



Study of Clinical, Laboratory, and Radiological Predictors for Predicting the Difficulty Level of Laparoscopic Cholecystectomy



Dr. Lauve Bhatt ^a, Dr. Aum Vavadia ^b

Manuscript submitted: 27 July 2025, Manuscript revised: 18 August 2025, Accepted for publication: 04 September 2025

Corresponding Author ^a



Keywords

*Laboratory;
Laparoscopic
Cholecystectomy;
Radiological;*

Abstract

Laparoscopic cholecystectomy (LC) has become the gold-standard treatment for symptomatic gallstone disease. While often a routine procedure, its difficulty can vary, with some cases presenting significant technical challenges. A difficult LC is associated with increased operative time, higher rates of conversion to open surgery, and a greater risk of complications such as bile duct injury. Therefore, accurately predicting the difficulty level before surgery is crucial for patient counseling, surgical planning, and improving outcomes. This article explores the key clinical, laboratory, and radiological factors used to predict the difficulty of LC. Preoperative assessment of the patient's clinical history, laboratory results, and radiological findings is essential for predicting the difficulty of a laparoscopic cholecystectomy. By identifying high-risk patients, surgeons can optimize surgical planning, ensure the availability of experienced staff and appropriate resources, and provide more realistic counseling to the patient. Several studies have developed scoring systems that integrate these factors to provide a more objective prediction of surgical difficulty, thereby enhancing patient safety and improving the overall quality of care.

*International Journal of Health Sciences © 2025.
This is an open access article under the CC BY-NC-ND license
(<https://creativecommons.org/licenses/by-nc-nd/4.0/>).*

Contents

Abstract.....	883
1 Introduction.....	884
2 Clinical Predictors.....	884
3 Laboratory Investigations.....	885
4 Radiological Findings.....	885
5 Conclusion.....	885

^a Assistant Professor, Department of General Surgery, Sumandeep Vidyapeeth, India

^b 1st year Resident, Department of General Surgery, Narendra Modi Medical College, India

Acknowledgments.....	885
References	886
Biography of Authors	886

1 Introduction

Laparoscopic cholecystectomy (LC) has become the gold-standard treatment for symptomatic gallstone disease. While often a routine procedure, its difficulty can vary, with some cases presenting significant technical challenges. A difficult LC is associated with increased operative time, higher rates of conversion to open surgery, and a greater risk of complications such as bile duct injury (Jain, 2005). Therefore, accurately predicting the difficulty level before surgery is crucial for patient counseling, surgical planning, and improving outcomes. This article explores the key clinical, laboratory, and radiological factors used to predict the difficulty of LC.

2 Clinical Predictors

A thorough clinical assessment is the initial step in identifying a potentially challenging LC.

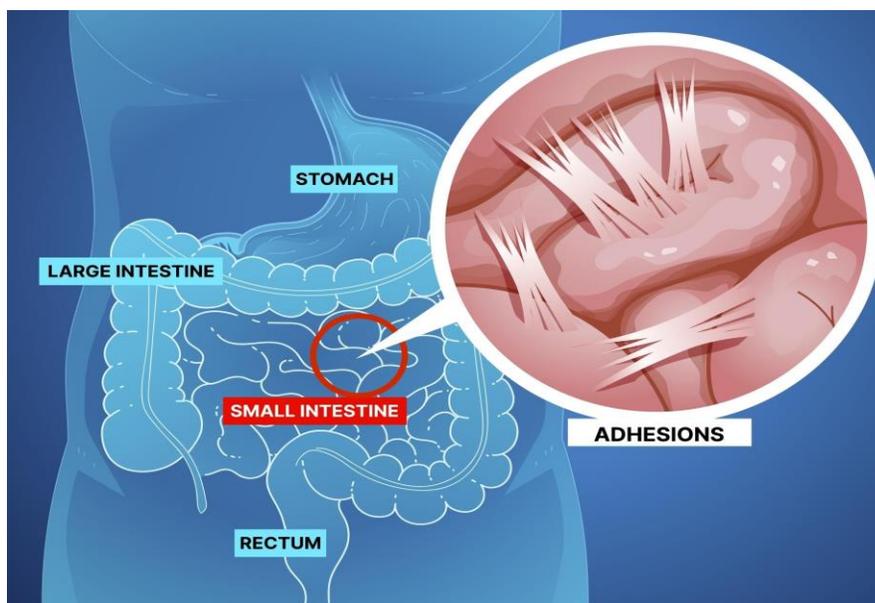
Demographics: Studies consistently show that older age and male gender are significant risk factors. Older patients often have more chronic inflammation and fibrosis, while male patients typically have denser tissue and a higher body mass index (BMI), which can complicate the procedure.

Body Mass Index (BMI): A high BMI, generally over 30 kg/m², is a well-established predictor of difficulty. Increased abdominal fat obstructs the surgeon's view and limits the working space for instruments, making it harder to identify anatomical landmarks and dissect the gallbladder.

History of Acute Cholecystitis: A history of prior hospitalization for acute cholecystitis is a strong indicator of a difficult procedure. These inflammatory episodes lead to chronic scarring and adhesions around the gallbladder.

Previous Upper Abdominal Surgery: Patients with prior upper abdominal surgeries are at a higher risk of extensive intraperitoneal adhesions, which can make initial port placement and subsequent dissection more hazardous and time-consuming.

Palpable Gallbladder: A clinically palpable gallbladder suggests severe inflammation, a distended gallbladder, or a mucocele, all of which can increase surgical difficulty.



3 Laboratory Investigations

Although less specific than clinical or imaging findings, certain laboratory tests can indicate an underlying inflammatory state that points to a more complex surgery.

Elevated White Blood Cell (WBC) Count: A high WBC count suggests an active inflammatory process, such as acute cholecystitis. The associated tissue edema and inflammation can make dissection more difficult and increase the risk of bleeding.

Deranged Liver Function Tests (LFTs): Abnormalities in LFTs, such as elevated bilirubin or alkaline phosphatase, may indicate a gallstone obstructing the bile duct. This can complicate the surgery and may require an intraoperative cholangiogram to confirm the anatomy or remove the stone (Puggioni & Wong, 2003).

4 Radiological Findings

Preoperative ultrasound (USG) is the most valuable tool for predicting LC difficulty. It provides a visual assessment of the gallbladder and surrounding structures (Saba et al., 2019).

Gallbladder Wall Thickness: A wall thickness greater than 3-4 mm is one of the most reliable predictors of a difficult LC. It is a key sign of chronic inflammation and fibrosis, leading to dense, scarred tissue that is hard to dissect.

Impacted Stone: A stone lodged in the neck of the gallbladder can cause localized inflammation and fibrosis, making it difficult to grasp the gallbladder and identify the critical structures of Calot's triangle (cystic duct, cystic artery, and common hepatic duct).

Pericholecystic Fluid Collection: The presence of fluid around the gallbladder indicates severe inflammation and edema, which can obscure anatomical planes and increase the risk of bile spillage.

Gallbladder Size and Shape: A shrunken, fibrotic gallbladder is a common finding in chronic disease and is often difficult to manipulate. Conversely, a significantly distended gallbladder can be fragile and prone to rupture.

5 Conclusion

Preoperative assessment of the patient's clinical history, laboratory results, and radiological findings is essential for predicting the difficulty of a laparoscopic cholecystectomy. By identifying high-risk patients, surgeons can optimize surgical planning, ensure the availability of experienced staff and appropriate resources, and provide more realistic counseling to the patient. Several studies have developed scoring systems that integrate these factors to provide a more objective prediction of surgical difficulty, thereby enhancing patient safety and improving the overall quality of care.

Acknowledgments

We are grateful to two anonymous reviewers for their valuable comments on the earlier version of this paper.

References

- Karmacharya, G., & Karki, S. (2017). Predictive factors for difficult laparoscopic cholecystectomy: a study from a tertiary care center. *Journal of Nepal Health Research Council*, 15(36), 148-152.
- Kasi, M., M., & Kasi, S. P. (2015). A study to predict difficult laparoscopic cholecystectomy. *International Journal of Research in Medical Sciences*, 3(7), 1672-1676.
- Livingston, E. H., & Rege, R. V. (2004). A nationwide study of the incidence of cholecystectomy. *American Journal of Surgery*, 188(1), 107-112.
- Nachnani, G., & Kumar, R. (2018). Preoperative prediction of difficult laparoscopic cholecystectomy based on clinical, laboratory, and sonographic parameters. *The Journal of Minimally Invasive Surgery*, 21(3), 118-122.
- Sood, P., & Kapoor, R. (2017). Predicting difficult laparoscopic cholecystectomy: a comparison of two scoring systems. *Journal of Clinical and Diagnostic Research: JCDR*, 11(2), PC01-PC04.
- Tayeb, M., & El-Lakany, H. (2019). Pre-operative scoring system for predicting difficult laparoscopic cholecystectomy. *The Egyptian Journal of Surgery*, 38(3), 565-570.
- Jain, K. K. (2005). Nanotechnology in clinical laboratory diagnostics. *Clinica chimica acta*, 358(1-2), 37-54. <https://doi.org/10.1016/j.cccn.2005.03.014>
- Puggioni, A., & Wong, L. L. (2003). A metaanalysis of laparoscopic cholecystectomy in patients with cirrhosis. *Journal of the American College of Surgeons*, 197(6), 921-926. <https://doi.org/10.1016/j.jamcollsurg.2003.08.011>
- Randhawa, M. S., & Singh, K. (2013). Pre-operative prediction of difficult laparoscopic cholecystectomy. *Indian Journal of Surgery*, 75(4), 282-286.
- Saba, L., Biswas, M., Kuppili, V., Godia, E. C., Suri, H. S., Edla, D. R., ... & Suri, J. S. (2019). The present and future of deep learning in radiology. *European journal of radiology*, 114, 14-24. <https://doi.org/10.1016/j.ejrad.2019.02.038>

Biography of Authors

	<p>Dr Lauve Bhatt Assistant Professor, Department of General Surgery, Sumandeep Vidyapeeth, India Email: lauvebhatt@gmail.com</p>
	<p>Dr. Aum Vavadia 1st year Resident, Department of General Surgery, Narendra Modi Medical College, India</p>