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Enhanced Surgical Recovery Program. Safe cholecystectomy

Programa de Recuperación Quirúrgica Mejorada. Colecistectomía segura

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ABSTRACT

In Mexico, cholecystectomy is the most common surgical procedure in general surgery. Enhanced recovery programs in surgery aim to provide efficient treatment based on the best scientific evidence. This document aims to optimize the outcome of patients undergoing cholecystectomy in our country based on a series of recommendations issued by experts from different institutions and based on the best scientific evidence available to date. It is aimed at surgeons working in public institutions and private sectors. It seeks to promote strategies for improved surgical recovery and a safe cholecystectomy to offer our patients the best possible surgical outcome.

RESUMEN

En México, la colecistectomía es el procedimiento quirúrgico más frecuente en cirugía general. Los programas de recuperación mejorada en cirugía tienen como principal objetivo brindar un tratamiento eficiente basado en la mejor evidencia científica. El presente documento busca optimizar el desenlace quirúrgico de los pacientes sometidos a colecistectomía en nuestro país, a partir de una serie de recomendaciones emitidas por expertos de diferentes instituciones y basadas en la mejor evidencia científica disponible hasta este momento. Está dirigida tanto a cirujanos que trabajan en instituciones públicas como aquellos en el sector privado, además busca difundir estrategias para una recuperación quirúrgica mejorada y, ante todo, para una colecistectomía segura, con el objetivo de ofrecer a nuestros pacientes el mejor desenlace quirúrgico posible.

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INTRODUCTION

Gallbladder lithiasis is a frequent condition in our environment and the leading cause of cholecystitis and biliary colic. In Mexico, cholecystectomy is the most frequently performed surgical procedure in general surgery.[1] In spite of the technological advances and the different modifications in the conventional technique for performing cholecystectomy, the procedure continues to be performed in our country both by conventional open and laparoscopic routes. The main objective of enhanced recovery programs in surgery is to provide efficient treatment based on the best scientific evidence to shorten the postoperative recovery time of patients, reduce the incidence of complications inherent to hospitalization and surgical treatment, and, consequently, reduce hospital costs. One of the initiatives of the Mexican Association of General Surgery (AMCG) A.C. is to issue a series

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of recommendations that support national surgeons to have better surgical results, with the sole objective of increasing the quality of care of the Mexican population.[2,3] The above applies to the different modalities of the procedure and in any type of institution in the country; these are general recommendations applicable to all cases.

MATERIAL AND METHODS

This work aimed to reach a consensus of experts to issue recommendations during the preoperative, intraoperative, and postoperative periods to improve the surgical outcomes of patients who underwent cholecystectomy. All these recommendations are based on the best available scientific evidence and are oriented to general surgeons nationwide. For the purposes of these guidelines, a consensus was reached using the Delphi panel methodology, with the participation of two types of experts: firstly, surgeons with training in hepatopancreatobiliary surgery and/or transplant and/or oncologic surgery and with particular interest in this area; and secondly, general surgeons with extensive experience in cholecystectomy, who have performed more than 50 cholecystectomies per year during the last 10 years.[4,5] A total of 32 questions were developed, then submitted to the panel for consideration and answered based on the best available evidence. The answers were stated as statements and submitted electronically to an anonymous vote for electronic approval to ascertain the level of agreement with the statements. After three rounds, a consensus percentage of greater than 80% was reached in 28 statements; in one case, the agreement was 77%, and in three cases, there was no consensus. All the experts approved the final document. None of the authors declared a conflict of interest.

The recommendations are based on the level of evidence available, according to the Grading of Recommendations Assessment, Development and Evaluation (GRADE) classification: grade A, level 1 evidence corresponding to randomized clinical trials; grade B, corresponding to level 2 or 3 evidence, are cohort or case-control studies; grade C, recommendations based on studies with level 4 evidence, that is, case series or cohort studies of poor quality; and grade D, which are recommendations based on level 5 evidence, corresponding to expert opinion. The quality of the evidence for each recommendation was classified as high, moderate, low, or very low. The grade of each recommendation was assigned as strong (recommended) or weak (suggested).[2,6]

RESULTS

Recommendations

Preoperative

1. In which cases is cholecystectomy recommended for asymptomatic cholelithiasis?

At present, cholecystectomy is not recommended when incidental lithiasis is found.[7-9] Although there are circumstances in which the risk/benefit of prophylactic cholecystectomy can be evaluated, such as patients on transplant protocol, patients on the protocol for bariatric surgery, and regions with a high risk of gallbladder cancer, there is no consensus to date to recommend cholecystectomy in asymptomatic patients routinely.[10-13]

Percentage of agreement: 61.5%. Level of evidence: 2, grade: B, recommendation: strong.

2. Is gallbladder dyskinesia an indication of cholecystectomy?

The diagnosis of biliary dyskinesia within the functional disorders of the gallbladder and biliary sphincter is based on the definition of Rome IV guidelines.[14] Although gallbladder dyskinesia is associated with concomitant gastrointestinal disorders, cholecystectomy can provide relief of symptoms secondary to functional gallbladder disorder in most adult patients (> 90%). Therefore, cholecystectomy is considered the standard treatment for biliary dyskinesia, as up to 90% of patients have symptomatic relief.[15-18]

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Percentage of agreement: 92.3%. Level of evidence: 2, grade: B, recommendation: strong.

3. Is the presence of gallbladder polyps an indication of cholecystectomy?

In patients with vesicular polyps, treatment should be individualized, considering the size, number, and ultrasonographic characteristics of the polyps and the patient's symptomatology.[20]

In patients with gallbladder polyps larger than 10 mm, cholecystectomy is recommended due to the described risk of malignant transformation; in polyps smaller than 10 mm with concomitant biliary pathology (lithiasis) or biliary symptoms, surgical treatment is also recommended.[20,21]

In patients with asymptomatic polyps smaller than 10 mm, follow-up imaging (abdominal ultrasound) is recommended every six months; if growth is demonstrated or symptoms develop during follow-up, cholecystectomy is recommended.[20-24]

Percentage of agreement: 92.3%. Level of evidence: 2, grade: B, recommendation: strong.

4. What are the minimum preoperative studies (laboratory and imaging) recommended for elective and/or emergency cholecystectomy, and what are these studies' validity?

In the case of elective surgery, it is recommended that complete blood count, blood chemistry, liver function tests (including bilirubin and liver enzymes), and coagulation tests be performed as part of the pre-surgical protocol in all patients. Among the imaging studies, liver and biliary tract ultrasound is suggested.[3] In patients over 50 years of age, chest X-ray and electrocardiogram are also suggested.[25-27]

The validity of these studies ranges from one to three months if the patient remains clinically stable.

In patients with acute cholecystitis who are considered for emergency cholecystectomy, pancreatic function tests (serum amylase and lipase) are also suggested.

Percentage of agreement: 92.3%. Level of evidence: 5, grade: D, recommendation: strong.

5. What are the recommended assessments prior to elective cholecystectomy scheduling?

According to the American Society of Anesthesiologists (ASA) classification, anesthesiology evaluation is recommended prior to surgery for ASA I patients under 40 years of age.

Preoperative evaluation by an internist is recommended for ASA I patients over 40 and ASA II and older patients (regardless of age).

Depending on the patient's comorbidities, in the case of patients with known conditions (heart disease, lung disease, kidney disease, rheumatologic pathologies, and others), assessment by the corresponding specialty should be considered, especially in cases of decompensation of the underlying pathology.[28,29]

Percentage of agreement: 92.3%. Level of evidence: 2, grade: B, recommendation: strong.

6. In which cases is it recommended to have blood products for transfusion?

It is recommended that blood products be available only to patients with known coagulation disorder or thrombocytopenia.[3,30]

Percentage of agreement: 85%. Level of evidence: 2, grade: B, recommendation: strong.

7. What is the ideal time for scheduling elective and emergency cholecystectomies?

According to the 2018 Tokyo Guidelines, urgent cholecystectomy is recommended within 24 hours in cases of severe acute

cholecystitis. In cases of moderate acute cholecystitis, early cholecystectomy is suggested between 24 and 72 hours. In mild acute cholecystitis, early cholecystectomy is suggested within the first seven days of the onset of the symptoms to reduce the risk of complications.[31-33]

Surgical resolution is suggested in patients with chronic cholecystitis within 30 days[34,35] *(Table 1)*.

Percentage of agreement: 85%. Level of evidence: 2, grade: B, recommendation: strong.

8. Is it recommended to perform cholecystectomies during the night shift?

Elective cholecystectomy at night is not recommended. In cases of acute cholecystitis, urgent cholecystectomy can be performed if the hospital has all the resources (medical and infrastructure) to offer a safe procedure.[36-39]

Percentage of agreement: 85%. Level of evidence: 2, grade: B, recommendation: strong.

9. Is antimicrobial prophylaxis recommended? In which cases?

Antimicrobial prophylaxis is recommended in all cases, with one dose before the incision.[40-44]

Percentage of agreement: 92.3%. Level of evidence: 1, grade: A, recommendation: strong.

Table 1: Ideal cholecystectomy scheduling time.

Severity according to Tokyo Guidelines 18	Conduct
Cholecystitis	
Acute severe	First 24 hours
Moderate acute	Between 24 and 72 hours
Mild acute	First 7 days
Chronic	30 days

10. Is antithromboembolic prophylaxis recommended?

Antithromboembolic prophylaxis is only recommended in patients at high thromboembolic risk, with a score on the Caprini scale greater than or equal to 5 points.[45-47]

Percentage of agreement: 92.3%. Level of evidence: 2, grade: B, recommendation: strong.

11. What prehabilitation maneuvers are recommended for elective cholecystectomy?

In general, in all patients scheduled for elective cholecystectomy, control of comorbidities should be optimized (adequate glycemic and blood pressure control), and smoking should be suspended.

Among the main perioperative risks associated with smoking are an increased risk of myocardial infarction, arrhythmia, and stroke. The risk of postoperative pneumopathy doubles; there is an alteration of skin healing, increased postoperative pain and postoperative consumption of opioids, and risk of withdrawal syndrome.[3,48-51]

Percentage of agreement: 92.3%. Level of evidence: 2, grade B, recommendation: strong.

Transoperative

12. What is the recommended anesthetic technique for elective and/or emergency cholecystectomy?

General anesthesia is considered the technique of choice for cholecystectomy. It is less uncomfortable for the patient with the changes in position required for the procedure because it facilitates mechanical respiratory support and relaxation of the abdominal wall during surgery. Although regional anesthesia has proven to be equally effective in the patient's recovery process, hemodynamic stability, and lower risk of respiratory problems, the consensus recommendation is to opt for general anesthesia.[3,9,51,52]

Percentage of agreement: 100%. Level of evidence: 1, grade: A, recommendation: strong.

13. Is infiltration with local anesthetics recommended?

Infiltration of laparoscopy ports with local anesthetics is recommended.[53-55]

Percentage of agreement: 100%. Level of evidence: 1, grade: A, recommendation: strong.

14. Which surgical approach (open or laparoscopic) is recommended for elective and/or urgent cholecystectomy?

In all cases, as long as the resources and experience are available, the laparoscopic approach is recommended; among the most frequent contraindications for a laparoscopic approach are anatomical alterations or adhesions from previous abdominal procedures and the inability to tolerate pneumoperitoneum; however, depending on each case, the feasibility of this approach should be evaluated as long as all the resources are available to perform the procedure safely.[1,3,9,25,26,31,33,56-58]

Percentage of agreement: 100%. Level of evidence: 2, grade: B, recommendation: strong

15. In the case of laparoscopic cholecystectomy, how many access ports should be used?

Laparoscopic cholecystectomy with four ports is considered the gold standard since it allows for better exposure to the surgical field and facilitates obtaining a critical safety view, decreasing the risk of biliary tract disruption. Although techniques with three, two, or only one port have been described, studies report that the fewer the ports, the less postoperative pain, greater technical difficulty, longer surgical time, and greater risk of bleeding have also been reported. These techniques with less than four ports require a longer learning curve, and in some cases, they will not be feasible and will require "conversion" to conventional laparoscopy (four ports) by placing additional trocars, and in the long-term follow-up they are associated with a higher risk of incisional hernia (mainly in single port). On the other hand, there are no significant differences in terms of hospital stay, analgesic requirement, conversion rate to open procedure, or immune response to surgical stress compared to the four-port technique.

Therefore, although these techniques may have comparable results in selected patients and with experienced surgeons, the consensus recommendation is four-port laparoscopic cholecystectomy.[59,60]

Percentage of agreement: 100%. Level of evidence: 2, grade: B, recommendation: strong.

16. In the case of laparoscopic cholecystectomy, what is the recommended entry technique for pneumoperitoneum insufflation?

In general, there is no completely safe entry technique; closed techniques have been described, such as the use of the Veress needle, or open techniques, such as the Hasson technique; however, to date, there is no consensus as to the ideal technique for access to the abdominal cavity and for pneumoperitoneum insufflation. Each surgeon should perform the technique with which he/she was trained and with which he/she is familiar, to reduce the risk of complications.[61-63]

Percentage of agreement: 54%. Level of evidence: 2, grade: B, recommendation: weak.

17. In which cases is the conversion from a laparoscopic to an open approach recommended?

Conversion should be considered as a strategy to perform a safe procedure and for the resolution of transoperative complications; within the indications for conversion should be considered those derived from systemic complications (as in the case of patients who cannot tolerate pneumoperitoneum), complications attributable to local inflammation (multiple adhesions, fibrosis that makes it difficult to correctly identify the anatomy or inflammatory processes that are difficult to

dissect) or transoperative complications (such as bleeding that is difficult to control, intestinal perforation or any that cannot be resolved by laparoscopy).[56,64,65]

Before conversion, when obtaining a critical view of safety is impossible, it is suggested to consider salvage procedures, such as subtotal cholecystectomy (fenestrated or reconstituted).[64,66-70]

Conversion should also be considered in cases of technical failure of the equipment when there is a need to explore the biliary tract, when there is no adequate equipment to perform it laparoscopically, and when the surgeon is uncomfortable with the approach or exposure in laparoscopy.[64-66,71-73]

Percentage of agreement: 100%.
Level of evidence: 2, grade: B, grade of recommendation: strong.

18. In which cases is it recommended to perform the "critical safety overview"?

Always. Strasberg's critical view of safety has three dissection goals, which are maintained as the first recommendation for the culture of safe cholecystectomy. These goals consist of 1) complete dissection (anterior and posterior) of the hepatocystic triangle freeing fatty and fibrous tissue to observe and identify, in a complete manner, the cystic artery and cystic duct, 2) exposure of the lower third of the gallbladder bed, and 3) observe two and only two tubular structures entering the gallbladder corresponding to the cystic artery and cystic duct.[66]

By obtaining this safety-critical view, within this dissection space, up to 95% of the vascular variations and more than 80% of the anatomical variants of the extrahepatic bile duct can be identified.

If this critical safety view is not possible, it is recommended a salvage procedure, such as subtotal cholecystectomy and drainage, derivative cholecystostomy, or conversion to open surgery be considered [1,56,66,69,70,74-80] *(Figure 1)*.

Percentage of agreement: 100%.
Level of evidence: 1, grade: A, grade of recommendation: strong.

19. In which cases is transoperative cholangiography indicated?

The use of transoperative cholangiography is recommended in those patients with uncertainty of the biliary anatomy and in those with suspected choledocholithiasis (dilatation of the cystic duct and main bile duct, obstructive jaundice, or alteration in liver function tests). In cases of suspected bile duct disruption, transoperative cholangiography allows for the characterization of the extent of the disruption.[56,70,77-79]

Percentage of agreement: 100%.
Level of evidence: 2, grade: B, grade of recommendation: strong.

20. In which case is a salvage procedure (subtotal cholecystectomy/cholecystostomy/ conversion) indicated?

Depending on the surgeon's experience, whenever a critical safety view is not possible, a rescue procedure, such as subtotal cholecystectomy and drainage, derivative cholecystostomy, or conversion to open surgery, is recommended.

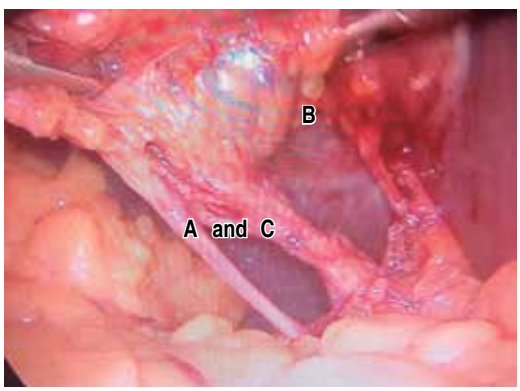


Figure 1: *Critical safety view.* ***A)*** *Complete dissection (anterior and posterior) of the hepatocystic triangle, freeing fatty and fibrous tissue to completely observe and identify the cystic artery and cystic duct.* ***B)*** *Exposure of the lower third of the vesicular bed.* ***C)*** *Observe two and only two tubular structures entering the gallbladder corresponding to the cystic artery and cystic duct.*

These salvage procedures should be considered when it is impossible to identify the structures of the hepatocystic triangle in acute or chronic inflammatory processes that are difficult to dissect and in unstable septic patients.

In patients with high surgical risk and severe cholecystitis, derivative cholecystostomy (percutaneous or surgical) can be considered as an alternative procedure for resolution of the septic process, with scheduling of interval cholecystectomy.[1,56,65,66,69,70,74,75]

Percentage of agreement: 100%.
Level of evidence: 1, grade: A, grade of recommendation: strong.

21. What other safety strategies are recommended for cholecystectomy?

Among the strategies to achieve a correct identification of the structures and to achieve a safe cholecystectomy, the following are recommended:

1. Strategies for anatomical orientation: B-SAFE, Rouviere's sulcus, R4U, and asking for a second trans-operative opinion in difficult cases (ask for help from a more experienced colleague).
2. Intraoperative imaging techniques: conventional transoperative cholangiography, infrared fluorescent cholangiography (indocyanine green), and intraoperative ultrasound.
3. Conversion: In cases in which tactile discrimination allows resolving doubts regarding the anatomy, a conversion to an open procedure can be chosen.
4. Fundus first: fundocystic or antegrade cholecystectomy has been associated with a higher risk of vasculobiliary lesions, mainly of the right hepatic artery. It is, therefore, no longer recommended except in exceptional cases.
5. Finally, in cases in which a safe procedure is not possible, the procedure can be aborted, and deferred cholecystectomy can be performed at another level of care with more experience and resources *(Table 2)*.[78,80-87]

Percentage of agreement: 85%.
Level of evidence: 2, grade: B, grade of recommendation: strong.

22. In which cases is the placement of drains recommended?

In general, drains are not routinely recommended in uncomplicated cholecystectomy; however, they are recommended in patients in whom a salvage procedure has been performed, those with septic processes (necrotic/emphysematous cholecystitis/pyocholecystitis), or when there is suspicion of biliary leakage.

Depending on the center's availability, in those cases in which it is decided to leave drainage, this should ideally be a closed and soft drainage, or in its absence, open and soft drainage. The placement of rigid drains is not recommended.[88-90]

Percentage of agreement: 100%.
Level of evidence: 1, grade: A, grade of recommendation: strong.

Postoperative

23. What are the recommendations for optimal postoperative analgesia?

In the transoperative period, infiltration of the laparoscopic access ports with local anesthetics is suggested. Postoperatively, most patients can be managed with paracetamol plus nonsteroidal anti-inflammatory analgesic with a schedule. On an individual basis, a stepwise approach is recommended, reserving opioid analgesia for selected cases.[53-55,91-93]

Percentage of agreement: 100%.
Level of evidence: 1, grade: A, grade of recommendation: strong.

24. What would be the ideal postoperative recommendations for an improved recovery?

After anesthetic recovery and in the absence of nausea or vomiting, the following measures for an improved recovery are recommended: initiation of the oral route, early ambulation,

and bathing. Bandaging is not recommended for laparoscopic surgery.

Hospital discharge can be performed the same day at the surgeon's discretion, as long as the following discharge criteria are met: pain control with oral analgesics according to the analog pain rating scale (VAS) of less than 4, adequate tolerance to the oral route, ambulation, ability to urinate, hemodynamic stability, full mental recovery, surgeon's approval, and absence of nausea and vomiting.[3,48-51]

Percentage of agreement: 85%. Level of evidence: 2, grade: B, recommendation: strong.

25. In which cases is the histopathological study of the gallbladder recommended

Histopathological studies are currently recommended in all cholecystectomy surgical specimens. If neoplasia is documented similarly, the patient should be referred to surgical oncology for complete staging and, if required, complete oncologic treatment.[94]

Percentage of agreement: 100%. Level of evidence: 2, grade: B, recommendation: strong.

26. What is the recommended postoperative follow-up after hospital discharge?

In general, an evaluation 7-10 days after discharge is recommended to know the postoperative evolution, to rule out complications, to review the histopathological study, and, if necessary, to remove the stitches. According to the evolution and at the surgeon's discretion, an assessment at 30 days for discharge is suggested.[25]

Percentage of agreement: 61%. Level of evidence: 5, grade: D, recommendation: weak.

27. How many days of incapacity for work are recommended after elective and/or emergency cholecystectomy?

Depending on whether the procedure was open or laparoscopic and whether there were any complications, 10 to 28 days are suggested. The type of work the patient performs should also be considered.[25]

Percentage of agreement: 77%. Level of evidence: 5, grade: D, recommendation: weak.

Table 2: Safety strategies.

Strategies for anatomical orientation	Critical Safety Overview B-SAFE Rouviere's groove R4U Second transoperative opinion
Intraoperative imaging techniques	Conventional transoperative cholangiography Infrared fluorescence cholangiography (indocyanine green) Intraoperative ultrasound
Subtotal cholecystectomy	Reconstituted Fenestrated
Conversion	In cases in which tactile discrimination allows the resolution of doubts regarding anatomy
Fundus first	It has been associated with an increased risk of vasculobiliary lesions, so it is only recommended in exceptional cases
Delayed cholecystectomy	In cases where a safe procedure is not possible, it may be aborted, and the patient may be referred to another level of care with more expertise and resources

R4U = Rouvière sulcus segment 4.

Special considerations

28. In which cases is cholecystectomy indicated during pregnancy?

Cholecystectomy during pregnancy is indicated exclusively in patients with acute cholecystitis.

Although laparoscopic cholecystectomy is considered safe and effective during all trimesters of pregnancy, in the third trimester, its feasibility should be carefully evaluated given the presence of the pregnant uterus..[95-99]

Percentage of agreement: 92.3%. Level of evidence: 3, grade: B, recommendation: strong.

Table 3: Cholecystectomy scheduling time in acute pancreatitis of biliary origin.

Severity according to Atlanta classification	Conduct
Mild acute pancreatitis	During the same hospitalization
Moderately severe acute pancreatitis without local complications	Once the systemic inflammatory response is controlled and there is no evidence of pancreatic necrosis
Moderately severe acute pancreatitis with local complications	It is recommended to defer cholecystectomy until the need for surgical resolution of complications (necrosis, pseudocyst) is determined
Severe acute pancreatitis without local complications	Once organic failures are resolved and the patient's clinical conditions allow them, surgery can be performed in the same hospitalization
Severe acute pancreatitis with local complications	Even when the organic failures are resolved and the patient's clinical conditions allow them, it is recommended to defer cholecystectomy until the need for surgical resolution of the complications is determined

29. In cases where cholecystectomy is required during pregnancy, what is the recommended approach?

Laparoscopic cholecystectomy is considered safe and effective during all trimesters of pregnancy; therefore, laparoscopic cholecystectomy is recommended in the first and second trimesters of pregnancy; however, in the third trimester, its feasibility should be assessed, and an open approach should be considered due to the presence of the pregnant uterus.[95-99]

Percentage of agreement: 100%. Level of evidence: 3, grade: B, recommendation: strong.

30. In patients with acute pancreatitis of biliary origin, when is cholecystectomy recommended?

In patients with acute pancreatitis of biliary origin, the performance of cholecystectomy will depend on the severity of the pancreatitis, the presence or absence of local complications, and the patient's general condition.

In patients with mild acute pancreatitis, according to the Atlanta criteria (without local or systemic complications), cholecystectomy is suggested during the same hospitalization to reduce the risk of recurrence.[100-103]

In moderately severe acute pancreatitis, the timing of cholecystectomy will depend on the presence of local complications; when there are no local complications, cholecystectomy can be performed once the systemic inflammatory response is controlled and there is no evidence of pancreatic necrosis. If local complications develop, it is recommended that cholecystectomy be deferred until the need for surgical resolution of the complications is determined.[104-105]

In severe acute pancreatitis, without local complications, surgery can be performed in the same hospitalization once the organic failures are resolved, and the patient's clinical conditions allow it. However, if pancreatic necrosis or other local complications develop, it is recommended to defer cholecystectomy until the need for surgical resolution of the complications is determined *(Table 3)*.

Percentage of agreement: 85%. Level of evidence: 1, grade: A, grade of recommendation: strong.

31. Which patients should be referred to as a third level of care for cholecystectomy?

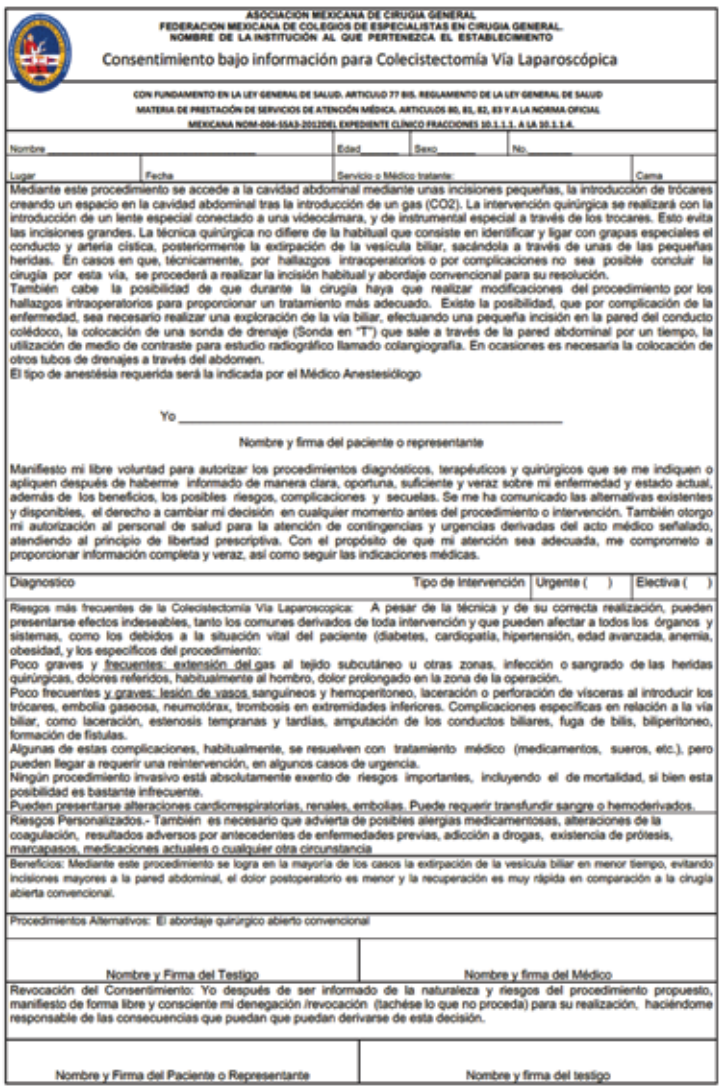
Cholecystectomy is considered a procedure that can be safely performed at a second level of care; however, in some cases, referral to a third level is recommended when the cholecystectomy has preoperative risk factors for being a problematic cholecystectomy, and the resources (medical and infrastructure) are not available to resolve it, in patients with icteric syndrome of unstudied etiology or with suspected gallbladder cancer.

Referral is also suggested in patients with underlying pathologies that merit third-level management.[3,25,28,29,32,56]

Percentage of agreement: 92.3%. Level of evidence: 5, grade: D, recommendation: weak.

32. What special considerations should the informed consent for cholecystectomy have?

It should be as detailed as possible and include minor and major risks associated with the patient's characteristics, those attributable to anatomical variants, inflammatory alterations, and technical failures of the equipment. It is suggested to specify bleeding risk, risk of biliary tract disruption or involvement of other organs, the possibility of conversion (in the case of laparoscopy), and even the possibility of not concluding the procedure due to technical difficulties and of performing a rescue procedure and/or subsequent referral to a center with hepatopancreatic biliary surgery or a third level of care.[106-109] *(Figure 2)*.



ASOCIACIÓN MEXICANA DE CIRUGÍA GENERAL
FEDERACION MEXICANA DE COLEGIOS DE ESPECIALISTAS EN CIRUGIA GENERAL.
NOMBRE DE LA INSTITUCIÓN AL QUE PERTENEZCA EL ESTABLECIMIENTO

Consentimiento bajo información para Colecistectomía Vía Laparoscópica

CON FUNDAMENTO EN LA LEY GENERAL DE SALUD. ARTICULO 77 BIS. REGLAMENTO DE LA LEY GENERAL DE SALUD
MATERIA DE PRESTACIÓN DE SERVICIOS DE ATENCIÓN MÉDICA. ARTICULOS 80, 81, 82, 83 Y A LA NORMA OFICIAL
MEXICANA NOM-004-SSA3-2012DEL EXPEDIENTE CLÍNICO FRACCIONES 10.1.1.1. A LA 10.1.1.4.

Nombre ____ Edad ____ Sexo ____ No. ____

Lugar ____ Fecha ____ Servicio o Médico tratante: ____ Cama ____

Mediante este procedimiento se accede a la cavidad abdominal mediante unas incisiones pequeñas, la introducción de trócares creando un espacio en la cavidad abdominal tras la introducción de un gas (CO_2). La intervención quirúrgica se realizará con la introducción de un lente especial conectado a una videocámara, y de instrumental especial a través de los trocares. Esto evita las incisiones grandes. La técnica quirúrgica no difiere de la habitual que consiste en identificar y ligar con grapas especiales el conducto y arteria cística, posteriormente la extirpación de la vesícula biliar, sacándola a través de unas de las pequeñas heridas. En casos en que, técnicamente, por hallazgos intraoperatorios o por complicaciones no sea posible concluir la cirugía por esta vía, se procederá a realizar la incisión habitual y abordaje convencional para su resolución.
También cabe la posibilidad de que durante la cirugía haya que realizar modificaciones del procedimiento por los hallazgos intraoperatorios para proporcionar un tratamiento más adecuado. Existe la posibilidad, que por complicación de la enfermedad, sea necesario realizar una exploración de la vía biliar, efectuando una pequeña incisión en la pared del conducto colédoco, la colocación de una sonda de drenaje (Sonda en "T") que sale a través de la pared abdominal por un tiempo, la utilización de medio de contraste para estudio radiográfico llamado colangiografía. En ocasiones es necesaria la colocación de otros tubos de drenajes a través del abdomen.
El tipo de anestésia requerida será la indicada por el Médico Anestesiólogo

Yo _____

Nombre y firma del paciente o representante

Manifiesto mi libre voluntad para autorizar los procedimientos diagnósticos, terapéuticos y quirúrgicos que se me indiquen o apliquen después de haberme informado de manera clara, oportuna, suficiente y veraz sobre mi enfermedad y estado actual, además de los beneficios, los posibles riesgos, complicaciones y secuelas. Se me ha comunicado las alternativas existentes y disponibles, el derecho a cambiar mi decisión en cualquier momento antes del procedimiento o intervención. También otorgo mi autorización al personal de salud para la atención de contingencias y urgencias derivadas del acto médico señalado, atendiendo al principio de libertad prescriptiva. Con el propósito de que mi atención sea adecuada, me comprometo a proporcionar información completa y veraz, así como seguir las indicaciones médicas.

Diagnostico ____ Tipo de Intervención ____ Urgente ( ) ____ Electiva ( )

Riesgos más frecuentes de la Colecistectomía Vía Laparoscopica: A pesar de la técnica y de su correcta realización, pueden presentarse efectos indeseables, tanto los comunes derivados de toda intervención y que pueden afectar a todos los órganos y sistemas, como los debidos a la situación vital del paciente (diabetes, cardiopatía, hipertensión, edad avanzada, anemia, obesidad, y los específicos del procedimiento:
Poco graves y frecuentes: extensión del gas al tejido subcutáneo u otras zonas, infección o sangrado de las heridas quirúrgicas, dolores referidos, habitualmente al hombro, dolor prolongado en la zona de la operación.
Poco frecuentes y graves: lesión de vasos sanguíneos y hemoperitoneo, laceración o perforación de vísceras al introducir los trócares, embolia gaseosa, neumotórax, trombosis en extremidades inferiores. Complicaciones específicas en relación a la vía biliar, como laceración, estenosis tempranas y tardías, amputación de los conductos biliares, fuga de bilis, biliperitoneo, formación de fistulas.
Algunas de estas complicaciones, habitualmente, se resuelven con tratamiento médico (medicamentos, sueros, etc.), pero pueden llegar a requerir una reintervención, en algunos casos de urgencia.
Ningún procedimiento invasivo está absolutamente exento de riesgos importantes, incluyendo el de mortalidad, si bien esta posibilidad es bastante infrecuente.
Pueden presentarse alteraciones cardiorrespiratorias, renales, embolias. Puede requerir transfundir sangre o hemoderivados.

Riesgos Personalizados.- También es necesario que advierta de posibles alergias medicamentosas, alteraciones de la coagulación, resultados adversos por antecedentes de enfermedades previas, adicción a drogas, existencia de prótesis, marcapasos, medicaciones actuales o cualquier otra circunstancia

Beneficios: Mediante este procedimiento se logra en la mayoría de los casos la extirpación de la vesícula biliar en menor tiempo, evitando incisiones mayores a la pared abdominal, el dolor postoperatorio es menor y la recuperación es muy rápida en comparación a la cirugía abierta convencional.

Procedimientos Alternativos: El abordaje quirúrgico abierto convencional

Nombre y Firma del Testigo ____ Nombre y firma del Médico

Revocación del Consentimiento: Yo después de ser informado de la naturaleza y riesgos del procedimiento propuesto, manifiesto de forma libre y consciente mi denegación /revocación (tachése lo que no proceda) para su realización, haciéndome responsable de las consecuencias que puedan que puedan derivarse de esta decisión.

Nombre y Firma del Paciente o Representante ____ Nombre y firma del testigo

Figure 2: *Informed consent letter.*

Percentage of agreement: 92.3%. Level of evidence: 5, grade: D, recommendation: strong.

CONCLUSIONS

This document seeks to optimize the outcome of patients undergoing cholecystectomy in our country based on a series of recommendations issued by experts from different institutions and based on the best scientific evidence available at this time. It is aimed both at surgeons working in public institutions and those in the private sector. It seeks to disseminate strategies for improved surgical recovery and, above all, for a safe cholecystectomy, seeking to offer our patients the best possible surgical outcome.

REFERENCES

1. Cano-Zepeda NI, De Gante-Aguilar JM. Cultura de seguridad, estrategia para prevenir la disrupción de la vía biliar. Cir Gen. 2018; 40: 179-183.
2. Pérez-Soto RH, Clemente-Gutiérrez U, Alvarado-Bachmann R, Basurto-Kuba EOP, Domínguez-Fonseca CB, Barajas-Fregoso EM, et al. Asociación mexicana de cirugía general, A.C. programa de recuperación quirúrgica mejorada. Cirugía endocrina tiroidea. Cir Gen. 2023; 45: 138-115. Available in: https://dx.doi.org/10.35366/112923
3. Romero RJ, Martinez-Mier G, Ayala-García MA, Beristain-Hernández JL, Chan-Nuñez LC, Chapa-Azuela O, et al. Establishing consensus on the perioperative management of cholecystectomy in public hospitals: a Delphi study with an expert panel in Mexico. HPB (Oxford). 2021; 23: 685-699. doi: 10.1016/j.hpb.2020.09.021.
4. Varela-Ruiz M, Díaz-Bravo L, García-Durán R. Descripción y usos del método Delphi en investigaciones del área de la salud. Inv Ed Med. 2012; 1: 90-95.
5. García Valdés M, Suárez Marín M. El método Delphi para la consulta a expertos en la investigación científica. Rev Cubana de Salud Pública. 2013; 39: 253-267.
6. Aguayo-Albasini JL, Flores-Pastor B, Soria-Aledo V. Sistema GRADE: clasificación de la calidad de la evidencia y graduación de la fuerza de la recomendación. Cir Esp. 2014; 92: 82-88. doi: 10.1016/j.ciresp.2013.08.002.
7. Godínez-Vidal AR, Hernández-Rodríguez GE, Montalvo-Jave EE, Chapa-Azuela O. Litiasis vesicular asintomática: ¿vigilar o intervenir? Rev Hosp Jua Mex. 2021; 88: 32-36.

8. Johnson AG, Fried M, Tytgat GNJ, Krabshuis JH. World gastroenterology organisation practice guidelines: litiasis vesicular asintomática. Consultado en: https://www.worldgastroenterology.org/UserFiles/file/guidelines/asymptomatic-gallstone-disease-spanish.pdf
9. Gurusamy KS, Davidson BR. Surgical treatment of gallstones. Gastroenterol Clin North Am. 2010; 39: 229-244. doi: 10.1016/j.gtc.2010.02.004.
10. Sakorafas GH, Milingos D, Peros G. Asymptomatic cholelithiasis: is cholecystectomy really needed? A critical reappraisal 15 years after the introduction of laparoscopic cholecystectomy. Dig Dis Sci. 2007; 52: 1313-1325. doi: 10.1007/s10620-006-9107-3.
11. Gupta D, Sakorafas GH, McGregor CG, Harmsen WS, Farnell MB. Management of biliary tract disease in heart and lung transplant patients. Surgery. 2000; 128: 641-649. doi: 10.1067/msy.2000.108210.
12. Begos DG, Franco KL, Baldwin JC, Lee FA, Revkin JH, Modlin IM. Optimal timing and indications for cholecystectomy in cardiac transplant patients. World J Surg. 1995; 19: 661-667. doi: 10.1007/BF00294752.
13. Lee SY, Jang JH, Kim DW, Park J, Oh HK, Ihn MH, et al. Incidental cholecystectomy in patients with asymptomatic gallstones undergoing surgery for colorectal cancer. Dig Surg. 2015; 32: 183-189. doi: 10.1159/000380961.
14. Cotton PB, Elta GH, Carter CR, Pasricha PJ, Corazziari ES. Rome IV. Gallbladder and sphincter of oddi disorders. Gastroenterology. 2016; S0016-5085(16)00224-9. doi: 10.1053/j.gastro.2016.02.033.
15. Clark CJ. An update on biliary dyskinesia. Surg Clin North Am. 2019; 99: 203-214. doi: 10.1016/j.suc.2018.11.004.
16. Presti ME, Elwing JE, Sayuk GS. Gallbladder dyskinesia. South Med J. 2022; 115: 838-841. doi: 10.14423/SMJ.0000000000001466.
17. Eltyeb HA, Al-Leswas D, Abdalla MO, Wayman J. Systematic review and meta-analyses of cholecystectomy as a treatment of biliary hyperkinesia. Clin J Gastroenterol. 2021; 14: 1308-1317. doi: 10.1007/s12328-021-01463-x.
18. Gudsoorkar VS, Oglat A, Jain A, Raza A, Quigley EMM. Systematic review with meta-analysis: cholecystectomy for biliary dyskinesia-what can the gallbladder ejection fraction tell us? Aliment Pharmacol Ther. 2019; 49: 654-663. doi: 10.1111/apt.15128.
19. Dave RV, Pathak S, Cockbain AJ, Lodge JP, Smith AM, Chowdhury FU, et al. Management of gallbladder dyskinesia: patient outcomes following positive (99) technetium (Tc)-labeled hepatic iminodiacetic acid (HIDA) scintigraphy with cholecystokinin (CCK) provocation and laparoscopic cholecystectomy. Clin Radiol. 2015; 70: 400-407.
20. Morera-Ocón FJ, Ballestín-Vicente J, Calatayud-Blas AM, de Tursi-Rispoli LC, Bernal-Sprekelsen JC. Indicaciones quirúrgicas en los pólipos de vesícula biliar [Surgical indications in gallbladder polyps]. Cir Esp. 2013; 91: 324-330. doi: 10.1016/j.ciresp.2012.04.018.
21. Elmasry M, Lindop D, Dunne D, Malik H, Poston G, Fenwick S, et al. The risk of malignancy in ultrasound detected gallbladder polyps: a systematic review. Int J Surg. 2016; 33: 28-35. doi: 10.1016/j.ijsu.2016.07.061.
22. Schnelldorfer T. Porcelain gallbladder: a benign process or concern for malignancy? J Gastrointest Surg. 2013; 17: 1161-1168. doi: 10.1007/s11605-013-2170-0.
23. Cariati A, Piromalli E, Cetta F. Gallbladder cancers: associated conditions, histological types, prognosis, and prevention. Eur J Gastroenterol Hepatol. 2014; 26: 562-569. doi: 10.1097/MEG.0000000000000074.
24. Izarzugaza MI, Fernández L, Forman D, Sierra MS. Burden of gallbladder cancer in central and South America. Cancer Epidemiol. 2016; 44: S82-S89. doi: 10.1016/j.canep.2016.07.021.
25. Guía de Práctica Clínica Diagnóstico y Tratamiento de Colecistitis y Colelitiasis, México; Instituto Mexicano del Seguro Social, 2010. Available in: http://www.imss.gob.mx/profesionales/guiasclinicas/Pages/guias.aspx
26. Nazar JC, Bastidas EJ, Lema FG. Exámenes preoperatorios de rutina en cirugía electiva: ¿Cuál es la evidencia? Rev Chil Cir. 2014; 66: 188-193. Available in: https://dx.doi.org/10.4067/S0718-40262014000200017
27. Guzmán-Calderón E, Carrera-Acosta L, Aranzabal-Durand S, Espinoza-Rivera S, Truijllo-Loli Y, Cruzalegui-Gómez R, et al. Guía de práctica clínica para el diagnóstico y manejo de la colelitiasis, colecistitis aguda y coledocolitiasis en el Seguro Social del Perú. Rev Gastroenterol Perú. 2022; 42: 58-69. Available in: http://dx.doi.org/10.47892/rgp.2022.421.1379
28. Guía de Práctica Clínica Valoración Preoperatoria en Cirugía No Cardiaca en el Adulto México: Instituto Mexicano del Seguro Social, 2011. Consultada en: http://www.imss.gob.mx/profesionales/guiasclinicas/Pages/guias.aspx
29. Cruz-Ahumada SJ. Actualidades en valoración preoperatoria y riesgo anestésico: un enfoque práctico para cirugía no cardiaca. Rev Mex Anestesiol. 2022; 45: 253-256. Available in: https://dx.doi.org/10.35366/106344
30. Romero-González RJ, Cuéllar-Aguirre C, Díaz-Hernández L. Impacto de las pruebas cruzadas de compatibilidad sanguínea de rutina antes de una colecistectomía. Cir Gen. 2019; 41: 26-32.
31. Yokoe M, Hata J, Takada T, Strasberg SM, Asbun HJ, Wakabayashi G, et al. Tokyo Guidelines 2018: diagnostic criteria and severity grading of acute cholecystitis (with videos). J Hepatobiliary Pancreat Sci. 2018; 25: 41-54. doi: 10.1002/jhbp.515.
32. Okamoto K, Suzuki K, Takada T, Strasberg SM, Asbun HJ, Endo I, et al. Tokyo Guidelines 2018: flowchart for the management of acute cholecystitis. J Hepatobiliary Pancreat Sci. 2018; 25: 55-72. doi: 10.1002/jhbp.516.
33. Kirkendoll SD, Kelly E, Kramer K, Alouidor R, Winston E, Putnam T, et al. Optimal timing of cholecystectomy

for acute cholecystitis: a retrospective cohort study. Cureus. 2022; 14: e28548. doi: 10.7759/cureus.28548.
34. Memisoglu E, Sari R. Timing of cholecystectomy in recurrent attacks of acute cholecystitis. Ulus Travma Acil Cerrahi Derg. 2022; 28: 508-512.
35. Bagepally BS, Haridoss M, Sasidharan A, Jagadeesh KV, Oswal NK. Systematic review and meta-analysis of gallstone disease treatment outcomes in early cholecystectomy versus conservative management/delayed cholecystectomy. BMJ Open Gastroenterol. 2021; 8: e000675. doi: 10.1136/bmjgast-2021-000675.
36. Geraedts ACM, Sosef MN, Greve JWM, de Jong MC. Is nighttime really not the right time for a laparoscopic cholecystectomy? Can J Gastroenterol Hepatol. 2018; 2018: 6076948. doi: 10.1155/2018/6076948.
37. Chama-Naranjo A, Cruz-Zárate A, Ruiz-Funes AP, Barbosa-Villareal F, Farell-Rivas J, Cuevas-Osorio VJ. ¿Día o noche? El momento ideal para realizar la colecistectomía. Rev Colomb Cir. 2022; 37: 597-603.
38. Merati-Kashani K, Canal C, Birrer DL, Clavien PA, Neuhaus V, Turina M. Nighttime cholecystectomies are safe when controlled for individual patient risk factors-a nationwide case-control analysis. World J Surg. 2021; 45: 2058-2065. doi: 10.1007/s00268-021-06021-7.
39. Phatak UR, Chan W, Lew DF, Escamilla RJ, Ko TC, Wray CJ, et al. Is nighttime the right time risk of complications after laparoscopic cholecystectomy at night? J Am Coll Surg. 2014; 219: 718-724. doi: 10.1016/j.jamcollsurg.2014.05.009.
40. Sanabria A, Dominguez LC, Valdivieso E, Gomez G. Antibiotic prophylaxis for patients undergoing elective laparoscopic cholecystectomy. Cochrane Database Syst Rev. 2010; (12): CD005265. doi: 10.1002/14651858.CD005265.pub2.
41. Matsui Y, Satoi S, Kaibori M, Toyokawa H, Yanagimoto H, Matsui K, Ishizaki M, Kwon AH. Antibiotic prophylaxis in laparoscopic cholecystectomy: a randomized controlled trial. PLoS One. 2014; 9: e106702. doi: 10.1371/journal.pone.0106702.
42. De Miguel-Palacio M, González-Castillo AM, Membrilla-Fernández E, Pons-Fragero MJ, Pelegrina-Manzano A, Grande-Posa L, et al. Impact of empiric antibiotic therapy on the clinical outcome of acute calculous cholecystitis. Langenbecks Arch Surg. 2023; 408: 345. doi: 10.1007/s00423-023-03063-4.
43. Kim SH, Yu HC, Yang JD, Ahn SW, Hwang HP. Role of prophylactic antibiotics in elective laparoscopic cholecystectomy: a systematic review and meta-analysis. Ann Hepatobiliary Pancreat Surg. 2018; 22: 231-247. doi: 10.14701/ahbps.2018.22.3.231.
44. Gomi H, Solomkin JS, Schlossberg D, Okamoto K, Takada T, Strasberg SM, et al. Tokyo Guidelines 2018: antimicrobial therapy for acute cholangitis and cholecystitis. J Hepatobiliary Pancreat Sci. 2018; 25: 3-16. doi: 10.1002/jhbp.518.
45. Blake AM, Toker SI, Dunn E. Deep venous thrombosis prophylaxis is not indicated for laparoscopic cholecystectomy. JSLS. 2001; 5: 215-219.
46. Stromberg J, Sadr-Azodi O, Videhult P, Hammarqvist F, Sandblom G. Incidence and risk factors for symptomatic venous thromboembolism following cholecystectomy. Langenbecks Arch Surg. 2015; 400: 463-469. doi: 10.1007/s00423-015-1284-0.
47. Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) Guidelines Committee. Guidelines for deep venous thrombosis prophylaxis during laparoscopic surgery. Surg Endosc. 2007; 21: 1007-1009. doi: 10.1007/s00464-007-9340-7.
48. Mendoza-Vélez MLÁ, Cárdenas-Lailson LE, Barlandas-Quintana E, Zubillaga-Mares A. Use of enhanced recovery after surgery protocol in laparoscopic cholecystectomy in patients with symptomatic cholelithiasis. Cir Cir. 2022; 90: 50-55. doi: 10.24875/CIRU.21000489.
49. Scott MJ, Baldini G, Fearon KC, Feldheiser A, Feldman LS, Gan TJ, et al. Enhanced recovery after surgery (ERAS) for gastrointestinal surgery, part 1: pathophysiological considerations. Acta Anaesthesiol Scand. 2015; 59: 1212-1231. doi: 10.1111/aas.12601.
50. Feldheiser A, Aziz O, Baldini G, Cox BP, Fearon KC, Feldman LS, et al. Enhanced recovery after surgery (ERAS) for gastrointestinal surgery, part 2: consensus statement for anesthesia practice. Acta Anaesthesiol Scand. 2016; 60: 289-334. doi: 10.1111/aas.12651.
51. Pisano M, Allievi N, Gurusamy K, Borzellino G, Cimbanassi S, Boerna D, et al. 2020 World Society of Emergency Surgery updated guidelines for the diagnosis and treatment of acute calculus cholecystitis. World J Emerg Surg. 2020; 15: 61. doi: 10.1186/s13017-020-00336-x.
52. Asaad P, O'Connor A, Hajibandeh S, Hajibandeh S. Meta-analysis and trial sequential analysis of randomized evidence comparing general anesthesia vs regional anesthesia for laparoscopic cholecystectomy. World J Gastrointest Endosc. 2021; 13: 137-154. doi: 10.4253/wjge.v13.i5.137.
53. Cantore F, Boni L, Di Giuseppe M, Giavarini L, Rovera F, Dionigi G. Pre-incision local infiltration with levobupivacaine reduces pain and analgesic consumption after laparoscopic cholecystectomy: a new device for day-case procedure. Int J Surg. 2008; 6: S89-92. doi: 10.1016/j.ijsu.2008.12.033.
54. Altuntá G, Akkaya OT, Ozkan D, Sayn MM, Balas S, Ozlü E. Comparison of intraabdominal and trocar site local anaesthetic infiltration on postoperative analgesia after laparoscopic cholecystectomy. Turk J Anaesthesiol Reanim. 2016; 44: 306-311. doi: 10.5152/TJAR.2016.75983.
55. Inan A, Sen M, Dener C. Local anesthesia use for laparoscopic cholecystectomy. World J Surg. 2004; 28: 741-744. doi: 10.1007/s00268-004-7350-3.
56. Brunt LM, Deziel DJ, Telem DA, Strasberg SM, Aggarwal R, Asbun H, et al. Safe cholecystectomy multi-society practice guideline and state-of-the-art consensus conference on prevention of bile duct injury during cholecystectomy. Ann Surg. 2020; 272: 3-23. doi: 10.1097/SLA.0000000000003791.
57. Yamashita Y, Takada T, Strasberg SM, Pitt HA, Gouma DJ, Garden OJ, et al. TG13 surgical management of acute cholecystitis. J Hepatobiliary

Pancreat Sci. 2013; 20: 89-96. doi: 10.1007/s00534-012-0567-x.
58. The role of laparoscopic cholecystectomy (L.C.). Guidelines for clinical application. Society of American Gastrointestinal Endoscopic Surgeons (SAGES). Surg Endosc. 1993; 7: 369-370.
59. Gurusamy K, Vaughan J, Rossi M, Davidson BR. Fewer-than-four ports versus four ports for laparoscopic cholecystectomy. Cochrane Database Syst Rev. 2014; 2: CD007109. doi: 10.1002/14651858.CD007109.pub2.
60. Nip L, Tong KS, Borg CM. Three-port versus four-port technique for laparoscopic cholecystectomy: systematic review and meta-analysis. BJS Open. 2022; 6: zrac013. doi: 10.1093/bjsopen/zrac013.
61. Kumar S, Dubey IB, Aggarwal VC, Soni RK. Evaluation of open (Hasson's) and closed (Veress) technique of intraperitoneal access for creation of pneumoperitoneum in laparoscopic surgery. Cureus. 2024; 16: e54770. doi: 10.7759/cureus.54770.
62. Elnaggar AA, Diab KR, El-Hangour BA, Kamel IS, Farhat AM, Abdelsattar AT, et al. Direct trocar insertion vs. Veress needle technique in laparoscopic surgeries. A systematic review and meta-analysis. J Visc Surg. 2023; 160: 337-345. doi: 10.1016/j.jviscsurg.2023.02.001.
63. Raimondo D, Raffone A, Travaglino A, Ferla S, Maletta M, Rovero G, et al. Laparoscopic entry techniques: Which should you prefer? Int J Gynaecol Obstet. 2023; 160: 742-750. doi: 10.1002/ijgo.14412.
64. Nassar AHM, Hodson J, Ng HJ, Vohra RS, Katbeh T, Zino S, et al. Predicting the difficult laparoscopic cholecystectomy: development and validation of a preoperative risk score using an objective operative difficulty grading system. Surg Endosc. 2020; 34: 4549-4561. doi: 10.1007/s00464-019-07244-5. Erratum in: Surg Endosc. 2023; 37(3): 2415.
65. Granados-Romero JJ, Nieva-Kehoe R, Olvera-Gómez G, Londaiz-Gómez, Cabal-Jiménez KE, Sánchez-Ávila D, et al. Criterios de conversión de cirugía laparoscópica a cirugía abierta y complicaciones poscolecistectomía: Una estadificación preoperatoria. Rev Mex Cir Endos. 2001; 2: 134-141.
66. Strasberg SM. A three-step conceptual roadmap for avoiding bile duct injury in laparoscopic cholecystectomy: an invited perspective review. J Hepatobiliary Pancreat Sci. 2019; 26: 123-127. doi: 10.1002/jhbp.616.
67. Vargas Rodríguez LJ, Agudelo Sanabria MB, Lizcano Contreras RA, Martínez Balaguera YM, Velandia Bustcara EL, Sáchez Hernández SJ, Quintero MJ. Factores asociados con la conversión de la colecistectomía laparoscópica a colecistectomía abierta. Rev Colomb Gastroenterol. 2017; 32: 20-23. Available in: https://doi.org/10.22516/25007440.125
68. Morales-Maza J, Rodríguez-Quintero JH, Santes O, Aguilar-Frasco JL, Romero-Vélez G, Sánchez García-Ramos E, et al. Conversión de colecistectomía laparoscópica a abierta: análisis de factores de riesgo con base en parámetros clínicos, de laboratorio y de ultrasonido. Rev Gastroenterol Mex. 2021; 86: 363-369. Available in: https://doi.org/10.1016/j.rgmx.2020.07.011.
69. Strasberg SM, Brunt LM. Rationale and use of the critical view of safety in laparoscopic cholecystectomy. J Am Coll Surg. 2010; 211: 132-138.
70. Wakabayashi G, Iwashita Y, Hibi T, Takada T, Strasberg SM, Asbun HJ, et al. Tokyo Guidelines 2018: surgical management of acute cholecystitis: safe steps in laparoscopic cholecystectomy for acute cholecystitis (with videos). J Hepatobiliary Pancreat Sci. 2018; 25: 73-86. doi: 10.1002/jhbp.517.
71. Vivek MA, Augustine AJ, Rao R. A comprehensive predictive scoring method for difficult laparoscopic cholecystectomy. J Minim Access Surg. 2014; 10: 62-67. doi: 10.4103/0972-9941.129947.
72. Martínez-Mier G, Mendez-Rico D, Reyes-Ruiz JM, Moreno-Ley PI, Bernal-Dolores V, Avila-Mercado O. External validation of two scoring tools to predict the operative duration and open conversion of elective laparoscopic cholecystectomy in a Mexican population. Dig Surg. 2023; 40: 108-113. doi: 10.1159/000531087.
73. Bilimoria KY, Liu Y, Paruch JL, Zhou L, Kmiecik TE, Ko CY, et al. Development and evaluation of the universal ACS NSQIP surgical risk calculator: a decision aid and informed consent tool for patients and surgeons. J Am Coll Surg. 2013; 217: 833-42. e1-3. doi: 10.1016/j.jamcollsurg.2013.07.385.
74. Strasberg SM, Pucci MJ, Brunt LM, Deziel DJ. Subtotal cholecystectomy-"fenestrating" vs "reconstituting" subtypes and the prevention of bile duct injury: definition of the optimal procedure in difficult operative conditions. J Am Coll Surg. 2016; 222: 89-96. doi: 10.1016/j.jamcollsurg.2015.09.019.
75. Abe T, Oshita A, Fujikuni N, Hattori M, Kobayashi T, Hanada K, et al. Efficacy of bailout surgery for preventing intraoperative biliary injury in acute cholecystitis. Surg Endosc. 2023; 37: 2595-2603. doi: 10.1007/s00464-022-09755-0.
76. Hajibandeh S, Hajibandeh S, Parente A, Laing RW, Bartlett D, Athwal TS, et al. Meta-analysis of fenestrating versus reconstituting subtotal cholecystectomy in the management of difficult gallbladder. HPB (Oxford). 2024; 26: 8-20. doi: 10.1016/j.hpb.2023.09.005.
77. Gupta V, Jain G. Safe laparoscopic cholecystectomy: adoption of universal culture of safety in cholecystectomy. World J Gastrointest Surg. 2019; 11: 62-84. doi: 10.4240/wjgs.v11.i2.62.
78. Hope WW, Fanelli R, Walsh DS, Narula VK, Price R, Stefanidis D, Richardson WS. SAGES clinical spotlight review: intraoperative cholangiography. Surg Endosc. 2017; 31: 2007-2016. doi: 10.1007/s00464-016-5320-0.
79. Hall C, Amatya S, Shanmugasundaram R, Lau NS, Beenen E, Gananadha S. Intraoperative cholangiography in laparoscopic cholecystectomy: a systematic review and meta-analysis. JSLS. 2023; 27: e2022.00093. doi: 10.4293/JSLS.2022.00093.
80. Hernández LCJ, Escobar SLA, Rementeria VJM, Toledo GZ, Ramírez RPL, Salinas RE, et al. Procedimientos

de rescate en colecistectomía laparoscópica: cómo finalizar con seguridad por laparoscopia. Ciencia Latina Revista Científica Multidisciplinar. 2023; 7: 783-798. Available in: https://doi.org/10.37811/cl_rcm.v7i2.5356
81. Tornqvist B, Waage A, Zheng Z, Ye W, Nilsson M. Severity of acute cholecystitis and risk of iatrogenic bile duct injury during cholecystectomy, a population-based case-control study. World J Surg. 2016; 40: 1060-1067.
82. Sanford DE, Strasberg SM. A simple effective method for generation of a permanent record of the critical view of safety during laparoscopic cholecystectomy by intraoperative "doublet" photography. J Am Coll Surg. 2014; 218: 170-178.
83. Madni TD, Leshikar DE, Minshall CT, Nakonezny PA, Cornelius CC, Imran JB, et al. The Parkland grading scale for cholecystitis. Am J Surg. 2018; 215: 625-630.
84. Sebastian M, Sebastian A, Rudnicki J. The evaluation of B-SAFE and ultrasonographic landmarks in safe orientation during laparoscopic cholecystectomy. Wideochir Inne Tech Maloinwazyjne. 2020; 15: 546-552. doi: 10.5114/wiitm.2020.100972.
85. Álvarez LF, Rivera D, Esmeral ME, García MC, Toro DF, Rojas OL. Colecistectomía laparoscópica difícil, estrategias de manejo. Rev Colomb Cir. 2013; 28: 186-195.
86. Subedi SS, Neupane D, Lageju N. Critical view of safety dissection and Rouviere's sulcus for safe laparoscopic cholecystectomy: a descriptive study. J Laparoendosc Adv Surg Tech A. 2023; 33: 1081-1087. doi: 10.1089/lap.2023.0262.
87. Bains L, Pradhan U. Safety landmarks in laparoscopic cholecystectomy. gallstones - newer insights and current trends. Intech Open; 2023. Available in: http://dx.doi.org/10.5772/intechopen.113223
88. Gurusamy K, Koti R, Davidson BR. Routine abdominal drainage versus no abdominal drainage for uncomplicated laparoscopic cholecystectomy. Cochrane Database Syst Rev. 2013; 9: CD006004. doi: 10.1002/14651858.CD006004.pub4.
89. Xu M, Tao YL. Drainage versus no drainage after laparoscopic cholecystectomy for acute cholecystitis: a meta-analysis. Am Surg. 2019; 85: 86-91.
90. Calini G, Brollo PP, Quattrin R, Bresadola V. Predictive factors for drain placement after laparoscopic cholecystectomy. Front Surg. 2022; 8: 786158. doi: 10.3389/fsurg.2021.786158.
91. Kehlet H, Gray AW, Bonnet F, Camu F, Fischer HB, McCloy RF, et al. A procedure-specific systematic review and consensus recommendations for postoperative analgesia following laparoscopic cholecystectomy. Surg Endosc. 2005; 19: 1396-1415. doi: 10.1007/s00464-004-2173-8.
92. Barazanchi AWH, MacFater WS, Rahiri JL, Tutone S, Hill AG, Joshi GP. Evidence-based management of pain after laparoscopic cholecystectomy: a PROSPECT review update. Br J Anaesth. 2018; 121: 787-803. doi: 10.1016/j.bja.2018.06.023.
93. Udayasankar M, Udupi S, Shenoy A. Comparison of perioperative patient comfort with 'enhanced recovery after surgery (ERAS) approach' versus 'traditional approach' for elective laparoscopic cholecystectomy. Indian J Anaesth. 2020; 64: 316-321. doi: 10.4103/ija.IJA_782_19.
94. Montalvo-Javé EE, Kurt RS, Pulido CA, Vazquez OR, Basurto KE. Hallazgos de anatomía patológica en una serie clínica de colecistectomía electiva. ¿Es frecuente el cáncer *in situ*? Cir Gen. 2013; 35: 36-40.
95. Sedaghat N, Cao AM, Eslick GD, Cox MR. Laparoscopic versus open cholecystectomy in pregnancy: a systematic review and meta-analysis. Surg Endosc. 2017; 31: 673-679. doi: 10.1007/s00464-016-5019-2.
96. Weinstein MS, Feuerwerker S, Baxter JK. Appendicitis and cholecystitis in pregnancy. Clin Obstet Gynecol. 2020; 63: 405-415. doi: 10.1097/GRF.0000000000000529.
97. Mazza GR, Youssefzadeh AC, Aberle LS, Anderson ZS, Mandelbaum RS, Ouzounian JG, et al. Pregnant patients undergoing cholecystectomy: nationwide assessment of clinical characteristics and outcomes. AJOG Glob Rep. 2024; 4: 100310. doi: 10.1016/j.xagr.2024.100310.
98. Mahjoubi MF, Dhaou AB, Maatouk M, Essid N, Rezgui B, Karoui Y, et al. Acute cholecystitis in pregnant women: A therapeutic challenge in a developing country center. Ann Hepatobiliary Pancreat Surg. 2023; 27: 388-393. doi: 10.14701/ahbps.23-031.
99. Zhang W, Yi H, Cai M, Zhang J. Management strategies for acute cholecystitis in late pregnancy: a multicenter retrospective study. BMC Surg. 2023; 23: 340. doi: 10.1186/s12893-023-02257-3.
100. Da Costa DW, Bouwense SA, Schepers NJ, Besselink MG, van Santvoort HC, van Brunschot S, et al. Same-admission versus interval cholecystectomy for mild gallstone pancreatitis (PONCHO): a multicentre randomised controlled trial. Lancet. 2015; 386: 1261-1268. doi: 10.1016/S0140-6736(15)00274-3.
101. Blundell JD, Gandy RC, Close JCT, Harvey LA. Time to interval cholecystectomy and associated outcomes in a population aged 50 and above with mild gallstone pancreatitis. Langenbecks Arch Surg. 2023; 408: 380. doi: 10.1007/s00423-023-03098-7.
102. Jee SL, Jarmin R, Lim KF, Raman K. Outcomes of early versus delayed cholecystectomy in patients with mild to moderate acute biliary pancreatitis: a randomized prospective study. Asian J Surg. 2018; 41: 47-54. doi: 10.1016/j.asjsur.2016.07.010.
103. Mueck KM, Wei S, Pedroza C, Bernardi K, Jackson ML, Liang MK, Ko TC, Tyson JE, Kao LS. Gallstone pancreatitis: admission versus normal cholecystectomy-a randomized trial (Gallstone PANC Trial). Ann Surg. 2019; 270: 519-527. doi: 10.1097/SLA.0000000000003424.
104. Di Martino M, Ielpo B, Pata F, Pellino G, Di Saverio S, Catena F, et al. Timing of cholecystectomy after moderate and severe acute biliary pancreatitis. JAMA Surg. 2023; 158: e233660. doi: 10.1001/jamasurg.2023.3660. Erratum in: JAMA Surg. 2024; 159: 353.
105. Zhong FP, Wang K, Tan XQ, Nie J, Huang WF, Wang XF. The optimal timing of laparoscopic cholecystectomy in patients with mild gallstone pancreatitis: a meta-

analysis. Medicine (Baltimore). 2019; 98: e17429. doi: 10.1097/MD.0000000000017429.
106. Secretaría de Salud, Diario Oficial de la Federación. Ley General de Salud, Secretaría de Salud, 14 de junio de 1992. Artículos 100 Fracc. IV 320 y 321.
107. Secretaría de Salud. Reglamento de la Ley General de Salud en materia de prestación de servicios médicos. Artículos 80 y 81.
108. Secretaría de Salud. Norma Oficial Mexicana NOM-004-SSA3-2012 Del Expediente Clínico. México: Diario Oficial de la Federación; 15-10-2012 Numerales 4.2 y 10.1.1.
109. Vázquez GAR, Ramírez BÉJ, Vázquez RJA, Cota GF, Gutiérrez MJA. Consentimiento informado. ¿Requisito legal o ético Cir Gen. 2017; 39: 175-182. doi: 10.35366/77032.

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