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Comparison of Early Vs Interval Laparoscopic Cholecystectomy for Acute Cholecystitis in Terms of Hospital Stay and Operative Time

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ABSTRACT

Background: This study evaluates and compares early and interval laparoscopic cholecystectomy in terms of hospital stay, operative time, and secondary outcomes. **Methods:** This cross-sectional investigation took place at Lady Reading Hospital, Peshawar, between November 2023 and May 2024. A cohort of 375 patients, each presenting with acute cholecystitis, was prospectively allocated into two groups according to surgical timing. The early cohort underwent laparoscopic cholecystectomy within 72 hours of symptom onset, whereas the interval cohort received surgery 4 to 6 weeks later, following an initial period of conservative management. Comprehensive data regarding demographic variables, clinical manifestation, surgical parameters, and postoperative outcomes were systematically recorded. The statistical evaluation was executed with SPSS version 25, and a threshold of $p<0.05$ was employed to indicate statistical significance. **Results:** The results demonstrated that early laparoscopic cholecystectomy provided significant advantages. Patients in the early group experienced shorter hospital stays '(4 days vs. 6 days, $p<0.0001$) and reduced operative times (60 minutes vs. 70 minutes, $p<0.0001$)'. 'The conversion rate to open surgery was also lower in the early group (10% vs. 15%, $p=0.015$)'. 'While rates of complications surgical site infections and bile leaks were comparable between the two groups, early group patients recovered faster, resuming normal activities in 10 days compared to 14 days in the interval group ($p<0.0001$)'. Additionally, patients in the early group reported higher satisfaction scores (4.5 vs. 4.0 on a 5-point scale, $p<0.0001$), and treatment costs were significantly lower (5000 PKR vs. 6500 PKR, $p<0.0001$). **Conclusions:** These findings underscore the effectiveness of early laparoscopic cholecystectomy in managing acute cholecystitis. The approach not only reduces hospital stay, operative time, and treatment costs but also facilitates quicker recovery and improves patient satisfaction, without increasing the risk of complications. This evidence strongly supports the routine adoption of 'early laparoscopic cholecystectomy as the preferred treatment approach for eligible patients, aligning with current clinical guidelines' and enhancing overall healthcare outcomes.

INTRODUCTION

Acute cholecystitis, an inflammatory condition of the gallbladder often caused by gallstones, is a frequent cause of hospital admissions worldwide (1, 2). Prompt and effective management is essential to prevent complications such as gallbladder perforation, abscess formation, or systemic sepsis. 'Laparoscopic cholecystectomy is the gold standard treatment, but the optimal timing for surgery whether early during the acute phase or delayed after a period of conservative management remains a subject of considerable debate'(3, 4)

'Early laparoscopic cholecystectomy, typically performed within 72 hours of symptom onset, allows for immediate resolution of the condition'(4, 5). Advocates of this approach highlight its potential to shorten hospital stays, reduce the risk of recurrent symptoms, and minimize the need for multiple hospital visits (6, 7). However, concerns about increased technical difficulty due to active inflammation have led to the widespread use of interval laparoscopic cholecystectomy. This delayed approach, usually performed several weeks after conservative treatment, is thought to provide a safer surgical environment but carries the risk of recurrent attacks and prolonged overall treatment duration.

Despite extensive research, the choice 'between early and interval laparoscopic cholecystectomy remains controversial, particularly in terms of key outcomes

operative time, length of hospital stay, and the incidence of complications'. Balancing the benefits and challenges of these approaches is critical to improving patient outcomes and optimizing healthcare resource utilization.

This study compares 'early and interval laparoscopic cholecystectomy in patients with acute cholecystitis', focusing on two primary outcomes: hospital stay and operative time. Secondary outcomes, including postoperative recovery, complications, and patient satisfaction, were also evaluated to provide a comprehensive assessment of the relative advantages and limitations of each approach. By addressing these questions, this research aims to contribute valuable 'evidence to guide clinical decision-making and improve the management of acute cholecystitis'.

METHODOLOGY

This cross-sectional investigation took place at Lady Reading Hospital, Peshawar, between November 2023 and May 2024. It sought to evaluate and compare clinical outcomes arising from early laparoscopic cholecystectomy against those resulting from interval laparoscopic cholecystectomy in patients presenting with acute cholecystitis. Ethical clearance was granted by the College of Physicians and Surgeons Pakistan, reference RTMC No. SGR-2021-022-13086, and supplementary authorization from the Institutional Review Board was likewise acquired. 'All stages of the research complied with the ethical standards promulgated in the Declaration of Helsinki. Participants provided written informed consent, and participant confidentiality was safeguarded by anonymizing all data prior to analysis and publication'

The target population included patients diagnosed 'with acute cholecystitis who underwent laparoscopic cholecystectomy'. 'Participants were divided into two groups based on the timing of surgery Early Group patients who underwent laparoscopic cholecystectomy within 72 hours of symptom onset and Interval Group patients who underwent laparoscopic cholecystectomy 4–6 weeks after initial conservative treatment'.

The total sample size was 375 patients, with 187 patients allocated to each group. The sample size was determined using the formula for two population proportions to ensure adequate statistical power. Key assumptions included:

- A 95% confidence interval (critical value = 1.96)
- 80% power (Z = 0.84)
- Success rates of 0.75 and 0.65 for the early and interval groups, respectively

Using these parameters, the calculated sample size was 375 patients. Consecutive sampling was employed, enrolling all eligible participants meeting the inclusion criteria until the target sample size was achieved. This approach ensured a robust and representative dataset for analysis.

Inclusion Criteria

- Patients aged 18 years and older
- Diagnosed with acute cholecystitis based on clinical, laboratory, and imaging findings (e.g., ultrasound or CT scan showing gallbladder wall thickening, pericholecystic fluid, or gallstones)
- Patients deemed fit for laparoscopic cholecystectomy based on preoperative assessments
- Patients providing written informed consent

Exclusion Criteria

- Patients with chronic cholecystitis or gallbladder malignancy
- Patients undergoing emergency open cholecystectomy due to complications such as perforation or generalized peritonitis
- Patients with severe comorbidities making them unfit for laparoscopic surgery
- Patients declining participation

Data Collection

Data were prospectively collected using a structured proforma. Information sources included patient interviews, medical records, and operative notes. Key variables recorded were categorized as follows:

1. **Demographics**: Age, gender, BMI, and comorbidities (e.g., diabetes, hypertension, cardiovascular diseases)
2. **Clinical Data**: Duration of symptoms, severity of acute cholecystitis (graded using Tokyo Guidelines), imaging findings, laboratory markers (e.g., WBC count, CRP levels), and duration of preoperative antibiotic use
3. **Operative Details**: Timing of surgery (early vs. interval), operative time, conversion to open surgery, and intraoperative complications
4. **Postoperative Outcomes**: Length of hospital stay, postoperative complications (e.g., bile leaks, infections), reoperation rates, readmissions within 30 days, and time to return to normal activity

Additional Metrics: Treatment cost, patient satisfaction, and adherence to clinical Data were analyzed using SPSS version 25. Continuous variables (age, BMI, hospital stay) were presented as means ± standard deviations and compared using independent t-tests. Categorical variables (comorbidities, complications) were expressed as frequencies and percentages, analyzed using chi-square tests. Statistical significance was set at $p<0.05$. Subgroup analyses were performed based on the severity of acute cholecystitis and surgical outcomes.

RESULTS

The demographic characteristics of the two groups were similar in most aspects. The mean age was approximately 50 years 'in the early group and 51 years in the interval group, with no statistically significant difference' ($p=0.089$). The interval group had a slightly higher BMI (27.95 kg/m^2 vs. 27.36 kg/m^2, $p=0.042$). The American Society of Anesthesiologists (ASA) score, reflecting overall health status, was notably higher 'in the interval group (2.63 vs. 2.50, $p=0.0002$)' indicating a greater prevalence of health-related risks.

The timing of surgery was significantly different between groups, with the early group undergoing surgery within 35 hours of symptom onset compared to 81 hours 'in the interval group ($p<0.0001$)'. 'Severity of acute cholecystitis was higher in the interval group' with more cases classified as severe (20% vs. 10%, $p<0.0001$). Markers of inflammation, including CRP levels, were significantly elevated in the interval group. Antibiotic usage was also

prolonged in the interval group (4 days vs. 2 days, p<0.0001).

Table 1

Comparative Demographic Characteristics of Early and Interval Cohorts

Variable	Early Group (Mean ± SD or %)	Interval Group (Mean ± SD or %)	p-value
Age (years)	50.21 ± 9.46	51.43 ± 10.17	0.089
Gender (Male/Female)	60% / 40%	60% / 40%	1.000
BMI (kg/m^2)	27.36 ± 4.03	27.95 ± 3.91	0.042
Comorbidities (%)			
Diabetes mellitus	25.00%	27.00%	0.451
Hypertension	30.00%	35.00%	0.212
Cardiovascular disease	10.00%	12.00%	0.564
Respiratory disorders	8.00%	9.00%	0.721
Other chronic illnesses	15.00%	17.00%	0.590
ASA Score	2.50 ± 0.48	2.63 ± 0.49	0.0002

Table 2

Clinical Presentation and Preoperative Variables in Early and Interval Groups

Variable	Early Group (Mean ± SD or %)	Interval Group (Mean ± SD or %)	p-value
Time from symptom onset to surgery (hours)	35.19 ± 10.21	80.93 ± 16.15	<0.0001
Severity Mild Moderate Severe, %)	 50 40 10	 30 50 20	<0.0001
Pre-surgery complications (%)			
Gallbladder wall thickening	45.00%	50.00%	0.351
Pericholecystic fluid	30.00%	35.00%	0.242
Inflammatory markers			
White blood cell count (x10^9/L)	11.85 ± 2.86	12.26 ± 3.08	0.063
C-reactive protein (mg/L)	50.00 ± 20.00	60.00 ± 20.00	<0.0001
Antibiotic duration (days)	2.00 ± 1.00	4.00 ± 1.50	<0.0001

The operative time was significantly shorter for the early group (60 minutes vs. 70 minutes, p<0.0001). Conversion to open surgery 'was more frequent in the interval group (15% vs. 10%, p=0.015)'. Rates of intraoperative complications, bleeding or injury, did not differ significantly between groups.

Table 3

Operative Characteristics and Intraoperative Outcomes

Variable	Early Group (Mean ± SD or %)	Interval Group (Mean ± SD or %)	p-value
Operative time (minutes)	60.00 ± 10.00	70.00 ± 10.00	<0.0001
Conversion to open surgery (%)	10.00%	15.00%	0.015
Intraoperative complications (%)	5.00%	8.00%	0.234
Surgeon experience (years)	15.00 ± 3.00	14.00 ± 3.50	0.046

The early group had significantly shorter hospital stays (4 days vs. 6 days, p<0.0001). Patients in the early group resumed normal activities faster (10 days vs. 14 days, p<0.0001). The rates of postoperative complications and readmissions were comparable between the groups, with no significant differences.

Table 4

Postoperative Outcomes Across Early and Interval Groups

Variable	Early Group (Mean ± SD or %)	Interval Group (Mean ± SD or %)	p-value
Hospital stay (days)	4.00 ± 1.00	6.00 ± 1.50	<0.0001
Postoperative complications (%):			
- Surgical site infection (%)	5.00%	7.00%	0.346
- Bile leak (%)	2.00%	3.00%	0.562
Return to normal activity (days)	10.00 ± 2.00	14.00 ± 3.00	<0.0001

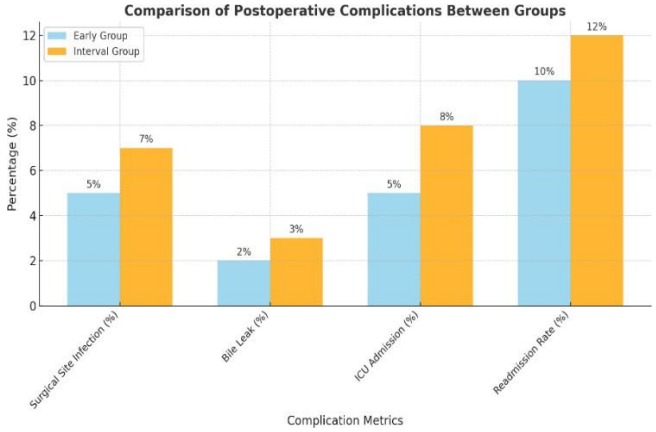
The early group incurred lower treatment costs (5000 PKR vs. 6500 PKR, p<0.0001) and reported higher satisfaction scores (4.5 vs. 4.0, p<0.0001). Adherence to clinical guidelines was also slightly better in the early group.

Table 5

Cost of Treatment and Patient Satisfaction

Variable	Early Group (Mean ± SD or %)	Interval Group (Mean ± SD or %)	p-value
Cost of treatment (PKR)	5000 ± 1000	6500 ± 1200	<0.0001
Patient satisfaction (1–5 scale)	4.5 ± 0.5	4.0 ± 0.6	<0.0001
Adherence to clinical guidelines (%)	95.00%	90.00%	0.043

Figure 1



The bar graph comparing key outcome metrics between the early and interval laparoscopic cholecystectomy groups reveals several noteworthy findings. Patients who underwent early surgery experienced a shorter hospital stay, averaging 4 days, whereas those in the interval group stayed for about 6 days. This reduction in hospitalization time suggests that early intervention can lead to more efficient patient throughput and resource utilization.

DISCUSSION

This study aimed to evaluate and compare the outcomes of early versus interval laparoscopic cholecystectomy in patients with acute cholecystitis, focusing on hospital stay and operative time'. The findings clearly demonstrate that early laparoscopic cholecystectomy significantly reduces both hospital stay and operative time compared to interval surgery. These outcomes are consistent with previous research, reinforcing the benefits of early surgical intervention in managing acute cholecystitis (8, 9).

The early group had a notably shorter hospital stay (4 days vs. 6 days, p<0.0001). This reduction can be attributed to

avoiding the need for repeated admissions or prolonged preoperative management often required in interval surgery. Early intervention allows for resolving the condition in a single hospital admission, minimizing the burden on healthcare resources and patients. Similar results have been reported in studies highlighting the efficiency of early laparoscopic cholecystectomy in shortening hospitalization duration (10-12).

'Operative time was also significantly shorter in the early group (60 minutes vs. 70 minutes, p<0.0001)'. Although interval surgery has traditionally been considered easier due to reduced inflammation, the results of this study suggest that early surgery can be performed efficiently by experienced surgeons. Delaying surgery often leads to fibrosis and adhesions, which can complicate the procedure and prolong operative time (13). These findings emphasize the importance of surgical expertise in achieving favorable outcomes during early intervention.

'The conversion rate to open surgery was lower in the early group (10% vs. 15%, p=0.015), challenging the perception that early surgery poses higher technical risks due to active inflammation'. Similar findings in prior studies demonstrate that early laparoscopic cholecystectomy does not increase the likelihood of conversion to open surgery and may, in fact, mitigate complications associated with delayed intervention, such as the progression of disease or the development of adhesions (14, 15).

Postoperative complications, including surgical site infections, bile leaks, and pneumonia, 'were comparable between the two groups, with no statistically significant differences'. This confirms that early laparoscopic cholecystectomy is as safe as interval surgery when performed by skilled surgeons. The findings align with previous research demonstrating the safety of early intervention without increasing morbidity or adverse outcomes (16, 17).

Patients in the early group returned to normal activities significantly faster than those in the interval group (10 days vs. 14 days, p<0.0001). This highlights the reduced recovery burden associated with early surgery and the avoidance of recurrent symptoms that often delay recovery in interval cases. The quicker recovery also enhances patient quality of life, aligning with evidence from other studies advocating for early intervention (18, 19).

Treatment costs were significantly lower in the early group (5000 PKR vs. 6500 PKR, p<0.0001). This economic advantage stems from shorter hospital stays, fewer admissions, and reduced reliance on extended preoperative management (20). 'Additionally, patient satisfaction was higher in the early group (4.5 vs. 4.0, p<0.0001), reflecting the benefits of a shorter recovery period, reduced treatment duration, and better overall outcomes'.

Adherence to clinical guidelines was slightly better in the early group (95% vs. 90%, p=0.043). This finding supports recommendations, such as the Tokyo Guidelines, which endorse early laparoscopic cholecystectomy as the preferred approach for eligible patients. Early intervention not only aligns with best practices but also ensures efficient utilization of healthcare resources.

The results of this study align with existing literature, 'including randomized controlled trials and meta-analyses, which have consistently demonstrated the superiority of early laparoscopic cholecystectomy in reducing hospital stay, costs, and recovery time without increasing complications'. These findings add robust evidence to the growing consensus favoring early intervention (21, 22).

The adherence to clinical guidelines was slightly better in the early group (95% vs. 90%, p=0.043). This finding supports recommendations from the Tokyo Guidelines, which advocate for early laparoscopic cholecystectomy in patients with acute cholecystitis, provided there are no contraindications (23).

A major strength of this study is its substantial sample size and prospective data collection, which contribute to the reliability and validity of the findings. However, the cross-sectional design limits the ability to establish causal relationships. Additionally, conducting the study at a single center may restrict the generalizability of the results to other healthcare settings with different patient demographics or resource availability. Future studies with multi-center, randomized designs could provide more comprehensive evidence to validate these findings.

CONCLUSION

This study highlights the significant benefits of early laparoscopic cholecystectomy in the management of acute cholecystitis. Early surgical intervention is associated with shorter hospital stays, reduced operative times, faster recovery, lower overall costs, and higher patient satisfaction, all without an increased risk of complications. These results provide strong support for the routine implementation of early laparoscopic cholecystectomy as the preferred treatment approach for eligible patients. The findings align with established clinical guidelines and reinforce the evidence advocating for early intervention to optimize patient outcomes and resource utilization.

REFERENCES

1. Gallaher JR, Charles A. Acute cholecystitis: a review. Jama. 2022;327(10):965-75. https://doi.org/10.1001/jama.2022.2350
2. Doherty G, Manktelow M, Skelly B, Gillespie P, Bjourson AJ, Watterson S. The need for standardizing diagnosis, treatment and clinical care of cholecystitis and biliary colic in gallbladder disease. Medicina. 2022;58(3):388. https://doi.org/10.3390/medicina58030388
3. Virdis F, Podda M, Reccia I, Gallo G, Khan M, Martin M, et al. Laparoscopy and minimally invasive surgery techniques in acute care surgery. Trauma Centers and Acute Care Surgery: A Novel Organizational and Cultural Model. 2021:235-48. https://doi.org/10.1007/978-3-030-73155-7_19
4. Rather ZM, Majid NA, Islam MN, Mohd RW. Outcome of early laparoscopic cholecystectomy versus delayed laparoscopic cholecystectomy for patients with acute cholecystitis. International Surgery Journal. 2020;7(4):1212-7. https://doi.org/10.18203/2349-2902.isj20201399
5. Korayem IM, Bessa SS, El-Sayes I. Extending the optimal

timing for early laparoscopic cholecystectomy among patients presenting with acute calculous cholecystitis. The Egyptian Journal of Surgery. 2023;41(3). https://doi.org/10.1186/s12893-024-02532-x
6. Piele SM, Preda SD, Pătrașcu Ș, Laskou S, Sapalidis K, Dumitrescu D, et al. Indication and Timing of Cholecystectomy in Acute Biliary Pancreatitis-Systematic Review. Current Health Sciences Journal. 2024;50(1):125.
7. Sah MK, Bhattarai A. Day Care Laparoscopic Cholecystectomy: A Review. Sch J Med Case Rep. 2024;3:292-7. https://doi.org/10.36347/sjmcr.2024.v12i03.015
8. Yuksekdag S, Bas G, Okan I, Karakelleoglu A, Alimoglu O, Akcakaya A, et al. Timing of laparoscopic cholecystectomy in acute cholecystitis. Nigerian journal of clinical practice. 2021;24(2):156-60. https://doi.org/10.4103/njcp.njcp_138_20
9. Coccolini F, Solaini L, Binda C, Catena F, Chiarugi M, Fabbri C, et al. Laparoscopic cholecystectomy in acute cholecystitis: Refining the best surgical timing through network meta-analysis of randomized trials. Surgical Laparoscopy Endoscopy & Percutaneous Techniques. 2022;32(6):755-63. https://doi.org/10.1097/sle.0000000000001103
10. Lucocq J, Patil P, Scollay J. Acute cholecystitis: Delayed cholecystectomy has lesser perioperative morbidity compared to emergency cholecystectomy. Surgery. 2022;172(1):16-22. https://doi.org/10.1016/j.surg.2022.03.024
11. Peden CJ, Aggarwal G, Aitken RJ, Anderson ID, Bang Foss N, Cooper Z, et al. Guidelines for perioperative care for emergency laparotomy Enhanced Recovery After Surgery (ERAS) Society recommendations: part 1—preoperative: diagnosis, rapid assessment and optimization. World journal of surgery. 2021;45(5):1272-90. https://doi.org/10.1007/s00268-021-05994-9
12. Rickward J, Hameed I, Ho S, Wijeratne S. Day case laparoscopic cholecystectomy: a review of patient selection factors and identification of potential barriers to same-day discharge. ANZ Journal of Surgery. 2024. https://doi.org/10.1111/ans.19241
13. Budiæcă OA, Harosa FMG, Ahmed S, Strugari V, Szanto L-A, Bălan M, et al. Early versus delayed laparoscopic cholecystectomy for acute cholecystitis: a single center experience. Chirurgia. 2024;119:44-55. https://doi.org/10.21614/chirurgia.2024.v.119.i.1.p.44
14. Lof S, Vissers F, Klompmaker S, Berti S, Boggi U, Coratti A, et al. Risk of conversion to open surgery during robotic and laparoscopic pancreatoduodenectomy and effect on outcomes: international propensity score-matched comparison study. British Journal of Surgery. 2021;108(1):80-7. https://doi.org/10.1093/bjs/znaa026
15. Halpern AL, Friedman C, Torphy RJ, Al-Musawi MH, Mitchell JD, Scott CD, et al. Conversion to open surgery during minimally invasive esophagectomy portends worse short-term outcomes: an analysis of the National Cancer Database. Surgical Endoscopy. 2020;34:3470-8. https://doi.org/10.1007/s00464-019-07124-y
16. Bundgaard NS, Bohm A, Hansted AK, Skovsen AP. Early laparoscopic cholecystectomy for acute cholecystitis is safe regardless of timing. Langenbeck's Archives of Surgery. 2021;406(7):2367-73. https://doi.org/10.1007/s00423-021-02229-2
17. Cheng X, Cheng P, Xu P, Hu P, Zhao G, Tao K, et al. Safety and feasibility of prolonged versus early laparoscopic cholecystectomy for acute cholecystitis: a single-center retrospective study. Surgical Endoscopy. 2021;35:2297-305. https://doi.org/10.1007/s00464-020-07643-z
18. Nechay T, Titkova S, Tyagunov A, Anurov M, Sazhin A. Modified enhanced recovery after surgery protocol in patients with acute cholecystitis: efficacy, safety and feasibility. Multicenter randomized control study. Updates in surgery. 2021;73:1407-17. https://doi.org/10.1007/s13304-021-01031-5
19. Michael Brunt L, 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. Surgical endoscopy. 2020;34:2827-55. https://doi.org/10.1097/sla.0000000000004396
20. Isbell KD, Wei S, Dodwad S-JM, Avritscher EB, Mueck KM, Bernardi K, et al. Impact of early cholecystectomy on the cost of treating mild gallstone pancreatitis: gallstone PANC trial. Journal of the American College of Surgeons. 2021;233(4):517-25. e1. https://doi.org/10.1016/j.jamcollsurg.2021.06.023
21. Riquelme F, Marinkovic B, Salazar M, Martínez W, Catan F, Uribe-Echevarría S, et al. Early laparoscopic cholecystectomy reduces hospital stay in mild gallstone pancreatitis. A randomized controlled trial. HPB. 2020;22(1):26-33. https://doi.org/10.1016/j.hpb.2019.05.013
22. Yuan X, Xu B, Wong M, Chen Y, Tang Y, Deng L, et al. The safety, feasibility, and cost-effectiveness of early laparoscopic cholecystectomy for patients with mild acute biliary pancreatitis: A meta-analysis. The Surgeon. 2021;19(5):287-96. https://doi.org/10.1016/j.surge.2020.06.014
23. Borzellino G, Khuri S, Pisano M, Mansour S, Allievi N, Ansaloni L, et al. Timing of early laparoscopic cholecystectomy for acute calculous cholecystitis: a meta-analysis of randomized clinical trials. World Journal of Emergency Surgery. 2021;16:1-12. https://doi.org/10.1186/s13017-021-00360-5