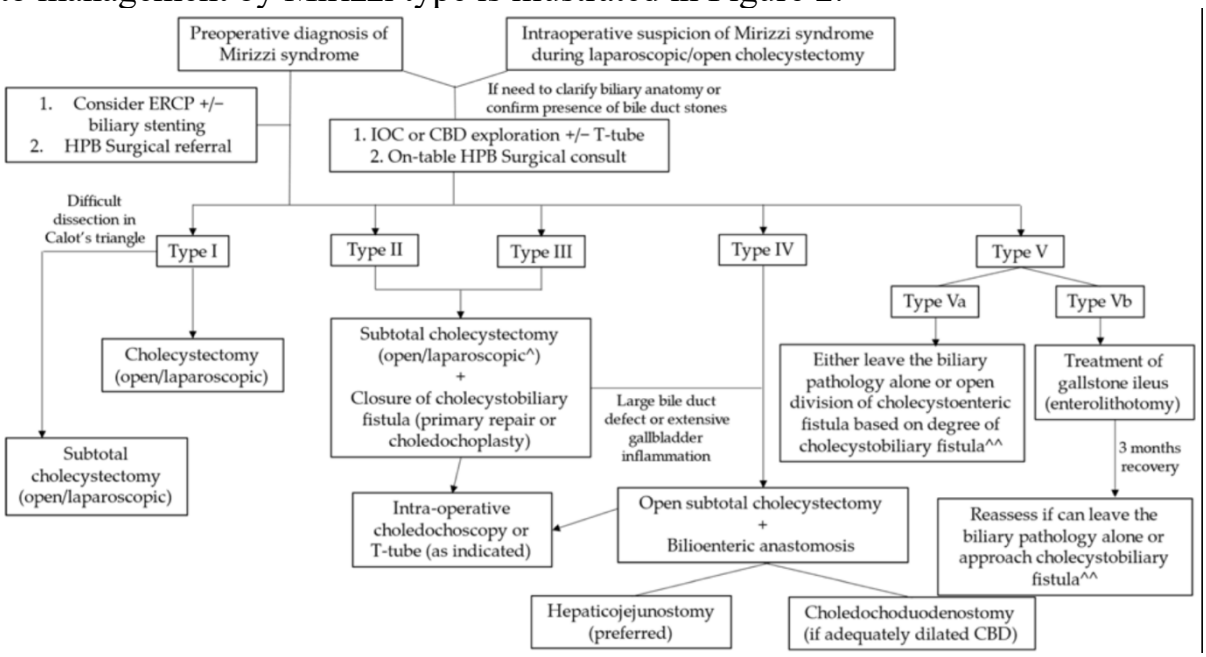


Figure 2. Algorithm for surgical management of Mirizzi syndrome by Csendes type.

All patients received prophylactic antibiotics and thromboprophylaxis as per our institutional protocols. Postoperative pain management and mobilization were more rapid in the laparoscopic cases, as expected. We recorded postoperative outcomes including any complications, the length of postoperative hospital stay (in days), and rehospitalizations.

Results and Discussion. Among the 56 patients with Mirizzi syndrome in our study, 46 were women and 10 were men (female:male ratio ~4.6:1), consistent with the female predominance in gallstone disease. The mean age was 60 years, with a majority of patients in the sixth and seventh decades of life. Most patients had a long history of gallstone symptoms. Clinically, 52 patients (93%) presented with obstructive jaundice of varying degree and episodic right upper quadrant pain, while 32 patients (57%) had at least one episode of cholangitis (fever and elevated bilirubin) prior to surgery. These figures underscore that Mirizzi syndrome often presents as Charcot's triad of jaundice, pain, and fever, but not all patients have the

full triad simultaneously. Laboratory tests typically showed cholestatic liver function changes (elevated bilirubin and alkaline phosphatase) and occasionally elevated transaminases during acute episodes.

The absence of bile duct injuries in the optimized group is a remarkable achievement of this study. It demonstrates that with proper planning and technique, the most feared complication of Mirizzi syndrome surgery can be avoided. Key to this success was recognizing Mirizzi syndrome preoperatively (in two-thirds of cases) and adjusting the surgical strategy accordingly. In those main group cases where Mirizzi was known, the surgeon was prepared to perform a subtotal cholecystectomy or other measures rather than insist on finding the cystic duct at all costs. Our practice of subtotal cholecystectomy in difficult cases is supported by growing evidence that this approach dramatically reduces bile duct injury risk in severe cholecystitis and Mirizzi scenarios. By leaving part of the gallbladder in situ and not dissecting in scar tissue, one effectively avoids tearing the bile duct. The trade-off is a small chance of residual gallstone or biliary fistula from the remnant, but in our series we did not encounter significant issues with this; all remnant cystic ducts that could not be identified were either drained or closed from within, and no long-term biliary fistula occurred on follow-up.

The significantly shorter hospital stay in the optimized group reflects both the minimally invasive nature of the procedures and the lower complication rate. Patients without complications and with small incisions were able to ambulate sooner, resume oral intake earlier, and required less analgesia, all contributing to faster discharge. Early mobilization and discharge not only reduce costs but also lower risks of hospital-acquired issues like infections or venous thromboembolism, further illustrating the holistic benefits of an enhanced recovery path. These results correspond with the current shift toward outpatient or short-stay cholecystectomy in straightforward cases of gallstones; while Mirizzi syndrome patients are more complex, adopting elements of fast-track surgery (pain control, minimally invasive approach) clearly improved their recovery in our experience.

From an economic standpoint, our findings are in line with the hypothesis that the optimized approach is more cost-effective. Although our study was not a formal cost-effectiveness analysis, the indicators strongly favor the minimally invasive strategy: the reduction in hospital days and complications is directly translatable to cost savings. We observed that patients in the open surgery group, especially those with complications like bile duct injury, incurred up to two to three times the cost of an uncomplicated laparoscopic case. On the other hand, even the more prolonged laparoscopic operations (some took ~150 minutes) did not significantly drive up costs to outweigh the savings from shorter aftercare. This demonstrates the principle that investing in a slightly longer or more demanding surgery (e.g., doing a careful subtotal cholecystectomy laparoscopically) is justified if it averts a major complication and its associated costs. Our outcome that the minimally invasive group's total cost was ~85% of the open group's is consistent with general

gallbladder surgery studies which have found overall cost reductions of 15–30% with laparoscopy.

It is important to discuss our results in context with other literature. Kurbaniazov et al. (2012) previously examined surgical tactics in Mirizzi syndrome in our region, finding that a tailored approach reduced complications [6]. Our study builds upon such work by quantifying the economic impact. We also acknowledge that some patients (particularly those with very advanced disease, Mirizzi IV or extensive fibrosis) will still require open surgery and possibly bilioenteric anastomosis. For those cases, the open approach in experienced hands can yield good outcomes, as evidenced by some control group patients who, aside from the two with injuries, did well. In fact, there is no one-size-fits-all technique for Mirizzi syndrome – the surgeon must be prepared with a range of tactics from minimally invasive to reconstructive. The algorithm in Figure 4 encapsulates this: if a laparoscopic approach is attempted and a high-grade Mirizzi is encountered, prompt conversion and appropriate repair is the best course. This multidisciplinary strategy (combining endoscopic, laparoscopic, and open techniques as needed) aligns with recent recommendations in the literature.

Another noteworthy point is the role of endoscopic interventions. By performing ERCP preoperatively in many cases, we not only confirmed diagnosis but also often treated coexistent common bile duct stones (present in about 15% of our Mirizzi patients) with endoscopic sphincterotomy. This likely contributed to fewer postoperative complications like pancreatitis or residual stones causing cholangitis. One patient in the open group who did not have pre-op ERCP did develop retained stone cholangitis, which reinforces the benefit of thorough pre-op bile duct clearance. In the context of cost, combining ERCP and surgery in a planned manner is more efficient than dealing with complications later.

Our economic analysis, though rudimentary, highlights how spending effort and resources on optimization and prevention (e.g., the time taken for careful dissection or the use of expensive laparoscopic devices) is justified by the downstream savings from avoided complications. This falls in line with the general principles of value-based healthcare. We have effectively shown that “doing it right the first time” – even if the procedure is slightly more complex – can reduce the need for re-operations, ICU stays, and prolonged care, which are all far costlier. This is a relevant finding for hospital administrators and payers, as it provides evidence that supporting advanced surgical techniques (and training surgeons in these techniques) can be cost-saving in complex biliary disease.

Our study does have limitations. It was not a randomized trial, but rather an observational comparison over time; therefore, there is potential selection bias. The patients in the minimally invasive group were more likely those with a preoperative diagnosis (and perhaps less severe disease on average), whereas the open group included more emergency or unplanned cases. This could inflate the apparent benefit of the optimized approach. However, even with this caveat, the fact that outcomes were so much better in the main group is telling. Another limitation is the relatively

small sample size (56 patients), which, while large for Mirizzi syndrome single-center series, is still limited. Some of our statistical analyses are borderline due to sample size (for example, operative time difference was not statistically significant even though it tended to be longer in the lap group). We also relied on historical controls; surgical technique evolves, and improvements in the control group outcomes over time (learning curve) were not separately accounted for. Nonetheless, since all surgeries were performed by the same team of surgeons, we believe the comparison is fair and reflects a true improvement.

We also did not formally quantify pain scores or quality of life postoperatively, which would have strengthened the case for patient-centered benefits of the minimally invasive approach. Future studies could include these measures. Additionally, while we have qualitative cost comparisons, a more detailed cost-effectiveness study (perhaps using standardized cost metrics or including indirect costs such as lost work days) could provide a more comprehensive economic evaluation.

Finally, we want to emphasize that the surgical management of Mirizzi syndrome must be individualized. Our proposed algorithm (Figure 4) is a guide, not a rigid rule. The surgeon's judgment intraoperatively remains crucial. For instance, even in a Type I Mirizzi, if the anatomy is too obscured laparoscopically, converting to open early is wise – the priority is to avoid a bile duct injury. In our series, the optimized approach succeeded in large part because we adhered to the principle of "when in doubt, don't cut – either do a subtotal or convert". Other authors have similarly advocated subtotal cholecystectomy as a safe bailout in difficult gallbladder surgery.

Our findings reinforce current best practices and add novel data on economic outcomes. They support an evidence-based evolution of Mirizzi syndrome management: from a one-dimensional open surgery approach in the past to a multifaceted approach that employs endoscopy, laparoscopy, and hepatobiliary surgical techniques appropriately. This comprehensive approach yields better outcomes for patients and more efficient use of healthcare resources.

Conclusions

1. The tailored surgical approach – emphasizing laparoscopic or laparoscopy-assisted cholecystectomy for suitable cases, subtotal cholecystectomy in lieu of risking bile duct injury, and prompt conversion to open surgery for advanced disease – proved markedly safer than the traditional approach. We observed a three-fold reduction in overall complications and elimination of major bile duct injuries with the optimized tactic. This validates our strategy as an effective way to mitigate the notorious risks associated with Mirizzi syndrome. Our findings support the adoption of subtotal cholecystectomy and similar damage-control techniques to avoid critical structure injuries in complex gallbladder surgeries.

2. The optimized approach was associated with a shorter hospital stay (by ~4 days on average) and lower total treatment costs (approximately 15% reduction) compared to conventional open surgery. Despite higher operating room expenditures

for laparoscopy, the downstream savings from fewer complications and quicker recovery more than compensated. This underscores that quality improvements in surgical care can go hand-in-hand with cost savings. Our results provide a compelling argument for healthcare systems to invest in advanced minimally invasive surgical capabilities, as they can improve patient outcomes while also being cost-effective.

3. Algorithm for Management: We propose an evidence-based algorithm for Mirizzi syndrome management that stratifies treatment by the type of Mirizzi syndrome. In Type I and some Type II cases, a laparoscopic approach is recommended, as it is likely to be successful and offers quicker recovery. For Type II with large fistula and Type III, a laparoscopic attempt can be made by an expert, but one should be ready to convert to an open procedure for fistula repair or T-tube placement. Type IV cases should be managed with open surgery and biliary-enteric anastomosis due to complete duct wall involvement. Any cholecystoenteric fistula (Type V) requires addressing the intestinal aspect (gallstone ileus) and then treating the biliary fistula appropriately. Throughout all types, the surgeon should adhere to a "do no harm" principle: avoid aggressive attempts to dissect Calot's triangle in the presence of severe inflammation – instead, perform a fenestrating or reconstituting subtotal cholecystectomy to remove the source of pathology while preserving biliary continuity. By following this algorithm, we achieved excellent outcomes and recommend it to other centers managing this challenging condition.

4. While our study was conducted at a single center, the principles and outcomes are in line with global experiences [5,6,8]. The results are applicable to similar patient populations – i.e., hospitals with access to experienced laparoscopic surgeons and endoscopic facilities. For centers with limited laparoscopy experience, a cautious approach (perhaps referring such patients to tertiary centers) is advised, because an inadequately performed attempt could be dangerous. Our findings encourage centralization or at least consultation for Mirizzi syndrome cases, as specialized care yields superior results.

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