Original Article

Comparison of Clinical Outcome between Early Laparoscopic Cholecystectomy and Delayed Laparoscopic Cholecystectomy among Patients with Complicated Acute Cholecystitis — A Retrospective Observational Study

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ABSTRACT

Introduction: *Acute cholecystitis often requires timely surgical intervention via laparoscopic cholecystectomy (LC). The optimal timing, whether early (within 72 hours of symptom onset) or delayed (after initial conservative treatment), is debated, particularly in resource-limited settings like Bangladesh.* ***Objective:*** *This study aims to compare the clinical outcomes of early laparoscopic cholecystectomy (ELC) versus delayed laparoscopic cholecystectomy (DLC) in patients with complicated acute cholecystitis at Sheikh Sayera Medical College, Gopalgong.* ***Methods & Materials:*** *This retrospective observational study spanned five years (January 2018 to December 2022) and involved 50 patients with complicated acute cholecystitis. Patients were divided into ELC (n=25) and DLC (n=25) groups.* ***Results:*** *The mean age of Group 1 was predominantly 61-70 years, while Group 2 was 71-80 years. Hypertension was more prevalent in Group 2 (84%) compared to Group 1 (68%), with a similar prevalence of diabetes mellitus (56%) in both groups. Group 2 had higher mean WBC counts and CRP levels. Group 1 had a longer mean operation time (96.78± 48.24 minutes) compared to Group 2 (83.19± 30.41 minutes). Group 1 experienced significantly higher intraoperative blood loss (358.29 ± 197.25 ml) compared to Group 2 (174.61± 199.43*

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ml, p < 0.01). The ELC group had a significantly shorter hospital stay (12.83± 4.72 days) compared to the DLC group (19.57 ± 8.49 days, p < 0.001). The time to resume diet was similar between groups. ***Conclusion:*** *Early laparoscopic cholecystectomy offers significant advantages in reducing hospital stay while maintaining comparable postoperative recovery times, despite higher intraoperative blood loss and operative complexity.*

Keywords: *Acute Cholecystitis, Laparoscopic Cholecystectomy, Early Surgery, Delayed Surgery, Postoperative Outcomes*

INTRODUCTION

Acute cholecystitis, characterized by inflammation of the gallbladder, is a common condition that significantly impacts healthcare systems worldwide. It is predominantly caused by gallstones obstructing the cystic duct, leading to bile stasis, inflammation, and infection. Acute cholecystitis accounts for approximately 10-15% of all cases of gallstone disease, with gallstones present in about 95% of patients presenting with acute cholecystitis. The clinical presentation typically includes severe right upper quadrant pain, fever, and leukocytosis, which necessitate prompt medical intervention to prevent complications such as gallbladder gangrene or perforation[1.2]. Laparoscopic cholecystectomy (LC) has become the gold standard for the surgical management of gallbladder diseases, including acute cholecystitis, due to its minimally invasive nature, reduced postoperative pain, shorter hospital stays, and quicker recovery times compared to open cholecystectomy[3,4]. Despite its widespread acceptance, the optimal timing of LC for acute cholecystitis remains a subject of debate. Early laparoscopic cholecystectomy (ELC), defined as surgery performed within 72 hours of symptom onset, is increasingly recommended based on evidence suggesting it offers several clinical and economic benefits. Studies have shown that ELC reduces the total hospital stay, decreases the risk of recurrent symptoms, and is cost-effective due to lower hospital resource utilization[5,6]. Moreover, ELC has been associated with fewer postoperative complications and a similar safety profile compared to delayed laparoscopic cholecystectomy (DLC)[7,8]. Current clinical guidelines, including the Tokyo Guidelines 2013, endorse ELC for patients with mild (grade 1) and selected moderate (grade 2) acute cholecystitis. These guidelines recommend early percutaneous cholecystostomy followed by DLC for patients with severe (grade 3) acute cholecystitis or those at high surgical risk[9]. However, recent studies suggest that even patients with moderate and severe acute cholecystitis can benefit from ELC, challenging the more conservative approach traditionally favored for these cases[10]. In Bangladesh, the burden of gallstone disease and acute cholecystitis is substantial, contributing to significant healthcare challenges. Limited healthcare resources and high patient volumes necessitate efficient treatment protocols to minimize hospital stays and reduce costs. The economic burden of managing gallstone-related complications is significant, with prolonged hospital stays and multiple readmissions adding to the strain on the healthcare system[11,12].

Implementing ELC in clinical practice could alleviate some of these burdens by reducing the length of hospital stays and associated costs while maintaining patient safety and outcomes. The efficacy and safety of ELC versus DLC have been extensively studied in various global contexts. For instance, a prospective randomized study by Chandler et al. (2000) found that ELC significantly reduced total hospital stay and hospital charges compared to DLC, without increasing operative time or complication rates[13]. Similarly, a study by Minutolo et al. (2014) demonstrated that ELC offers shorter hospital stays and lower overall costs, despite a comparable conversion rate to open surgery and postoperative complications[14]. These findings are corroborated by the ACDC study, which showed that ELC within 24 hours of admission was superior to conservative treatment followed by DLC in terms of morbidity, hospital stay, and costs[15]. In South Asia, regional studies have also highlighted the benefits of ELC. A study conducted in Pakistan by Bhurt et al. (2020) revealed that ELC had a lower conversion rate to open surgery and better overall outcomes compared to DLC[16]. AThese regional insights are crucial for understanding the feasibility and impact of ELC in similar healthcare settings, including Bangladesh. Despite the overwhelming evidence supporting ELC, there are instances where DLC might be preferred, particularly in cases with severe inflammation where surgical difficulties and risks are heightened. However, the overall trend in the literature supports ELC as a safe and effective approach for managing acute cholecystitis, emphasizing its role in reducing healthcare burdens and improving patient outcomes[17]. In conclusion, the adoption of ELC in Bangladesh's healthcare system could provide significant benefits in managing acute cholecystitis. This study aims to compare the clinical outcomes and cost-effectiveness of ELC versus DLC in patients with complicated acute cholecystitis in Bangladesh, providing critical insights that could inform clinical practice and healthcare policy.

METHODS & MATERIALS

This retrospective observational study was conducted at Sheikh Sayera Medical College, Gopalgong, over a period of five years from January 2018 to December 2022. The study aimed to compare clinical outcomes between early laparoscopic cholecystectomy (ELC) and delayed laparoscopic cholecystectomy (DLC) among patients diagnosed with complicated acute cholecystitis. A total of 50 patients who underwent either ELC or DLC were included in the study, divided equally into two groups: Group 1 comprised 25 patients who underwent ELC, defined as surgery performed within 72 hours of symptom onset, and Group 2 comprised 25 patients who underwent DLC, performed after an initial period of conservative treatment and scheduled at least six weeks post-diagnosis. Patient records were meticulously reviewed to ensure the completeness of the data. Only complete hospital records were included in the study to maintain data integrity and reliability. The inclusion criteria encompassed patients diagnosed with complicated acute cholecystitis based on clinical presentation, laboratory findings, and imaging studies confirming the diagnosis. Exclusion criteria included patients with incomplete medical records,

those who underwent other types of cholecystectomy, and patients who had concurrent severe medical conditions that could significantly impact the outcomes. Data collected from hospital records included demographic details (age, gender), clinical characteristics (symptom duration, severity of cholecystitis, comorbid conditions), intraoperative details (operation time, intraoperative complications, conversion to open surgery), and postoperative outcomes (postoperative complications, length of hospital stay, readmission rates). The primary outcome measure was the length of hospital stay, while secondary outcomes included postoperative complications and readmission rates. Statistical analysis was performed using appropriate statistical software. Continuous variables were expressed as mean ± standard deviation (SD) and compared using the Student's t-test. Categorical variables were expressed as frequencies and percentages and compared using the chi-square test or Fisher's exact test as appropriate. A p-value of less than 0.05 was considered statistically significant. Ethical approval for the study was obtained from the Institutional Review Board of Sheikh Sayera Medical College. The study was conducted in accordance with the ethical standards of the Declaration of Helsinki. Due to the retrospective nature of the study, the requirement for informed consent was waived. Patient confidentiality was maintained by anonymizing all patient data and ensuring that no identifiable information was disclosed.

RESULTS

Table I: Distribution of baseline characteristics among the participants (*n*=50)

Baseline Characteristics	Group 1		Group 2	
	n	%	n	%
Age				
41-50	2	8.00%	1	4.00%
51-60	7	28.00 %	3	12.00 %
61-70	13	52.00 %	9	36.00 %
71-80	2	8.00%	11	44.00 %
>80	1	4.00%	1	4.00%
Gender				
Male	14	56.00 %	13	52.00 %
Female	11	44.00 %	12	48.00 %
Comorbidities				
Hypertension	17	68.00 %	21	84.00 %
Heart Disease	1	4.00%	1	4.00%
Diabetes Mellitus	14	56.00 %	14	56.00 %
Lung Disease	1	4.00%	0	0.00%
Cerebrovascular Disease	0	0.00%	2	8.00%
Laboratory Parameters				
WBC (mm^6)	14.86±4.09		16.21±4.72	
CRP (mg/dl)	13.54±8.25		19.07±9.57	

The baseline characteristics of the participants in the study are presented in **Table I**. Group 1, which consisted of patients who underwent early laparoscopic cholecystectomy (ELC), had a higher proportion of patients aged between 61 and 70 years (52%), while Group 2, consisting of patients who underwent delayed laparoscopic cholecystectomy

(DLC), had a higher proportion of patients aged between 71 and 80 years (44%). The distribution of gender was similar between the groups, with males comprising 56% in Group 1 and 52% in Group 2, and females comprising 44% in Group 1 and 48% in Group 2. Regarding comorbidities, hypertension was more prevalent in Group 2 (84%) compared to Group 1 (68%). The prevalence of diabetes mellitus was identical in both groups, with 56% of patients affected in each group. Other comorbid conditions such as heart disease and lung disease were relatively rare, with one patient in each group having heart disease and one patient in Group 1 having lung disease. Cerebrovascular disease was present only in Group 2 (8%). Laboratory parameters indicated that patients in Group 2 had higher mean white blood cell (WBC) counts and C-reactive protein (CRP) levels compared to Group 1. The mean WBC count in Group 2 was 16.21 ± 4.72 mm^6, compared to 14.86 ± 4.09 mm^6 in Group 1. Similarly, the mean CRP level was significantly higher in Group 2 (19.07 ± 9.57 mg/dl) compared to Group 1 (13.54 ± 8.25 mg/dl). These differences suggest a more pronounced inflammatory response in patients undergoing delayed laparoscopic cholecystectomy.

Table II: Operational variables among participants during operation of complicated cholecystitis (*n*=50)

Operational Variables	Group 1 (n=25)	Group 2 (n=25)	*p*-value
Operation Time (min)	96.78±4 8.24	83.19±3 0.41	>0.05
Blood Loss (ml)	358.29±1 97.25	174.61±1 99.43	**<0.01**

The operational variables for participants undergoing early and delayed laparoscopic cholecystectomy are detailed in **Table II**. The average operation time for Group 1 (ELC) was 96.78 ± 48.24 minutes, while Group 2 (DLC) had a slightly shorter average operation time of 83.19 ± 30.41 minutes. However, the difference in operation time between the two groups was not statistically significant ($p > 0.05$). In terms of intraoperative blood loss, Group 1 experienced significantly higher blood loss, averaging 358.29 ± 197.25 ml, compared to 174.61 ± 199.43 ml in Group 2. This difference was statistically significant ($p < 0.01$), indicating that patients undergoing early laparoscopic cholecystectomy tended to have greater intraoperative blood loss compared to those undergoing delayed surgery.

Table III: Comparison of postoperative characteristics among the participants of both groups (*n*=50)

Postoperative Characteristics	Group 1		Group 2		p-value
	n	%	n	%	
Complications					
Postoperative Bleeding	0	0.00%	1	4.00%	>0.05
Bile Leakage	2	8.00%	0	0.00%	
Sub hepatic Abscess Formation	1	4.00%	1	4.00%	
Drain Site Hemorrhage	0	0.00%	1	4.00%	
Cardiovascular Disease	4	16.00%	2	8.00%	
Pneumonia	2	8.00%	1	4.00%	
Pulmonary Embolism	1	4.00%	0	0.00%	
General Edema	1	4.00%	0	0.00%	
Gastrointestinal Trouble	4	16.00%	1	4.00%	
Hospital Stay (Days)	12.83±4.72		19.57±8.49		<0.001
Time to diet (Days)	2.56±1.09		2.55±0.90		>0.05

The postoperative characteristics of the participants in both groups are presented in **Table III**. Complications were relatively infrequent but varied between the groups. In Group 1 (early laparoscopic cholecystectomy, ELC), there were no cases of postoperative bleeding, while Group 2 (delayed laparoscopic cholecystectomy, DLC) had one case (4%). Bile leakage occurred in 8% of patients in Group 1, but was not observed in Group 2. Both groups had similar incidences of subhepatic abscess formation (4%). Drain site hemorrhage was reported in one patient (4%) in Group 2 and none in Group 1. Cardiovascular complications were more common in Group 1, affecting 16% of patients compared to 8% in Group 2. Pneumonia was observed in 8% of patients in Group 1 and 4% in Group 2. Pulmonary embolism and general edema were each reported in one patient (4%) in Group 1, but not in Group 2. Gastrointestinal troubles were more frequent in Group 1, occurring in 16% of patients compared to 4% in Group 2. Regarding hospitalization metrics, Group 1 had a significantly shorter hospital stay with an average of 12.83 ± 4.72 days compared to 19.57 ± 8.49 days in Group 2 ($p < 0.001$). The time to resume diet was similar between the groups, with Group 1 averaging 2.56 ± 1.09 days and Group 2 averaging 2.55 ± 0.90 days, showing no significant difference ($p > 0.05$).

DISCUSSION

The current study provides a comprehensive comparative analysis of early laparoscopic cholecystectomy (ELC) and delayed laparoscopic cholecystectomy (DLC) in patients with complicated acute cholecystitis at Sheikh Sayera Medical

College, Gopalgong. Our findings indicate significant differences in clinical outcomes between the two approaches, supporting the broader literature on this topic. Our study found that the majority of patients in the ELC group were aged between 61-70 years, while the DLC group had a higher proportion of patients aged 71-80 years. This age distribution is consistent with previous studies indicating that older patients often undergo delayed procedures due to higher operative risks associated with advanced age[14,18]. Gender distribution was similar across both groups, reflecting findings by AlQahtani et al. and Botaitis et al., who reported no significant gender differences in outcomes following laparoscopic cholecystectomy[19,20]. Comorbidities such as hypertension and diabetes mellitus were prevalent among our study participants, with hypertension being more common in the DLC group (84%) compared to the ELC group (68%). This aligns with Paajanen et al., who noted that comorbid conditions like diabetes are associated with increased postoperative complications[21]. Our study also observed higher mean WBC counts and CRP levels in the DLC group, indicative of a more severe inflammatory response, which is consistent with the findings of Lee et al. and Gutt et al.[15]. In terms of operative variables, the mean operation time was slightly longer for the ELC group (96.78 ± 48.24 minutes) compared to the DLC group (83.19 ± 30.41 minutes), although this difference was not statistically significant. These results are similar to those reported by Agrawal et al. and Chandler et al., who found no significant difference in operation times between early and delayed procedures[13,22]. However, our study revealed significantly higher intraoperative blood loss in the ELC group, a finding echoed by Chang et al. and Kolla et al., suggesting that early intervention might involve more complex surgical challenges[23,24]. Postoperative complications were relatively infrequent in our study. Postoperative bleeding was observed in 4% of patients in the DLC group, but absent in the ELC group, a pattern also reported by Donkervoort et al.[25]. Bile leakage occurred in 8% of patients in the ELC group and was absent in the DLC group, consistent with findings by Duca et al. and Sperlongano et al., highlighting the potential risks associated with early surgery[26,27]. Subhepatic abscess formation was noted equally in both groups (4%), which aligns with the observations of Satinsky et al.[28]. Our study also highlighted the clinical and economic advantages of ELC. The ELC group had a significantly shorter hospital stay (12.83 ± 4.72 days) compared to the DLC group (19.57 ± 8.49 days), a finding supported by multiple studies including those by Gutt et al., Minutolo et al., and Jamil et al., who consistently reported reduced hospital stays with early surgery[5.29]. Moreover, the time to resume diet was similar between the groups, corroborating the results of El-Awadi et al. and Khalid et al., who found no significant differences in this parameter[30,31]. These findings underscore the benefits of early laparoscopic cholecystectomy in terms of shorter hospital stays and comparable postoperative recovery times, despite the increased operative complexity and higher intraoperative blood loss. This study, in line with the existing literature, supports the adoption of ELC as a standard practice for managing complicated acute cholecystitis, provided it is performed within an optimal timeframe and by

experienced surgeons. The insights gained from this research can inform clinical decision-making and healthcare policies, particularly in resource-limited settings like Bangladesh, where efficient treatment protocols are critical for managing the economic and healthcare burden associated with gallstone disease and its complications.

Limitations of the Study:

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

Conclusion:

This retrospective observational study highlights the comparative advantages of early laparoscopic cholecystectomy (ELC) over delayed laparoscopic cholecystectomy (DLC) in patients with complicated acute cholecystitis at Sheikh Sayera Medical College, Gopalgong. Our findings indicate that ELC significantly reduces hospital stay and maintains comparable postoperative recovery times, despite higher intraoperative blood loss and operative complexity. These results are consistent with existing literature and support the adoption of ELC as a preferred approach for managing complicated acute cholecystitis, especially in resource-limited settings where efficient treatment protocols are crucial. By optimizing surgical timing and leveraging early intervention, healthcare systems can improve patient outcomes, reduce healthcare costs, and alleviate the overall burden of gallstone disease complications. Further research and continuous evaluation of clinical practices are essential to refine these findings and enhance the quality of care for patients with acute cholecystitis.

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REFERENCES

1. *Paulson EK. Acute cholecystitis: CT findings. Seminars in Ultrasound, CT and MRI. 2000 Feb 1;21(1):56–63.*
2. *Radunovic M, Terzic D, Mugoša B, Terzic Z, Andrić B, Ratković M, et al. CHOLECYSTITIS AS A CAUSE OF ABDOMINAL PAIN IN PATIENTS WITH ACUTE VIRAL HEPATITIS A AND B. Acta medica medianae. 2012 Mar 15;51.*
3. *Lau H, Lo CY, Patil NG, Yuen WK. Early versus delayed-interval laparoscopic cholecystectomy for acute cholecystitis. Surg Endosc. 2006 Jan 1;20(1):82–7.*
4. *Yokoe M, Takada T, Strasberg SM, Solomkin JS, Mayumi T, Gomi H, et al. New diagnostic criteria and severity assessment of acute cholecystitis in revised Tokyo guidelines. Journal of Hepato-Biliary-Pancreatic Sciences. 2012;19(5):578–85.*
5. *Roulin D, Saadi A, Di Mare L, Demartines N, Halkic N. Early Versus Delayed Cholecystectomy for Acute Cholecystitis, Are the 72 hours Still the Rule?: A Randomized Trial. Annals of Surgery. 2016 Nov;264(5):717.*
6. *Chia CLK, Lu J, Goh SSN, Lee DJK, Rao AD, Lim WW, et al. Early laparoscopic cholecystectomy by a dedicated emergency surgical unit confers excellent outcomes in acute cholecystitis presenting beyond 72 hours. ANZ Journal of Surgery. 2019;89(11):1446–50.*
7. *Serralta AS, Bueno JL, Planells MR, Rodero DR. Prospective Evaluation of Emergency Versus Delayed Laparoscopic Cholecystectomy for Early Cholecystitis. Surgical Laparoscopy Endoscopy & Percutaneous Techniques. 2003 Apr;13(2):71.*
8. *Farooq T, Buchanan G, Manda V, Kennedy R, Ockrim J. Is Early Laparoscopic Cholecystectomy Safe After the "Safe*

Period"? Journal of Laparoendoscopic & Advanced Surgical Techniques. 2009 Aug;19(4):471–4.

9. *Amirthalingam V, Low JK, Woon W, Shelat V. Tokyo Guidelines 2013 may be too restrictive and patients with moderate and severe acute cholecystitis can be managed by early cholecystectomy too. Surg Endosc. 2017 Jul 1;31(7):2892–900.*
10. *Keiji Ohota NS. Early Laparoscopic Cholecystectomy for Acute Cholecystitis in Accordance with the Tokyo Guidelines for the Management of Acute Cholangitis and Cholecystitis. General Med [Internet]. 2014 [cited 2024 Jun 29];02(01). Available from: http://www.esciencecentral.org/journals/early-laparoscopic-cholecystectomy-for-acute-cholecystitis-in-2327-5146.1000127.php?aid=22237*
11. *Acalovschi M, Lammert F. The growing global burden of gallstone disease. World Gastroenterology News. 2012;17(4):6–9.*
12. *Glasgow RE, Cho M, Hutter MM, Mulvihill SJ. The Spectrum and Cost of Complicated Gallstone Disease in California. Archives of Surgery. 2000 Sep 1;135(9):1021–5.*
13. *Chandler CF, Lane JS, Ferguson P, Thompson JE, Ashley SW. Prospective Evaluation of Early versus Delayed Laparoscopic Cholecystectomy for Treatment of Acute Cholecystitis. The American Surgeon™. 2000 Sep 1;66(9):896–900.*
14. *Minutolo, Licciardello A, Arena M, Nicosia A, DiStefano B, Calì G, et al. Laparoscopic cholecystectomy in the treatment of acute cholecystitis: comparison of outcomes and costs between early and delayed cholecystectomy. European review for medical and pharmacological sciences [Internet]. 2014 Dec 1 [cited 2024 Jun 29]; Available from: https://www.semanticscholar.org/paper/Laparoscopic-cholecystectomy-in-the-treatment-of-of-Minutolo-Licciardello/962ebb36065b59836ce4ab0b89999d74f136f858*
15. *Gutt CN, Encke J, Köninger J, Harnoss JC, Weigand K, Kipfmüller K, et al. Acute Cholecystitis: Early Versus Delayed Cholecystectomy, A Multicenter Randomized Trial (ACDC Study, NCT00447304). Annals of Surgery. 2013 Sep;258(3):385.*
16. *Bhurt AA, Khatoon S, Danish AA, Baig I, Laghari ZH. Efficacy of Early Versus Delayed Laparoscopic Cholecystectomy in Federal Government Services Hospital Islamabad. Annals of Punjab Medical College. 2020 Mar 31;14(1):20–3.*
17. *Mencarini L, Vestito A, Zagari RM, Montagnani M. The Diagnosis and Treatment of Acute Cholecystitis: A Comprehensive Narrative Review for a Practical Approach. J Clin Med. 2024 May 3;13(9):2695.*
18. *Yan ZY, He J qing, Xing J. Application value of early and delayed laparoscopic cholecystectomy after percutaneous transhepatic gallbladder drainage in 65 years of age or older patients with severe acute cholecystitis: a prospective analysis. Chinese Journal of Digestive Surgery. 2019;18:447–52.*
19. *Alqahtani R, Ghnnam W, Alqahtani M, Qatomah A, AlKhathami A, Alhashim A. ROLE OF MALE GENDER IN LAPAROSCOPIC CHOLECYSTECTOMY OUTCOME. IJSM. 2015;1(2):38.*
20. *Botaitis S, Polychronidis A, Pitiakoudis M, Perente S, Simopoulos C. Does Gender Affect Laparoscopic Cholecystectomy? Surgical Laparoscopy Endoscopy & Percutaneous Techniques. 2008 Apr;18(2):157.*
21. *Paajanen H, Suuronen S, Nordstrom P, Miettinen P, Niskanen L. Laparoscopic versus open cholecystectomy in diabetic patients and postoperative outcome. Surg Endosc. 2011 Mar 1;25(3):764–70.*
22. *Agrawal R, Sood KC, Agarwal B. Evaluation of Early versus Delayed Laparoscopic Cholecystectomy in Acute Cholecystitis. Surgery Research and Practice. 2015;2015(1):349801.*
23. *Chang TC, Lin MT, Wu MH, Wang MY, Lee PH. Evaluation of early versus delayed laparoscopic cholecystectomy in the treatment of acute cholecystitis. Hepatogastroenterology. 2009;56(89):26–8.*
24. *Kolla SB, Aggarwal S, Kumar A, Kumar R, Chumber S, Parshad R, et al. Early versus delayed laparoscopic cholecystectomy for acute cholecystitis: a prospective randomized trial. Surg Endosc. 2004 Sep;18(9):1323–7.*
25. *Donkervoort SC, Kortram K, Dijksman LM, Boermeester MA, van Ramshorst B, Boerma D. Anticipation of complications after*

laparoscopic cholecystectomy: prediction of individual outcome. Surg Endosc. 2016 Dec 1;30(12):5388–94.

26. *Duca S, Bălă O, al-Hajjar N, Puia IC, Iancu C, Bodea M. [Laparoscopic cholecystectomy: incidents and complications. Analysis of 8002 consecutive cholecystectomies performed at the Surgical Clinic III Cluj-Napoca]. Chirurgia (Bucur). 2000;95(6):523–30.*
27. *Sperlongano P, Pisaniello D, Parmeggiani D, Piatto A, Avenia N, d'Ajello M, et al. [Bile leakage after laparoscopic cholecystectomy: report of three cases in our experience]. G Chir. 2005;26(6–7):251–5.*
28. *Satinský I, Mitták M, Foltys A, Dostalík J. [Subhepatic drainage in laparoscopic cholecystectomy--a necessity or an overused tradition?]. Rozhl Chir. 2003 Aug;82(8):427–31.*
29. *Minutolo AL. Laparoscopic cholecystectomy in the treatment of acute cholecystitis: comparison of outcomes and costs between early and delayed cholecystectomy. European review for medical and pharmacological sciences. 2014;18 2 Suppl:40–6.*
30. *El-Awadi S, El-Nakeeb A, Youssef T, Fikry A, Abd El-Hamed TM, Ghazy H, et al. Laparoscopic versus open cholecystectomy in cirrhotic patients: A prospective randomized study. International Journal of Surgery. 2009 Jan 1;7(1):66–9.*
31. *Khalid S, Iqbal Z, Bhatti AA. Early Versus Delayed Laparoscopic Cholecystectomy For Acute Cholecystitis. J Ayub Med Coll Abbottabad. 2017;29(4):570–3.*