



EFFICACY OF LAPAROSCOPIC APPROACH IN EMERGENCY SURGICAL CONDITIONS- A PROSPECTIVE STUDY

Dr Vineet Sunaria	MBBS, Senior Resident, Deptt of General Surgery, Government Medical College, Patiala
Dr Dinesh Kumar Pasi*	MBBS, MS, Associate Professor, Deptt of General Surgery, Government Medical College, Patiala *Corresponding Author
Dr Parmod Kumar	MBBS, MD, Professor and Head, Deptt of Anaesthesia, Government Medical College, Patiala
Dr Ashwani Kumar	MBBS, MS, Professor and Head, Deptt of General Surgery, Government Medical College, Patiala
Dr Jaswinder Singh	MBBS, MS, Associate Professor, Deptt of General Surgery, Government Medical College, Patiala
Dr Parth Dhamija	MBBS, MS, Senior Resident, Deptt of General Surgery, Government Medical College, Patiala
Dr Manju Bala	MBBS, MD, Professor, Deptt of Anatomy, Government Medical College, Patiala

ABSTRACT

Background: Laparoscopic surgery is a minimally invasive technique used for diagnostic and therapeutic management of abdominal conditions. Its role has expanded to emergency surgeries due to benefits such as reduced pain, shorter hospital stay, faster recovery, and better cosmetic outcomes. **Materials and Methods:** A prospective study (2023–2024) including 50 emergency patients. Laparoscopy was performed using Veress needle or Hasson technique. Outcomes assessed included operative time, hospital stay, conversion to open surgery, recovery time, postoperative complications, and VAS pain score. **Results:** Most common indication was acute appendicitis (46%), followed by acute cholecystitis (20%) and perforation peritonitis (14%). Operative time ranged from 47 minutes (appendicitis) to 185 minutes (diaphragmatic hernia). Conversion rate was 32%, highest in perforation peritonitis (85%). Complications occurred in 20% of patients, and hospital stay ranged from 3–11 days. **Conclusion:** Laparoscopy is safe and effective in selected emergency abdominal conditions, offering less pain, shorter hospital stay, and faster recovery, though complex cases show higher conversion rates.

KEYWORDS : Laparoscopy, Emergency Surgery, Acute Appendicitis, Perforation Peritonitis.

INTRODUCTION

Laparoscopy is a minimally invasive surgical technique using a laparoscope inserted through small abdominal incisions to visualize and operate on internal organs¹. Initially elective, it's now widely used in emergencies. Key advantages include reduced pain, scarring, tissue trauma, blood loss, infection risk, and faster recovery compared to open surgery². However, limitations include technical challenges (restricted visibility, complex instruments increasing injury risk), longer procedure times, potential discomfort from CO₂ insufflation, and rare complications like gas embolism³. In complex or unstable emergencies, it may be unfeasible, requiring conversion to open surgery, but remains valuable for stable patients.

MATERIALS AND METHODS

Study Design

This prospective study was conducted at a tertiary care hospital between 2023 and 2024 and was completed after achieving the required sample size.

Study Population

A total of 50 patients presenting to the emergency department and undergoing laparoscopic surgery were included.

Inclusion Criteria

- Patients undergoing emergency laparoscopic surgery
- Patients fit for general anesthesia
- Patients providing informed consent
- Cases requiring conversion to open surgery

Exclusion Criteria

- Primary open surgeries
- Patients unfit for general anesthesia
- Patients unwilling to participate in the study

Surgical Technique

Pneumoperitoneum was established using either the closed technique (Veress needle) or open Hasson technique, with the latter preferred in suspected bowel obstruction or perforation. Carbon dioxide insufflation was maintained at 12–15 mmHg. Trocars were placed under direct vision, and procedures were performed using standard laparoscopic instruments including graspers, electrocautery, and suction-irrigation. At the end of the procedure, CO₂ was evacuated and port sites were closed after ensuring hemostasis.

Patient Positioning

Patient positioning was adjusted according to the surgical site. Trendelenburg position was used to improve pelvic exposure, while reverse Trendelenburg position facilitated upper abdominal access.

Outcome Measures

The primary outcomes assessed included operative time, duration of hospital stay, recovery time, conversion to open surgery, postoperative complications, and postoperative pain measured using the Visual Analog Scale (VAS) on postoperative day 0 and day 1. Operative time was recorded from Veress needle insertion to port closure, and recovery time was defined as the duration from discharge to return to normal daily activities.

RESULTS

Table 1: Patient Demographics and Diagnosis Distribution (N = 50)

Parameters	Number (%)
------------	------------

Mean Age	37.4±15.1 yrs
Gender	Males: 31 (62%) Females: 19 (38%)
Most Common Diagnosis	Acute Appendicitis: 23 (46%) Acute Cholecystitis: 10 (20%) Perforation Peritonitis: 7 (14%)

The mean age of patients was 37.4 ± 15.1 years, indicating that emergency laparoscopic procedures were commonly performed in young to middle-aged individuals. There was a male predominance (62%) compared to females (38%). Acute appendicitis (46%) was the most common indication, followed by acute cholecystitis (20%) and perforation peritonitis (14%).

Table 2: Operative and Postoperative Parameters by Diagnosis

Diagnosis	Mean operative time (min)	Hospital stay (days)	Conversion rate (%)	Recovery time (days)
Acute appendicitis	47.0	3.0	17.3%	10
Acute cholecystitis	64.6	4.1	30%	13
Perforation peritonitis	169.5	11.1	85%	25
Diaphragmatic hernia	185.0	8.0	66.6%	18
Liver abscess	78.5	6.0	0%	14
Trauma (Blunt/Stab)	70.0	7.0	0%	16

Acute appendicitis had the shortest operative time (47 minutes) and hospital stay (3 days). In contrast, perforation peritonitis and diaphragmatic hernia required longer operative times (169.5 and 185 minutes) due to disease complexity. The highest conversion rate was observed in perforation peritonitis (85%). Liver abscess and abdominal trauma were successfully managed laparoscopically without conversion. Recovery time ranged from 10 days in appendicitis to 25 days in perforation peritonitis.

Table 3: Complications, Conversion, and VAS Score Summary

Variable	Mean VAS POD 0	Mean VAS POD 1	Complication present (%)
Converted cases (n=16)	6.5	4.0	90%
Non- Converted cases (n=34)	4.3	2.3	10%
Total (n=50)	-	-	20%

Postoperative pain assessed by VAS was higher in patients requiring conversion to open surgery. Converted cases had mean VAS scores of 6.5 (POD 0) and 4.0 (POD 1), compared with 4.3 and 2.3 in non-converted cases. Complications were more frequent in converted cases (90%) than non-converted cases (10%), with an overall complication rate of 20%, indicating better outcomes with successful laparoscopic management.

DISCUSSION

Demographic Characteristics

Acute appendicitis commonly occurs in younger individuals. In the present study, most appendicitis cases were seen in younger patients, consistent with studies by Lotfollahzadeh et al.⁴ and Sartelli et al.,⁵ although Buckius et al.,⁶ reported increasing incidence in older populations. Acute cholecystitis was more common in middle-aged and older patients, with a mean age of 52.3 years, similar to observations by Huang et al.,⁷ and Jones et al.,⁸ who attributed this to sedentary lifestyle and dietary habits. However, Wadhwa et al.,⁹ reported increasing incidence among younger individuals due to rising obesity.

A male predominance was observed in appendicitis cases, consistent with studies by Al-Omran et al.,¹⁰ and Lotfollahzadeh et al.,⁴ possibly related to anatomical and hormonal factors. Acute cholecystitis showed female predominance, aligning with studies reporting increased gallstone formation due to estrogen. Conversely, Ambe et al.,¹¹ reported higher incidence of severe gallbladder inflammation in males. Perforation peritonitis accounted for 14% of cases with male predominance, similar to findings by Kopperundevi et al.,¹² while Neupane et al.,¹³ reported slightly higher incidence in females due to NSAID use.

Operative Outcomes, Postoperative Recovery and Complications

Acute Appendicitis:

This condition showed the shortest operative time (47 min) and hospital stay (3 days), similar to findings by Ingraham AM et al.,¹⁴ and Minutolo et al.,¹⁵. Conversion rate was 17.3%, mainly due to perforation or adhesions. Complication rates were low and comparable with previous studies.

Acute Cholecystitis:

The mean operative time was 64.6 minutes and hospital stay was 4.1 days. Conversion rate was 30%, higher than reported by Oymaci E et al.,¹⁶ and Rather et al.,¹⁷ likely due to dense adhesions and difficult Calot's triangle. Complication rate was approximately 10%.

Perforation Peritonitis:

These cases had the longest operative time (169.5 minutes) and highest conversion rate (85%) due to severe contamination and adhesions. Hospital stay and recovery time were also prolonged compared with studies by Harvitkar et al.,¹⁸ and Ates et al.,¹⁹ reflecting disease severity.

Ruptured Liver Abscess:

Laparoscopic management showed good outcomes with no conversions or complications and a hospital stay of 6 days, consistent with findings by Mogahed M.M et al.,²⁰ and Pham Hong Duc et al.,²¹

Abdominal Trauma:

Laparoscopy was effective with moderate operative time, short hospital stay, and no complications, supporting findings by Chakravartty et al.,²²

Congenital Diaphragmatic Hernia:

Operative time was longer with higher conversion rates due to large defects and surgical complexity compared with previous studies by Wadhwa et al.,²³ and Kumar et al.,²⁴.

Subacute Intestinal Obstruction:

The study showed a mean operative time of 185 minutes, hospital stay of 9 days, and recovery time of 18 days, with a 100% conversion to open surgery due to complex adhesions and difficult operative conditions. Despite these challenges, no postoperative complications occurred, likely because of careful dissection and timely conversion. In comparison, Byrne et al.,²⁵ reported shorter operative time, shorter hospital stay (5 days for laparoscopy and 7 days for open surgery), early recovery.

Strengths and Limitations

This study demonstrates the feasibility of laparoscopy in various emergency abdominal conditions. However, limitations include small sample size and higher conversion rates in complex cases. Emergency laparoscopy has only recently been introduced at our institute, which may explain these findings. With improved infrastructure and increasing surgical experience, outcomes are expected to improve.

CONCLUSION

Laparoscopy is a safe and effective approach for emergency

abdominal surgeries, particularly in stable patients with uncomplicated pathology. It offers advantages such as reduced postoperative pain, shorter hospital stay, and faster recovery. However, complex cases still show higher conversion rates, emphasizing the importance of appropriate patient selection and surgical expertise.

Conflict of Interest

The authors declare no conflict of interest.

Source of Funding

None.

Author Contributions

AK and PK designed the study. VS conducted the research. JS, DKP, and PD analyzed data. VS and PD prepared the manuscript. All authors approved the final manuscript.

REFERENCES

1. Brunnicardi, F. C., Andersen, D. K., Billiar, T. R., Dunn, D. L., Hunter, J. G., & Matthews, J. B. (2019). *Schwartz's principles of surgery* (11th ed.). McGraw-Hill Education.
2. Yi, X., Chen, S., Wang, W., & Zou, L. (2017). A systematic review and meta-analysis of laparoscopic and open distal pancreatectomy of nonductal adenocarcinomatous pancreatic tumor in the pancreatic body and tail. *Surgical Laparoscopy, Endoscopy & Percutaneous Techniques*, 27(4), 206–219.
3. Srivastava, A., & Niranjana, A. (2010). Secrets of safe laparoscopic surgery: Anaesthetic and surgical considerations. *Journal of Minimal Access Surgery*, 6(4), 91–94.
4. Lotfollahzadeh, S., Lopez, R. A., & Deppen, J. G. (2025). Appendicitis. In *StatPearls*. StatPearls Publishing.
5. Sartelli, M., Baiocchi, G. L., Di Saverio, S., et al. (2018). Prospective observational study on acute appendicitis worldwide (POSAW). *World Journal of Emergency Surgery*, 13, 19.
6. Buckius, M. T., McGrath, B., Monk, J., Grim, R., Bell, T., & Ahuja, V. (2012). Changing epidemiology of acute appendicitis in the United States: Study period 1993–2008. *Journal of Surgical Research*, 175(2), 185–190.
7. Huang, J., Chang, C. H., Wang, J. L., Lin, J. W., & Chen, P. C. (2009). Nationwide epidemiological study of severe gallstone disease in Taiwan. *BMC Gastroenterology*, 9, 63.
8. Jones, M. W., Genova, R., & O'Rourke, M. C. (2023). Acute cholecystitis. In *StatPearls*. StatPearls Publishing.
9. Wadhwa, V., Jobanputra, Y., Garg, S. K., Patwardhan, S., Mehta, D., & Sanaka, M. R. (2017). Nationwide trends of hospital admissions for acute cholecystitis in the United States. *Gastroenterology Report*, 5(1), 36–42.
10. Al-Omran, M., Mamdani, M., & McLeod, R. S. (2003). Epidemiologic features of acute appendicitis in Ontario, Canada. *Canadian Journal of Surgery*, 46(4), 263–268.
11. Ambe, P. C., Christ, H., & Wassenberg, D. (2015). Does the Tokyo guidelines predict the extent of gallbladder inflammation in patients with acute cholecystitis? A single-center retrospective analysis. *BMC Gastroenterology*, 15, 142.
12. Kopperundevi, V., & Anbarasan. (2016). A retrospective study on perforation peritonitis. *International Journal of Current Research*, 8(3), 27711–27714.
13. Neupane, S., Koirala, D. P., Kharel, S., Silwal, S., & Yadav, K. K. (2022). Clinical profile and management of perforation peritonitis in Bharatpur Hospital, Nepal: A prospective study. *Annals of Medicine and Surgery*, 82, 104528.
14. Ingraham, A. M., Cohen, M. E., Bilimoria, K. Y., Ko, C. Y., & Hall, B. L. (2010). Effect of delay to operation on outcomes in adults with acute appendicitis. *Archives of Surgery*, 145(9), 886–892.
15. Minutolo, V., Licciardello, A., Di Stefano, B., Arena, M., Arena, G., & Antonacci, V. (2014). Outcomes and cost analysis of laparoscopic versus open appendectomy for treatment of acute appendicitis: Four years' experience in a district hospital. *BMC Surgery*, 14, 14.
16. Oymaci, E., Ucar, A. D., Aydogan, S., Sari, E., Erkan, N., & Yildirim, M. (2014). Evaluation of factors affecting conversion to open cholecystectomy in acute cholecystitis. *Przegląd Gastroenterologiczny*, 9(6), 336–341.
17. Rather, Z. M., Majid, N. A., Islam, M. N., & Mohd, R. W. (2019). Outcome of early laparoscopic cholecystectomy versus delayed laparoscopic cholecystectomy for patients with acute cholecystitis. *International Surgery Journal*, 6(6), 1898–1902.
18. Harvitkar, R. U., Gattupalli, G. B., Najmu, S., & Joshi, A. (2021). Emergency laparoscopic management of perforative peritonitis: A retrospective study. *Cureus*, 13(12), e20121.
19. Ates, M., Sevil, S., Bakircioglu, E., & Colak, C. (2007). Laparoscopic repair of peptic ulcer perforation without omental patch versus conventional open repair. *Journal of Laparoendoscopic & Advanced Surgical Techniques*, 17(5), 615–619.
20. Mogahed, M. M., Zytoon, A. A., Eysa, B., Manaa, M., & Abdellatif, W. (2020). Laparoscopic versus open drainage of complex pyogenic liver abscess. *World Journal of Laparoscopic Surgery*, 13(1), 11–15.
21. Pham, H. D., Le, Q. M., Le, C. T., et al. (2019). Laparoscopic management of intra-abdominal ruptured liver abscess: A prospective study. *International Journal of Surgery*, 10(5), 555798.
22. Chakravarty, S., Sarma, D. R., Noor, M., Panagiotopoulos, S., & Patel, A. G. (2017). Laparoscopy in the management of abdominal trauma: A matched-pair analysis. *International Journal of Surgery*, 44, 21–25.
23. Wadhwa, A., Surendra, J. B., Sharma, A., et al. (2005). Laparoscopic repair of diaphragmatic hernias: Experience of six cases. *Asian Journal of Surgery*, 28(2), 145–150.
24. Kumar, A., Karn, R., Khanal, B., Sah, S. P., & Gupta, R. (2020). Laparoscopic approach for diaphragmatic hernia repair in adults: Our experience of four cases. *Journal of Surgical Case Reports*, 2020(6), rjaa178.
25. Byrne, J., Saleh, F., Ambrosini, L., Quereshy, F., Jackson, T. D., & Okrainec, A. (2015). Laparoscopic versus open surgical management of adhesive small bowel obstruction: A comparison of outcomes. *Surgical Endoscopy*, 29(9), 2525–2532.