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From the desk of Editor-in-Chief

It is with great satisfaction that I present the second issue of the Journal of GSVMC, following the successful launch of our inaugural volume. The encouraging response from readers, contributors and the academic community has reaffirmed the importance of a dedicated platform for scholarly exchange rooted in community-oriented healthcare.

Building upon the foundation established in our first volume, Journal of GSVMC continues its commitment to promoting high-quality, evidence-based research that addresses both local and global health challenges. We remain particularly focused on generating knowledge that is relevant to underserved populations, primary healthcare systems and preventive medicine – areas that lie at the heart of our institutional mission.

This issue reflects a growing culture of research and academic curiosity within our institution and beyond. We are pleased to see increased participation from clinicians, young researchers and students, demonstrating a collective enthusiasm toward advancing medical science. The diversity of topics covered in this issue highlights the multidisciplinary nature of modern healthcare and the importance of collaborative efforts.

We have further strengthened our peer-review process to ensure scientific rigor, ethical integrity and transparency. Our editorial board remains committed to maintaining and continuously improving the quality of this journal so that it may gain wider recognition at national and international levels.

I extend my heartfelt appreciation to all authors, reviewers, and editorial members for their valuable contributions and dedication. Your efforts are instrumental in shaping the identity and credibility of this journal.

As we move forward, we invite continued support and contributions from the academic and medical community to sustain this momentum of growth and excellence.

With sincere regards,



Prof (Brig Gen-Retd) Dr. Md. Nizam Uddin
Editor-in-Chief
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The chemistry of life – A foundation for medical understanding

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The chemistry of life forms the scientific foundation upon which modern medicine is built. For medical students and healthcare professionals, understanding the biochemical basis of life is essential for interpreting physiological processes and recognizing the molecular origins of disease. Every function of the human body – from energy production to cellular communication – is governed by complex chemical interactions occurring within cells.

Living systems are primarily composed of a few key elements, including carbon, hydrogen, oxygen, nitrogen, phosphorus and sulfur. These elements combine to form the fundamental biomolecules of life: carbohydrates, proteins, lipids and nucleic acids. Carbohydrates serve as the primary source of energy, lipids function in energy storage and membrane structure, proteins act as enzymes and structural components and nucleic acids store and transmit genetic information necessary for cellular regulation^{1,2}.

Within the cell, thousands of biochemical reactions occur through highly organized metabolic pathways. Enzymes play a critical role as biological catalysts, ensuring that these reactions proceed efficiently and with specificity. Disruptions in these chemical processes can lead to various diseases, including metabolic disorders, diabetes and cancer³.

Advances in molecular biology and biochemistry have significantly expanded our understanding of the chemistry of life. Technologies such as genomics and proteomics now enable researchers to explore disease mechanisms at the molecular level, supporting the development of targeted therapies and personalized medicine^{4,5}.

A strong understanding of the chemistry of life allows medical students to connect molecular mechanisms with clinical manifestations, ultimately strengthening their ability to diagnose, treat and prevent disease.

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Effectiveness and patient-reported outcomes of endoscopic procedures among admitted patients in Dhaka city

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Abstract

Background: Endoscopic procedures are essential for the diagnosis and management of gastrointestinal disorders, yet evidence on patient-reported outcomes and procedural effectiveness from low- and middle-income countries remains limited. This study assessed outcomes, complications, and satisfaction related to endoscopic interventions among hospitalized gastroenterology patients in Dhaka, Bangladesh.

Materials & Methods: A descriptive cross-sectional study was conducted among 245 admitted patients who underwent gastroscopy, colonoscopy, or bronchoscopy in a tertiary-level public hospital in Dhaka between April and June 2025. Data were collected using a semi-structured questionnaire and medical record review covering sociodemographic characteristics, indications, procedural outcomes, complications, recovery, and satisfaction. Descriptive statistics and chi-square tests were applied using SPSS.

Results: Among 245 hospitalized patients, gastroscopy was the most common procedure (57.6%), mainly performed for diagnostic purposes (54.3%). Overall, 53.8% perceived the procedure as effective, while one-third remained uncertain. Most patients reported no complications (80.8%) and recovered within two days (70.2%). Timely diagnosis or treatment was the most commonly reported contributor to effectiveness (31.4%). Although most participants were satisfied with communication (61.7%), only 38.8% would recommend the procedure to others. Perceived effectiveness significantly varied across age groups ($p = 0.001$), with younger patients reporting better outcomes than older adults.

Conclusion: Endoscopic interventions among hospitalized patients demonstrated generally favorable outcomes with limited complications and rapid recovery. However, gaps in communication and patient understanding of outcomes remain. Strengthening patient-centered communication and standardized counseling may further enhance perceived effectiveness and satisfaction with endoscopic care.

Keywords: Endoscopy; Gastroenterology; Clinical outcomes; Patient satisfaction; Complications; Bangladesh

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Introduction

Endoscopic interventions have become indispensable in modern gastroenterology for diagnosing, monitoring, and treating a wide range of gastrointestinal disorders, including bleeding, malignancies, inflammatory diseases, and obstructive conditions worldwide¹. Globally, advances in endoscopic technology and procedural techniques have significantly improved patient outcomes, reduced hospital stay, and minimized procedure-related complications². In South Asia, includ-

ing Bangladesh, the burden of gastrointestinal diseases continues to rise due to demographic transition, lifestyle changes, and increasing prevalence of chronic conditions, necessitating expanded use of endoscopic services³.

In Bangladesh, tertiary-level hospitals play a critical role in providing endoscopic care to both urban and semi-urban populations. However, limited empirical evidence exists regarding the real-world outcomes of endoscopic interventions, particularly from the patient perspective, including perceived effectiveness, compli-

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cations, recovery experiences, and satisfaction with care⁴. Existing studies primarily focus on procedural indications or technical outcomes, with insufficient attention to patient-centered outcomes and determinants influencing procedural success in hospital settings⁵.

Endoscopic intervention refers to diagnostic or therapeutic procedures performed using flexible endoscopes to visualize or treat gastrointestinal conditions. A successful endoscopic outcome is defined as achieving the intended diagnostic or therapeutic objective with clinical improvement as assessed by the treating physician. Complications include any adverse events occurring during or after the procedure, such as bleeding, perforation, infection, or severe pain⁶.

Understanding patient experiences and outcomes is essential for improving service quality, optimizing procedural protocols, and strengthening healthcare delivery systems. This study addresses an important research gap by systematically evaluating outcomes, complications, and satisfaction among hospitalized patients undergoing endoscopic interventions in a Bangladeshi tertiary hospital.

The objective of this study was to assess the outcomes of endoscopic interventions among admitted gastroenterology patients and to identify socio-demographic and procedural factors associated with these outcomes. It was hypothesized that endoscopic procedures would result in favorable outcomes with low complication rates, but patient satisfaction and perceived effectiveness would vary across demographic groups.

Materials & Methods

Study Design and Settings: A descriptive cross-sectional study was conducted in the Department of Gastroenterology of Shaheed Suhrawardy Medical College Hospital, a tertiary-level public hospital in Dhaka, Bangladesh. The hospital serves a large urban and peri-urban population and provides routine diagnostic and therapeutic endoscopic services.

Sample Size and Sampling Technique: The calculated sample size using Cochran's formula was 350; however, due to time constraints, 245 participants were included. Convenience sampling was applied among eligible admitted patients who underwent an endoscopic procedure during April 2025 to June 2025.

Inclusion and Exclusion Criteria: Patients admitted to the gastroenterology department who underwent an endoscopic procedure and provided informed consent were included. Patients who were critically ill, unwilling to participate, or withdrew consent were excluded.

Respondents and Data Collection Tools: Data were collected using a semi-structured, interviewer-

administered questionnaire developed in English based on study objectives, complemented by medical record review. The tool captured sociodemographic information, type and indication of endoscopy, perceived outcomes, complications, recovery, and satisfaction.

Study Variables: The dependent variable was the outcome of endoscopic intervention. Independent variables included sociodemographic characteristics and procedure-related factors such as type of endoscopy, indication, complications, recovery time, and patient satisfaction.

Data Collection and Quality Control: Data were collected over three months with daily verification for completeness and consistency. Questionnaires were pretested, and data coding and entry were performed systematically to minimize errors.

Data Analysis: Data were analyzed using SPSS version 25. Descriptive statistics summarized participant characteristics and outcomes. Chi-square tests assessed associations between sociodemographic variables and perceived outcomes, with statistical significance set at $p < 0.05$.

Results

A total of 245 admitted patients who underwent endoscopic procedures in the Department of Gastroenterology were included in the analysis.

Table 1. Socio-demographic characteristics of the study participants (n = 245)

Variable	Category	n (%)
Age group (years)	<20	19 (7.8)
	20–29	27 (11.0)
	30–39	67 (27.3)
	40–49	58 (23.7)
	50–59	33 (13.5)
	≥60	41 (16.7)
Mean age (± SD)		33.04 ± 8.13
Gender	Male	149 (60.6)
	Female	96 (39.4)
Residence	Urban	73 (29.7)
	Semi-urban	125 (51.2)
	Rural	47 (19.1)
Marital status	Married	134 (54.7)
	Single	75 (30.6)
	Widowed/Divorced/ Separated	36 (14.7)

Variable	Category	n (%)
Education level	No formal education	39 (15.9)
	Primary	78 (31.8)
	Secondary	107 (43.7)
	≥Higher secondary	21 (8.6)
Employment status	Self-employed	68 (27.8)
	Homemaker	61 (24.9)
	Unemployed	55 (22.4)
	Student/Retired	61 (24.9)
Monthly family income (BDT)	≤20,000	73 (29.8)
	20,001–40,000	129 (52.7)
	>40,000	43 (17.5)

Most participants were aged 30–39 years (27.3%), with a mean age of 33.0 ± 8.1 years. Males constituted 60.6%, and over half lived in semi-urban areas (51.2%). The majority were married (54.7%), had secondary education (43.7%), and belonged to a middle-income group (52.7%).

Table 2. Clinical characteristics and endoscopic procedure profile (n = 245)

Variable	Category	n (%)
Chronic diseases*	None	101 (41.2)
	Hypertension	61 (24.9)
	Diabetes	33 (13.5)
	Asthma/COPD	22 (8.9)
	Heart disease	13 (5.3)
	Cancer	15 (6.1)
Type of endoscopic procedure	Gastrosocopy	141 (57.6)
	Colonoscopy	71 (28.9)
	Bronchoscopy	33 (13.5)
Primary indication	Diagnostic investigation	133 (54.3)
	Therapeutic intervention	51 (20.8)
	Emergency evaluation	37 (15.1)
	Routine screening	24 (9.8)

*Multiple responses allowed.

More than two-fifths (41.2%) of participants had no chronic illness, while hypertension (24.9%) was the most common comorbidity. Gastrosocopy (57.6%) was the predominant procedure, and diagnostic purposes (54.3%) were the main indication for endoscopy.

Approximately 53.8% of respondents rated the procedure as very or somewhat effective, though 33.1% remained unsure. Most patients (80.8%) reported no complications, and 70.2% recovered within two days. Timely diagnosis or treatment (31.4%) was the most frequently cited factor for effectiveness. Despite generally favorable outcomes, 38.3% were dissatisfied with communication, and only 38.8% would recommend the procedure to others.

Table 3. Outcomes, complications, recovery and patient experience following endoscopy (n = 245)

Variable	Category	n (%)
Overall outcome	Very effective	79 (32.2)
	Somewhat effective	53 (21.6)
	Not effective	32 (13.1)
	Not sure	81 (33.1)
Factors contributing to effectiveness*	Timely diagnosis/treatment	77 (31.4)
	Proper preparation	56 (22.9)
	Modern equipment	49 (20.0)
	Skilled staff	36 (14.7)
Complications	None	198 (80.8)
	Any complication	47 (19.2)
	Severe pain	15 (31.9)
	Bleeding	12 (25.5)
Type of complications*	Nausea/vomiting	10 (21.3)
	Perforation	7 (14.9)
	Infection	3 (6.4)
Recovery time	≤2 days	172 (70.2)
	>2 days	73 (29.8)
Communication satisfaction	Satisfied/Very satisfied	151 (61.7)
	Dissatisfied/Very dissatisfied	94 (38.3)
Concerns answered	Completely	82 (33.5)
	Partially	96 (39.2)
	Not at all	52 (21.2)
Would recommend procedure	Yes	95 (38.8)
	No/Not sure	150 (61.2)

*Multiple responses allowed.

Table 4. Association between age group and outcome of endoscopic intervention (n = 245)

Age group (years)	Very effective n (%)	Somewhat effective n (%)	Not effective n (%)	Not sure n (%)	p-value
<20	7 (36.8)	5 (26.3)	3 (15.8)	4 (21.1)	0.001
20–29	10 (37.0)	7 (25.9)	5 (18.5)	5 (18.5)	
30–39	25 (37.3)	15 (22.4)	10 (14.9)	17 (25.4)	
40–49	18 (31.0)	12 (20.7)	7 (12.1)	21 (36.2)	
50–59	10 (30.3)	8 (24.2)	4 (12.1)	11 (33.3)	
≥60	9 (21.9)	6 (14.6)	3 (7.3)	23 (56.1)	
Overall	79 (32.3)	53 (21.6)	32 (13.1)	81 (33.1)	

A statistically significant association was observed between age group and perceived outcome of endoscopic intervention ($\chi^2=10.31$, $p = 0.001$). Younger participants were more likely to report the procedure as effective, while uncertainty was highest among patients aged ≥60 years (56.1%).

Discussion

This study provides important insights into the clinical and patient-reported outcomes of endoscopic interventions among hospitalized gastroenterology patients in Bangladesh. The findings indicate that endoscopic procedures are generally well-tolerated and effective, aligning with global evidence supporting their role in gastrointestinal disease management^{1,5}.

The predominance of middle-aged participants reflects patterns observed in international studies, where gastrointestinal disorders commonly present during productive adult years^{11,13}. Male predominance has been similarly reported in studies from both low- and high-income settings, potentially reflecting gender differences in disease prevalence and healthcare utilization¹³.

Gastroscopy emerged as the most frequently performed procedure, consistent with regional and global trends where upper gastrointestinal symptoms and bleeding remain leading indications for endoscopy¹⁶. Diagnostic purposes being the primary indication underscores the importance of endoscopy in early detection and clinical decision-making.

Perceived effectiveness was influenced by procedural and communication-related factors. Timely diagnosis was widely acknowledged as a key determinant of effectiveness, reinforcing existing literature emphasizing early endoscopic evaluation for improved outcomes^{1,16}. Although complication rates were low, patient experiences of discomfort and anxiety highlight the need for optimized peri-procedural care and counseling⁶.

Patient satisfaction with communication varied, suggesting gaps in pre- and post-procedural information delivery. Previous studies have demonstrated that effective communication significantly improves patient confidence, satisfaction, and acceptance of invasive procedures^{2,17}. Addressing these gaps could enhance overall patient experience and trust in healthcare services.

Limitations and Implications

This single-center, cross-sectional study limits generalizability and causal inference. Self-reported outcomes may be subject to recall bias. Future multicenter and longitudinal studies are recommended to explore long-term outcomes and intervention effectiveness. Strengthening patient education and standardized counseling protocols may improve satisfaction and perceived outcomes.

Conclusion

This study demonstrates that endoscopic interventions among hospitalized gastroenterology patients are associated with generally favorable outcomes and minimal complications. Diagnostic endoscopy plays a central role in patient management, with timely diagnosis contributing substantially to perceived effectiveness. While most patients recover quickly, variability in satisfaction – particularly related to communication – highlights areas for service improvement. The findings support the hypothesis that endoscopic procedures are effective and safe in tertiary-level settings, while

emphasizing the importance of patient-centered communication. Strengthening counseling practices and ensuring clear information exchange may enhance patient confidence and acceptance of endoscopic care. These insights can inform clinical practice and policy efforts aimed at improving the quality of gastroenterology services in Bangladesh.

Ethical Clearance and Consent to Participate: Ethical approval for this study was obtained from the Institutional Review Board (IRB) of the Faculty of Health and Life Sciences, Daffodil International University, Dhaka, Bangladesh (Ref: REC-FHLS/DIU/2025/20). Written institutional approvals were collected before data collection. The objectives, procedures, and potential risks of the study were clearly explained to all respondents and written informed consent was obtained from each participant, emphasizing voluntary participation and the right to withdraw at any time without consequences. The study adhered to the ethical principles of the Declaration of Helsinki and ensured no coercion or exploitation of vulnerable groups. No experiments on humans and/or the use of human tissue samples were done in this study.

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Nature and circumstances of hanging deaths in Rajshahi: A cross-sectional study

Ashrafi Akter Zahan^{1*}, Sanjib Kumar Bose², Shweta Halder³, Bivas Paul⁴, Ayesa Perveen⁵

Abstract

Background: Hanging is a form of fatal asphyxial injury and remains an important public health concern. In Bangladesh and many other countries, it has become a commonly reported method of fatality. Understanding the demographic patterns and key characteristics of these cases is essential for the formulation of prevention strategies.

Materials & Methods: A retrospective review was conducted in the Department of Forensic Medicine, Rajshahi Medical College, covering all medicolegal autopsies performed between January 2020 and December 2021. A total of 1,290 postmortem examinations from 13 police station jurisdictions were analyzed to identify cases in which the cause of death was determined to be hanging. Demographic information and major documented findings relevant to the diagnosis were extracted.

Results: Among 1,290 examined deaths, 183 were attributed to hanging. Women accounted for 57.92% of cases, and men for 42.07%. Young adults aged 21–30 years represented the largest proportion (43.71%). All cases were classified as suicidal in manner. The majority showed features consistent with asphyxial death, with cyanosis being the most frequently recorded observation, noted in more than 90% of cases. Other reported signs appeared with varying frequency but were less common.

Conclusions: The study highlights a substantial burden of hanging-related deaths in the region, particularly among young adults. Identifying demographic patterns and associated factors is critical for guiding public health interventions aimed at reducing such fatalities and supporting at-risk populations.

Keywords: Asphyxia, Hanging, Death, Rajshahi

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Introduction

Hanging is one of the most commonly encountered forms of asphyxial deaths in forensic medicine and remains a significant public health concern worldwide. It is typically defined as the suspension of the body by a ligature around the neck, where the constricting force is produced by the weight of the body. Over a million people die from hanging each year, making it one of the top ten causes of death worldwide¹. Although hanging is most frequently associated with suicide, it may also occur accidentally or, in rare cases, as part of homicidal activity. The epidemiological pattern varies across regions, influenced by socio-economic factors, mental health conditions, access to means, and cultural contexts. The types of hanging are primarily classified

based on the degree of suspension and the position of the knot. According to degree of suspension-1. Complete Hanging is the body is fully suspended with no contact with a supporting surface². Partial (or Incomplete) Hanging is part of the body remains in contact with a supporting surface². The knot of the ligature is situated at the nape (back) of the neck, over the occipital region in typical hanging and the knot of the ligature is located anywhere other than the nape of the neck is called atypical hanging³. From a medico-legal perspective, the examination of hanging cases is crucial for determining the manner of death, identifying characteristic injuries, and differentiating suicidal hanging from other forms of neck compression. Careful analysis of the ligature mark, neck structural findings, and other

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postmortem results are very helpful in determining the cause and method of death in hanging instances⁴. Understanding these features is essential not only for forensic pathologists but also for clinicians, researchers, and policymakers aiming to address the rising burden of self-harm and preventable deaths.

In forensic practice, deaths due to hanging are generally regarded as suicidal unless evidence suggests another manner, apart from rare instances of accidental hanging associated with masochistic behavior⁵. Hanging is often perceived as one of the most rapid and easily accessible methods⁶. Given the increasing prevalence of hanging-related fatalities in many low- and middle-income countries, including South Asia, further research is necessary to explore demographic trends, risk factors, and medico-legal implications. This study aims to contribute to the existing body of knowledge by analyzing the patterns and characteristics of hanging cases encountered in our setting.

Materials & Methods

This retrospective review was carried out from Rajshahi Medical College's department of forensic medicine and toxicology, between January 2020 and December 2021. During this time, 1290 postmortems were performed. The departmental register book provided information about the victims, including age groups, sex, manner, types, and post mortem results. We also made some direct observations. The Rajshahi Medical College's Toxicology and Forensic Medicine department granted written consent for sample collection. Observations were followed by data analysis. SPSS software version 16.0 was used to analyze the data. Results and observations were meticulously recorded. Tables and charts were used to display the results.

Results

1290 medico-legal autopsies were performed, of which 183 (14.18%) involved hanging deaths.

Table 1. Age wise distribution (n=183)

Age Group (years)	No. of cases	Percentage
11-20	46	25.14%
21-30	80	43.71%
31-40	32	17.48%
41-50	18	9.84%
51-60	02	1.09%
61-70	03	1.64%
71-80	02	1.09%
Total	183	100%

According to Table 1, the age group with the highest incidence of suicide hanging was 21–40 years old (112, or 61.19%), which subsequently decreased, and the age group with the lowest incidence was ≥ 71 years old.

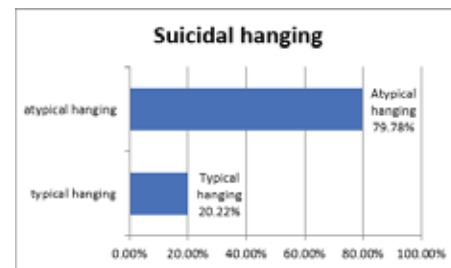


Figure 1. Typical and Atypical hanging according to position of knot (n=183)

A total of 183 suicidal hanging deaths were noted during the study period. There were 146 (79.78%) unusual hanging instances and 37 (20.22%) typical hanging cases. During the study period, no accidental hanging was discovered (Figure 1).

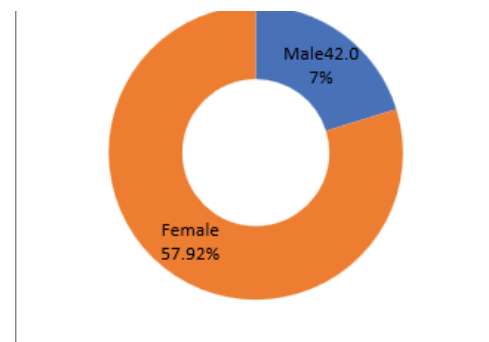


Figure 2. Sex wise distribution (n=183)

Figure 2 shows that there were 106 (57.92%) female victims and 77 (42.07%) male victims out of 183 post mortem cases. The ratio of men to women was discovered to be 7:10.

Table 2. Post mortem findings

Post mortem findings	No. of cases	Percentage
Cyanosis	178	97.26%
Salivary mark	55	30.33%
Petechial haemorrhage	49	26.77%
Sub-conjunctival Haemorrhage	48	26.22%
Face Congestion	18	9.88%
Injury of neck muscles	12	6.56%

According to Table 2, there were 178 (97.26%) cases of cyanosis, 49 (26.77%) of petechial hemorrhage, 48 (26.22%) of sub-conjunctival hemorrhage, 18 (9.88%) of face congestion, 55 (30.33%) of salivary marks, and 12 (6.56%) of neck muscular injuries.

Discussion

In Bangladesh, hanging is the most common way of committing suicide. A World Health Organization report states that 19,697 persons killed themselves in Bangladesh in 2011⁷. Suicide is a public health problem often overlooked by researchers, health policy makers and the medical professionals^{8,9}. Here, 112 cases (61.19%) of violent asphyxial deaths occur in the age

range of 21 to 40, which is also the busiest time in our lives. Several studies from other nations have also discovered that the intermediate age group has the highest prevalence of hanging, while the extremes of age have the lowest incidence¹⁰⁻¹¹.

A total of 183 (100%) hanging cases were discovered to be ante-mortem and suicide. In our large nation, depression, poverty, and unemployment are major contributors to hanging suicide. In addition to these familial conflicts, property disputes, love failures, and examinations are the other main reasons why they end their life¹¹⁻¹². Male 77 (42.07%) cases, female was 106 (57.92%) cases are found during our study and male female ratio were 7:10. A similar study conducted by Ahmed et al shows 58.63% female in their study on suicide by hanging in Bangladesh¹², but in the study of Ali E et al.,¹³ they found among the 334 cases, 69.2% were male and 30.8% were female. Only 37 (20.22%) of the 146 (79.78%) instances in our study had a knot at the nape of the neck, indicating conventional hanging, whereas 146 (79.78%) cases had a knot on the right or left side, indicating atypical hanging. 178 (97.26%) of the 183 individuals in our current study had cyanosis in the tips of their fingers and nail beds on both hands, 49 (26.77%) had brain petechial hemorrhage, 48 (26.22%) had sub-conjunctival hemorrhage, and 18 (9.88%) had face congestion (30.05%) of these 183 instances had injuries like contusions and abrasions¹³. Six (3.28%) instances had reddish subcutaneous tissue, while four (2.18%) had ecchymosis. 55 (30.33%) instances had dried saliva marks, while 12 (6.56%) had neck muscular injuries. These are the cardinal features of asphyxia and similar findings are observed in another literature available¹⁴.

Conclusion

The present study highlights that hanging in rural areas is predominantly suicidal in nature and often associated with easily accessible ligature materials within the household environment. Socio-economic stressors, interpersonal conflicts, and limited access to mental-health support appear to play a major role in the circumstances surrounding these deaths. Delayed discovery of victims and the lack of immediate medical intervention further contribute to the fatal outcome. The findings underscore the need for community-based awareness programs, early identification of psychosocial risk factors, and improved mental-health resources in rural settings. Strengthening preventive strategies and enhancing social support systems may significantly reduce the burden of hanging-related fatalities in these communities.

Ethical Clearance and Consent to Participate: Ethical approval for this study was obtained from the respected Institutional Review Board (IRB). Written institutional approvals were collected before data collection. The objectives, procedures, and potential risks of the study were clearly explained to all respondents and written informed consent was obtained from each participant, emphasizing voluntary participation and the right to withdraw at any time without consequences. The study adhered to the ethical principles of the Declaration of Helsinki and ensured no coercion or exploitation of vulnerable groups. No experiments on humans and/or the use of human tissue samples were done in this study. Competing interests: The authors report there are no competing interests to declare.

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Original Article

Clinical characteristics and associated factors among suspected pneumonia cases in an island area of Bangladesh

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Abstract

Background: Pneumonia remains a leading cause of morbidity and mortality among under-five children, particularly in resource-limited island communities. Identification of associated factors, pneumonia type and severity is critical for designing targeted interventions. This study was to assess the type, severity and associated socio-demographic, environmental, nutritional and clinical factors of pneumonia among under-five children in an island area of Bangladesh.

Materials & Methods: A cross-sectional study was conducted between January and June 2024 among 120 children aged 0–59 months who were suspected cases of pneumonia. Data were collected using structured questionnaires, clinical examination and chest radiograph. Pneumonia was diagnosed and classified according to WHO clinical criteria, with severity categorized as mild, moderate or severe. Associations between categorical variables and pneumonia were analyzed using Chi-square tests ($p < 0.05$).

Results: Pneumonia was diagnosed in 70 (58.3%) children. Infants aged 0–11 months, non-exclusive breastfeeding, undernutrition, incomplete immunization, biomass fuel exposure, household overcrowding, low maternal education, immunosuppressive drug use and associated diseases were significantly associated with pneumonia ($p < 0.05$). Bronchopneumonia was the most common type (38 cases, 31.7%), followed by lobar pneumonia (22 cases, 18.3%) and interstitial pneumonia (10 cases, 8.3%). Severity distribution showed 20 (16.7%) mild, 26 (21.7%) moderate and 24 (20.0%) severe pneumonia cases. Moderate and severe pneumonia were most frequent among bronchopneumonia and lobar pneumonia cases.

Conclusion: Pneumonia remains highly prevalent among under-five children in this island community, with multiple modifiable risk factors. Interventions focusing on exclusive breastfeeding, immunization, nutrition, environmental improvements and caregiver education are essential to reduce pneumonia burden in vulnerable populations.

Keywords: Pneumonia, Under-five children, Bronchopneumonia, Lobar pneumonia, Severity, Bangladesh

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Introduction

Pneumonia is a leading cause of morbidity and mortality among children under five years of age, particularly in low- and middle-income countries (LMICs). Globally, it accounts for an estimated 15% of all under-five deaths, translating to approximately 800,000 deaths annually¹. In Bangladesh, pneumonia remains a significant public health concern, with high incidence reported among children living in remote and resource-limited areas, including island populations².

The etiology of pneumonia in under-five children is multifactorial, involving host, environmental, socio-demographic and clinical determinants. Risk factors include young age, male sex, malnutrition, incomplete immunization, exposure to indoor air pollution from biomass fuels, overcrowding, low maternal education, and underlying comorbidities^{3,4}. Exclusive breastfeeding in the first six months of life has been shown to confer significant protection against respiratory infections, including pneumonia⁵.

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Classification of pneumonia by type (bronchopneumonia, lobar, interstitial) and severity (mild, moderate, severe) is essential for clinical management and planning public health interventions⁶. Despite national child health programs, data on pneumonia determinants, type, and severity among under-five children in isolated island communities of Bangladesh are limited. Understanding these factors is critical for designing targeted interventions to reduce pneumonia burden in vulnerable populations.

This study aimed to assess the type, severity and associated socio-demographic, environmental, nutritional and clinical factors of pneumonia among under-five children in an island area of Bangladesh.

Materials & Methods

This was a cross-sectional observational study conducted between January and June 2024 in Charfassion, upazilla of Bhola, District of Bangladesh which is known as an island. The study area was selected due to its geographical isolation, limited healthcare access, and high prevalence of childhood respiratory infections.

Children aged 0–59 months residing in the island with suspected case of pneumonia were eligible for inclusion. Children with chronic lung disease other than asthma or those with congenital anomalies incompatible with life were excluded. A total of 120 under-five children were included in the study.

Participants were recruited using consecutive sampling from private chamber where primary health care facility available.

The sample size was determined based on previous prevalence estimates of pneumonia in similar populations, using the formula for cross-sectional studies with 95% confidence interval and 5% margin of error⁷.

Data were collected using a structured interviewer-administered questionnaire and clinical examination.

Informed written consent was obtained from caregivers of all participating children. Information on socio-demographic characteristics, household environment, maternal education, immunization status, breast-feeding practices, nutritional status, history of immunosuppressive drug use and associated diseases was obtained from caregivers.

Nutritional status was assessed using WHO growth standards, including weight-for-age, weight-for-height, and height-for-age z-scores⁸.

Data were entered into SPSS version 26 for analysis. Descriptive statistics (frequencies, percentages, means $\pm$ SD) were used to summarize variables. Associations between categorical variables and pneumonia occurrence were analyzed using Chi-square tests, with $p <$

0.05 considered statistically significant. Pneumonia severity and type were presented as frequency distributions and cross-tabulated with associated factors.

Pneumonia Diagnosis and Classification: Pneumonia was diagnosed based on WHO clinical criteria: cough and/or difficulty breathing, with fast breathing and/or chest indrawing⁶. Severity was classified as mild, moderate, or severe according to WHO Integrated Management of Childhood Illness (IMCI) guidelines⁹. Chest radiographs were used to classify pneumonia type into bronchopneumonia, lobar, or interstitial¹⁰.

Results

A total of 120 under-five children were enrolled in the study, of whom 70 (58.3%) were diagnosed with pneumonia. Infants aged 0–11 months had a significantly higher proportion of pneumonia compared with children aged 12–59 months (36.7% vs. 30.0%; $p = <0.05$). Male children constituted a higher proportion of pneumonia cases than females (60.0% vs. 40.0%), though the difference was not statistically significant ($p = 0.268$) (Table 1).

Children who were not exclusively breastfed during the first six months had a higher prevalence of pneumonia compared with those who were exclusively breastfed (70.0% vs. 30.0%). Undernutrition was strongly associated with pneumonia, with two-thirds of pneumonia cases occurring among underweight or wasted children compared to one-third among children with normal nutritional status (66.7% vs. 33.3%) where p value was significant. Pneumonia was more frequent among partially or non-immunized children than among fully immunized children (56.7% vs. 43.3%), where p value was also significant.

Environmental and socio-demographic factors demonstrated significant relationships with pneumonia. Use of biomass fuel for cooking was associated with a higher occurrence of pneumonia compared with clean fuel (76.7% vs. 23.3%), and children living in overcrowded households had a significantly higher prevalence than those from non-overcrowded households (73.3% vs. 26.7%). Maternal education was also an important determinant, with pneumonia more common among children of mothers with primary or lower education compared to those whose mothers had education beyond primary level (70.0% vs. 30.0%).

Clinical factors further influenced pneumonia occurrence. History of immunosuppressive drug use was associated with higher pneumonia prevalence than no history (20.0% vs. 6.7%; $p = 0.028$). Similarly, the presence of associated diseases such as congenital heart disease, bronchial asthma, recurrent respiratory infections, tuberculosis, or neurological disorders was more

Table 1. Association between selected factors and pneumonia among under-five children in an island area of Bangladesh (n = 120)

Variables	Category	Pneumonia present n (%)	Pneumonia present n (%)	Total n (%)	p value
Age of child	0–11 months	22 (36.7)	18 (30.0)	40 (33.3)	0.041
	12–59 months	38 (63.3)	42 (70.0)	80 (66.7)	
Sex	Male	36 (60.0)	30 (50.0)	66 (55.0)	0.268
	Female	24 (40.0)	30 (50.0)	54 (45.0)	
Exclusive breastfeeding	Yes	18 (30.0)	36 (60.0)	54 (45.0)	0.002
	No	42 (70.0)	24 (40.0)	66 (55.0)	
Nutritional status	Normal	20 (33.3)	38 (63.3)	58 (48.3)	0.001
	Underweight/wasted	40 (66.7)	22 (36.7)	62 (51.7)	
Immunization status	Fully immunized	26 (43.3)	44 (73.3)	70 (58.3)	0.003
	Partially/not immunized	34 (56.7)	16 (26.7)	50 (41.7)	
Type of cooking fuel	Clean fuel	14 (23.3)	32 (53.3)	46 (38.3)	0.001
	Biomass fuel	46 (76.7)	28 (46.7)	74 (61.7)	
Overcrowding	Present	44 (73.3)	30 (50.0)	74 (61.7)	0.009
	Absent	16 (26.7)	30 (50.0)	46 (38.3)	
Maternal education	≤ Primary	42 (70.0)	28 (46.7)	70 (58.3)	0.012
	> Primary	18 (30.0)	32 (53.3)	50 (41.7)	
Immunosuppressive drug use	Yes	12 (20.0)	4 (6.7)	16 (13.3)	0.028
	No	48 (80.0)	56 (93.3)	104 (86.7)	
Associated disease	Present	30 (50.0)	14 (23.3)	44 (36.7)	0.002
	Absent	30 (50.0)	46 (76.7)	76 (63.3)	

common among children with pneumonia compared to those without (50.0% vs. 23.3%) and p value was also significant.

Table 2 demonstrates the distribution of pneumonia according to radiological type and clinical severity among the study participants (n = 120). Overall, 70 children (58.3%) were diagnosed with pneumonia, while 50 children (41.7%) had no evidence of pneumonia.

Among the identified pneumonia cases, bronchopneumonia was the most common type, affecting 38 children (31.7% of total participants and 54.3% of pneumonia cases). Lobar pneumonia was observed in 22 children (18.3%), whereas interstitial pneumonia accounted for the smallest proportion with 10 cases (8.3%).

Regarding severity according to WHO classification, moderate pneumonia was the most frequent presentation, seen in 26 children (21.7%), followed by severe pneumonia in 24 children (20.0%) and mild pneumonia in 20 children (16.7%). Children without pneumonia constituted 41.7% of the study population.

Analysis of severity according to pneumonia type showed that severe disease was most commonly associated with bronchopneumonia, where 16 of 38 cases (42.1%) were severe. In lobar pneumonia, moderate and

severe forms were equally distributed, each comprising 36.4% of cases. Interstitial pneumonia predominantly presented as mild disease, accounting for 60.0% of interstitial cases, and no severe interstitial pneumonia was identified in the study.

Table 2. Distribution of pneumonia type and severity (n = 120)**A. Type of pneumonia**

Type	Number (n)	Percentage (%)
Bronchopneumonia	38	31.7
Lobar pneumonia	22	18.3
Interstitial pneumonia	10	8.3
No pneumonia	50	41.7
Total	120	100

B. Severity of pneumonia (WHO classification)

Type	Number (n)	Percentage (%)
Mild	20	16.7
Moderate	26	21.7
Severe	24	20.0
No pneumonia	50	41.7
Total	120	100

C. Severity by type of pneumonia (n = 70 cases)

Type	Percentage (%)			
Bronchopneumonia	8 (21.1)	14 (36.8)	16 (42.21)	38 (54.2)
Lobar pneumonia	6 (27.3)	8 (36.4)	8 (36.4)	22 (31.4)
Interstitial Pneumonia	6 (60.0)	4 (40.0)	0 (0.0)	10 (14.30)
Total	20 (28.6)	26 (37.1)	24 (34.3)	70 (100)

Overall, bronchopneumonia represented the predominant radiological subtype and contributed the largest proportion of severe pneumonia cases in the study population.

Discussion

The present study assessed the type, severity, and associated socio-demographic, environmental, nutritional, and clinical factors of pneumonia among under-five children living in an island area of Bangladesh. Pneumonia was identified in 58.3% of the enrolled children, indicating a considerable burden of respiratory illness in this geographically vulnerable population. Similar high prevalence rates among hospitalized under-five children have been reported in previous Bangladeshi and South Asian studies, reflecting the continuing importance of pneumonia as a major public health problem in low-resource settings^{11,12}.

In this study, infants aged below one year were significantly more affected by pneumonia than older children. This finding is consistent with studies conducted in Bangladesh, India, and other developing countries, where younger age has been identified as a major risk factor because of immature immunity, smaller airways, and increased susceptibility to infections^{13,14}.

The higher proportion of pneumonia among male children observed in the present study is also comparable with findings from previous national and international studies, although the association was not statistically significant. Male predominance has often been attributed to biological vulnerability and greater health-care-seeking behavior for male children in South Asian societies¹⁵.

In this study, exclusive breastfeeding demonstrated a significant protective effect against pneumonia. Children who were not exclusively breastfed had substantially higher pneumonia prevalence compared with exclusively breastfed children. Breast milk provides essential immunological protection, including maternal antibodies and anti-inflammatory factors that reduce respiratory infections. Similar findings were reported by studies from Bangladesh, Nepal, Ethiopia, and Nigeria, which consistently showed that lack of exclusive breastfeeding increases the risk of childhood pneumonia.¹⁶⁻¹⁸

Undernutrition was strongly associated with pneumonia in the present study, with two-thirds of

pneumonia cases occurring among underweight or wasted children. Malnutrition impairs immune function, reduces mucosal defense, and predisposes children to recurrent and severe respiratory infections. This observation agrees with reports from the United Nations Children's Fund and World Health Organization, as well as studies from Bangladesh and other low-income countries where malnutrition remains a major contributor to childhood morbidity and mortality^{19,20}.

Immunization status also showed a significant relationship with pneumonia occurrence. Partially immunized or non-immunized children were more likely to develop pneumonia compared with fully immunized children. Vaccines against measles, pertussis, Haemophilus influenzae type b and pneumococcal disease are known to substantially reduce childhood pneumonia burden. Similar protective effects of complete immunization have been documented in studies conducted in Bangladesh, India and sub-Saharan Africa^{21,22}.

Environmental risk factors played an important role in this study. Use of biomass fuel was significantly associated with pneumonia, supporting evidence that indoor air pollution from wood, crop residues, and animal dung increases respiratory tract irritation and infection risk among children. Studies from rural Bangladesh, India and Nepal have similarly identified biomass smoke exposure as an important determinant of childhood pneumonia^{23,24}. Overcrowding was another significant factor in the present study, likely facilitating person-to-person transmission of respiratory pathogens. Comparable findings have been reported in several developing countries where overcrowded living conditions contribute to increased childhood respiratory infections²⁵.

In this study, maternal education emerged as an important socio-demographic determinant, as children of mothers with lower educational attainment experienced higher pneumonia prevalence. Educated mothers are generally more aware of child nutrition, hygiene, immunization and early healthcare-seeking behavior. Similar associations between low maternal education and childhood pneumonia have been documented in studies from Bangladesh, Pakistan and Ethiopia^{26,27}.

Among clinical factors, immunosuppressive drug use and associated diseases were significantly linked with pneumonia occurrence. Children with congenital heart disease, bronchial asthma, recurrent respiratory tract infections, tuberculosis, or neurological disorders were more vulnerable to pneumonia, likely because of impaired immunity or chronic respiratory compromise. Previous studies have similarly demonstrated increased susceptibility and severity of pneumonia among children with underlying comorbidities^{28,29}.

Radiologically, bronchopneumonia was the predominant type in the present study, accounting for more than half of all pneumonia cases. Similar predominance of bronchopneumonia has been reported in pediatric studies from Bangladesh and other developing countries³⁰. Lobar pneumonia constituted nearly one-third of cases, while interstitial pneumonia was comparatively less common. The predominance of bronchopneumonia in young children may be related to viral infections, malnutrition, delayed presentation and poor environmental conditions³¹.

Regarding severity, moderate pneumonia was the most frequent presentation, followed closely by severe pneumonia. Importantly, severe disease was most commonly associated with bronchopneumonia, whereas interstitial pneumonia predominantly presented with mild manifestations and no severe cases. These findings are consistent with previous literature indicating that bronchopneumonia is often associated with diffuse lung involvement and more severe clinical manifestations in under-five children^{32,33}.

The findings of this study highlight the multifactorial nature of childhood pneumonia in island communities like charfassion of Bangladesh. Nutritional deficiency, incomplete immunization, indoor air pollution, overcrowding, poor maternal education and associated comorbidities collectively contribute to increased pneumonia burden and severity. Strengthening maternal education, improving nutritional status, ensuring complete vaccination coverage, reducing indoor biomass smoke exposure and promoting exclusive breastfeeding may substantially reduce childhood pneumonia morbidity in such vulnerable settings.

Limitations and Policy Implications

The cross-sectional design limits causal inference. The study sample was from a single island, reducing generalizability. Diagnosis relied partly on clinical assessment, potentially introducing misclassification bias. Caregiver-reported data on breastfeeding and immunosuppressive drug history may be subject to recall bias.

Targeted interventions are needed to reduce pneumonia burden. Promoting exclusive breastfeeding, ensuring complete immunization, improving nutritional status, reducing indoor air pollution, mitigating household overcrowding, and enhancing maternal education are key strategies. These align with WHO IMCI guidelines and global child health policies.

Conclusion

Pneumonia remains a major health concern among under-five children in island areas of Bangladesh. Younger age, inadequate breastfeeding, undernutrition, incomplete immunization, biomass fuel exposure,

overcrowding, lower maternal education, immunosuppressive drug use, and associated comorbidities were significantly associated with pneumonia. Addressing these modifiable factors through comprehensive child health programs could reduce morbidity and mortality in this vulnerable population.

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A comparative study of Lignocaine and Esmolol in controlling hemodynamic response to laryngoscopy and endotracheal intubation. A randomized controlled trial

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Abstract

Background: Laryngoscopy and endotracheal intubation frequently trigger a transient yet significant sympathetic response, characterized by tachycardia and hypertension. Several pharmacological agents have been employed to attenuate this response, among which lignocaine (lidocaine) and esmolol are widely investigated. This randomized controlled trial evaluated and compared the efficacy and safety of intravenous lignocaine and esmolol in mitigating the hemodynamic response to laryngoscopy and endotracheal intubation in 400 adult patients.

Materials & Methods: A total of 400 American Society of Anesthesiologists (ASA) physical status I–II adult patients scheduled for elective surgeries under general anaesthesia with endotracheal intubation were randomly allocated into two equal groups ($n = 200$ each). Group L received intravenous lignocaine $1.5 \text{ mg}\cdot\text{kg}^{-1}$ as a bolus 2 minutes prior to laryngoscopy, while Group E received intravenous esmolol $1.5 \text{ mg}\cdot\text{kg}^{-1}$ as a bolus 2 minutes before laryngoscopy. Anaesthetic induction was standardized using fentanyl $2 \mu\text{g}\cdot\text{kg}^{-1}$, propofol titrated to effect, and rocuronium $0.6 \text{ mg}\cdot\text{kg}^{-1}$. Direct laryngoscopy was performed by experienced anaesthetists, with intubation completed within 20 seconds. Hemodynamic parameters – heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), and mean arterial pressure (MAP) – were recorded at baseline, after study drug administration (pre-laryngoscopy), immediately after intubation (0 minute), and at 1, 3, and 5 minutes post-intubation. The primary outcome was the maximum change in HR and MAP from baseline within the first 5 minutes following intubation. Secondary outcomes included the incidence of greater than 20% increases in HR or MAP, bradycardia, hypotension, and other adverse events.

Results: Both drugs attenuated the pressor response compared with expected untreated response, but esmolol produced significantly greater attenuation of HR and MAP at 0 and 1 minute post-intubation (mean ΔHR at 0 min: Group L $+18 \pm 9 \text{ bpm}$ vs Group E $+9 \pm 7 \text{ bpm}$; $p < 0.001$; mean ΔMAP at 0 min: Group L $+20 \pm 12 \text{ mmHg}$ vs Group E $+11 \pm 9 \text{ mmHg}$; $p < 0.001$). The incidence of a $>20\%$ increase in HR was 62% in Group L and 28% in Group E ($p < 0.001$). Esmolol was associated with a higher incidence of transient bradycardia (HR $< 50 \text{ bpm}$) – 6% vs 1.5% ($p = 0.02$) – but most episodes were responsive to atropine or transient and clinically insignificant. Hypotension (MAP decrease $> 20\%$) occurred in 4% (Group E) vs 2% (Group L), not statistically significant.

Conclusions: In this large randomized trial of 400 patients, esmolol $1.5 \text{ mg}\cdot\text{kg}^{-1}$ given prior to laryngoscopy provided superior attenuation of the sympathetic response compared with lignocaine $1.5 \text{ mg}\cdot\text{kg}^{-1}$, with an acceptable safety profile. Esmolol should be considered when stronger attenuation of hemodynamic response is desired, with attention to the risk of transient bradycardia.

Keywords: laryngoscopy, intubation, hemodynamic response, lignocaine, esmolol, randomized trial.

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Introduction

Laryngoscopy and endotracheal intubation are indispensable steps in securing the airway during general anaesthesia, yet they are accompanied by substantial sympathetic stimulation that manifests as tachycardia, hypertension, and arrhythmogenic potential¹. These hemodynamic alterations arise from nociceptive stimulation of the supraglottic and subglottic structures, resulting in a reflex catecholamine surge mediated primarily through increased sympathetic outflow². Although transient in healthy individuals, this pressor response may precipitate myocardial ischemia, heart failure exacerbation, cerebrovascular events, or increased intracranial pressure in vulnerable patients, making its attenuation a critical perioperative priority^{3,4}. Over the past several decades, numerous pharmacologic strategies have been explored to blunt this response. Opioids, particularly fentanyl and remifentanyl, mitigate sympathetic activation through μ -receptor – mediated analgesia but may cause respiratory depression or chest wall rigidity at higher doses⁵. Intravenous local anaesthetics such as lignocaine reduce airway reflexes and sympathetic discharge by stabilizing neuronal membranes and decreasing afferent sensory transmission from the airway mucosa⁶. Vasodilators – including nitroglycerin and sodium nitroprusside – have shown efficacy but may induce precipitous hypotension, limiting utility in hemodynamically fragile patients⁷. Similarly, alpha-2 agonists such as clonidine and dexmedetomidine reduce central sympathetic outflow but are associated with bradycardia and delayed recovery profiles⁸. Beta-blockers are among the most extensively investigated agents for controlling the cardiovascular stress response. Esmolol, an ultra – short-acting and highly β_1 -selective blocker with a rapid onset and an elimination half-life of approximately 9 minutes, enables precise and temporary regulation of heart rate and myocardial oxygen consumption without extending postoperative effects⁹. Its favorable pharmacokinetic characteristics permit careful titration with a low risk of persistent bradycardia or hypotension, making it especially suitable during the peri-intubation period¹⁰. Numerous studies have demonstrated that esmolol effectively reduces tachycardia, although its influence on systolic and diastolic blood pressure has shown variability across trials, likely due to differences in patient populations, timing of administration, and dosage protocols¹¹. Lignocaine, in contrast, continues to be a commonly used conventional agent. When administered intravenously prior to laryngoscopy, it suppresses airway reflexes and reduces endogenous catecholamine release; however, its effectiveness in limiting peak heart rate and blood pressure responses has been inconsistent¹². Variations in dosage, route of administration, and timing relative to intubation have

contributed to mixed findings in the literature¹³. Comparative meta-analyses evaluating lignocaine and esmolol indicate that both drugs mitigate the hemodynamic response, yet conclusions differ regarding which agent demonstrates superior efficacy, particularly when comparing heart rate control versus blood pressure outcomes¹⁴⁻¹⁵. In light of these uncertainties, additional high-quality research is necessary. Earlier comparative investigations have often been constrained by small sample sizes, heterogeneous methodologies, and limited statistical power. To overcome these shortcomings, the present study included 400 adult surgical patients to provide a comprehensive comparative evaluation of esmolol and lignocaine in attenuating hemodynamic responses to laryngoscopy and endotracheal intubation. The primary objective was to assess whether esmolol provides greater suppression of tachycardic and hypertensive responses than lignocaine. Through standardized dosing protocols, consistent anesthetic techniques, and rigorous hemodynamic monitoring, this study seeks to generate clinically relevant evidence to inform perioperative airway management practices.

Materials & Methods

Study design and setting: A prospective, randomized, single-blind clinical trial was conducted in the Departments of Anaesthesiology at Gonoshasthaya Samaj Vittik Medical College & Hospital, Mirzanagar, Ashulia, Savar; Ashiyan Medical College Hospital, Barua, Khilkhet; and East West Medical College and Hospital, Dhaka, Bangladesh, from July 2023 to June 2025, after institutional ethics committee approval and written informed consent from all participants.

Participants: Inclusion criteria: adult patients aged 18–65 years, ASA physical status I–II, scheduled for elective surgery under general anaesthesia requiring orotracheal intubation, Mallampati I–II, and anticipated easy airway.

Exclusion criteria: known allergy to study drugs, chronic beta-blocker use, significant cardiac conduction abnormalities, baseline bradycardia (HR < 50 bpm), uncontrolled hypertension, pregnancy, anticipated difficult airway, BMI > 35 kg·m⁻², hepatic or renal failure, and emergency surgeries.

Randomization and Blinding: A computer-generated randomization sequence assigned patients in a 1:1 ratio to either Group L (lignocaine) or Group E (esmolol) using block randomization with blocks of 20. Allocation concealment was ensured through sequentially numbered, opaque, sealed envelopes. The study medications were prepared by an anaesthesia technician who was not involved in patient management or data collection. Both

drugs were diluted to an equal total volume of 20 mL in identical syringes to maintain blinding of the attending anaesthetist and the outcome assessor.

Interventions

- Group L (Lignocaine): Intravenous lignocaine 1.5 mg·kg⁻¹ diluted to 20 mL with normal saline, administered over 60 seconds, 2 minutes prior to laryngoscopy.
- Group E (Esmolol): Intravenous esmolol 1.5 mg·kg⁻¹ diluted to 20 mL with normal saline, administered over 60 seconds, 2 minutes prior to laryngoscopy.

All patients received standardized anaesthetic management:

- Premedication: midazolam 0.03 mg·kg⁻¹ IV, administered 5 minutes before induction
- Fentanyl 2 µg·kg⁻¹ IV prior to induction
- Induction with propofol 1.5–2.5 mg·kg⁻¹, titrated until loss of consciousness
- Rocuronium 0.6 mg·kg⁻¹ to facilitate tracheal intubation

Mask ventilation with 100% oxygen was provided between induction and intubation. Direct laryngoscopy was performed by senior anaesthetists, with an anticipated intubation time of ≤ 20 seconds. No additional vasoactive medications were administered before the 5-minute post-intubation measurement unless clinically indicated.

Outcome Measures

Primary Outcome: Maximum change from baseline in heart rate (HR) and mean arterial pressure (MAP) within the first 5 minutes following intubation.

Secondary outcomes: incidence of a >20% increase in HR or MAP from baseline, episodes of bradycardia (HR <50 bpm), hypotension (MAP decrease >20% from baseline), need for rescue medications (atropine, ephedrine), oxygen desaturation (SpO₂ <92%), arrhythmias, and other adverse events.

Data collection: Demographic data and baseline hemodynamic measurements (HR, SBP, DBP, MAP) were recorded preoperatively in the operating room after a 5-minute rest. Hemodynamics were recorded at these time points: - T0: baseline (pre-drug) - T1: immediately before laryngoscopy (after drug administration, ~2 minutes) - T2: immediately after intubation (0 minutes) - T3: 1 minute after intubation - T4: 3 minutes after intubation - T5: 5 minutes after intubation. Adverse events and need for rescue medications were recorded intraoperatively.

Sample size calculation: Based on previous studies showing a mean difference of ~6–8 beats/min in peak HR and standard deviation of 20 beats/min, to achieve 90% power at $\alpha = 0.05$ to detect a 5-bpm difference, a minimum sample size of 166 per group was required.

Allowing for dropouts and to increase study precision, we enrolled 200 patients per group (total n = 400).

Statistical Analysis: Data were analyzed using SPSS version 25.0. Normality of continuous variables was assessed using the Shapiro – Wilk test. Normally distributed data are presented as mean ± standard deviation (SD). Non-normally distributed data are presented as median with interquartile range (IQR). Between-group comparisons were performed using the independent-samples t-test for normally distributed variables or the Mann – Whitney U test for non-normally distributed variables. Repeated-measures analysis of variance (ANOVA) was used to assess changes over time, including group × time interaction effects. Post hoc pairwise comparisons were conducted using Bonferroni correction. Categorical variables were analyzed using the Chi-square test or Fisher's exact test, as appropriate. A p-value < 0.05 was considered statistically significant.

Results

Of the 460 patients assessed for eligibility, 400 were randomized equally into Group L (lignocaine) and Group E (esmolol). Four patients (two from each group) were excluded from the final per-protocol analysis because of unexpected difficult intubation requiring more than 60 seconds and the use of alternative airway techniques. Consequently, 396 patients completed the study protocol and were included in the final analysis (198 patients in each group).

Table 1. Baseline demographic and clinical characteristics

Variable	Group L (n=198)	Group E (n=198)	p-value
Age (years), mean ± SD	38.6 ± 11.4	39.2 ± 10.9	0.58
Male, n (%)	112 (56.6)	118 (59.6)	0.54
Weight (kg), mean ± SD	68.9 ± 11.6	69.4 ± 12.1	0.62
ASA I/II, n	126/72	120/78	0.45
Baseline HR (bpm), mean ± SD	78 ± 10	77 ± 11	0.32
Baseline MAP (mmHg), mean ± SD	92 ± 10	93 ± 11	0.28
Mallampati I/II, n	148/50	150/48	0.77

Baseline demographic and clinical characteristics were comparable between the two groups, with no statistically significant differences observed in age, sex distribution, body weight, ASA physical status, baseline heart rate (HR), baseline mean arterial pressure (MAP), or Mallampati classification (Table 1). The mean age was 38.6 ± 11.4 years in Group L and 39.2 ± 10.9 years in Group E (p = 0.58). Baseline HR and MAP were also similar between the groups (HR: 78 ± 10 bpm vs 77 ± 11 bpm, p = 0.32; MAP: 92 ± 10 mmHg vs 93 ± 11 mmHg, p = 0.28) (Table 1).

Serial hemodynamic measurements demonstrated significant differences in peri-intubation cardiovascular responses between the two groups (Table 2 and Figure 1). Following administration of the study drugs, patients in the esmolol group exhibited significantly lower pre-laryngoscopy HR and MAP values compared with the lignocaine group at T1 (HR: 72 ± 10 bpm vs 76 ± 9 bpm, $p < 0.001$; MAP: 85 ± 9 mmHg vs 90 ± 9 mmHg, $p < 0.001$) (Table 2).

Table 2. Hemodynamic variables at specified time points (mean $\pm$ SD)

Timepoint	HR (bpm) Group L	HR (bpm) Group E	p (HR)	MAP (mmHg) Group L	MAP (mmHg) Group E	p (MAP)
T0 Baseline	78 ± 10	77 ± 11	0.32	92 ± 10	93 ± 11	0.28
T1 Pre- laryngoscopy	76 ± 9	72 ± 10	<0.001	90 ± 9	85 ± 9	<0.001
T2 0 min (post-intubation)	96 ± 12	86 ± 10	<0.001	112 ± 14	104 ± 12	<0.001
T3 1 min	94 ± 11	84 ± 11	<0.001	108 ± 13	100 ± 12	<0.001
T4 3 min	86 ± 10	78 ± 9	<0.001	98 ± 12	92 ± 11	0.002
T5 5 min	80 ± 9	76 ± 9	0.01	94 ± 10	90 ± 10	0.03

Immediately after endotracheal intubation (T2), both groups showed increases in HR and MAP; however, the magnitude of increase was significantly attenuated in the esmolol group. At T2, the mean HR increased to 96 ± 12 bpm in Group L compared with 86 ± 10 bpm in Group E ($p < 0.001$), while MAP increased to 112 ± 14 mmHg in Group L versus 104 ± 12 mmHg in Group E ($p < 0.001$) (Table 2 and Figure 1). Similar findings were observed at 1 minute post-intubation (T3), where HR remained significantly lower in the esmolol group (84 ± 11 bpm vs 94 ± 11 bpm, $p < 0.001$), along with lower MAP values (100 ± 12 mmHg vs 108 ± 13 mmHg, $p < 0.001$) (Table 2 and Figure 1).

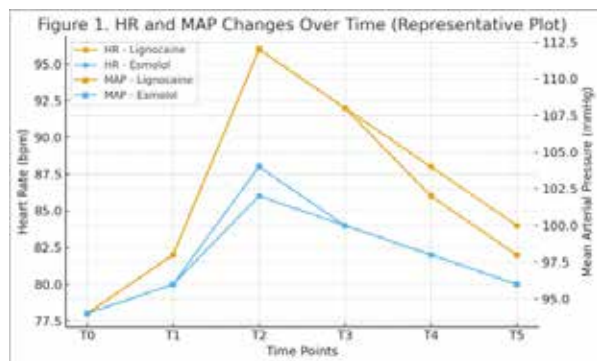


Figure 1. HR and MAP changes over time (Representative Plot)

Although the hemodynamic parameters gradually approached baseline values over time in both groups, Group E continued to demonstrate significantly lower HR and MAP at 3 minutes (T4) and 5 minutes (T5) following intubation. At T4, HR was 78 ± 9 bpm in Group E compared with 86 ± 10 bpm in Group L ($p < 0.001$), while MAP was 92 ± 11 mmHg versus 98 ± 12 mmHg, respectively ($p = 0.002$). At T5, HR values were

76 ± 9 bpm in Group E and 80 ± 9 bpm in Group L ($p = 0.01$), whereas MAP values were 90 ± 10 mmHg and 94 ± 10 mmHg, respectively ($p = 0.03$) (Table 2).

Repeated-measures ANOVA demonstrated a significant group $\times$ time interaction for both HR ($F = 18.9$, $p < 0.001$) and MAP ($F = 12.7$, $p < 0.001$), indicating significantly different temporal hemodynamic profiles between the lignocaine and esmolol groups. The greatest between-group differences were observed immediately

after intubation and at 1 minute post-intubation (T2 and T3) (Figure 1 and Table 2).

Table 3. Incidence of clinically significant responses and adverse events

Outcome	Group L (n=198)	Group E (n=198)	p-value
Age ($>20\%$ increase in HR)	123 (62.1%)	55 (27.8%)	<0.001
$>20\%$ increase in MAP	118 (59.6%)	64 (32.3%)	<0.001
Bradycardia (HR <50 bpm)	3 (1.5%)	12 (6.1%)	0.02
Hypotension (MAP decrease $>20\%$)	4 (2.0%)	8 (4.0%)	0.24
Need for atropine	2 (1.0%)	7 (3.5%)	0.08
Need for ephedrine	3 (1.5%)	5 (2.5%)	0.72
Desaturation SpO ₂ $<92\%$	0	0	—
Arrhythmias (new onset)	1 (0.5%)	2 (1.0%)	0.56

The incidence of clinically significant hemodynamic responses and adverse events is presented in Table 3. A greater than 20% increase in HR from baseline occurred significantly more frequently in Group L than in Group E (62.1% vs 27.8%, $p < 0.001$). Similarly, a greater than 20% increase in MAP was observed in 59.6% of patients receiving lignocaine compared with 32.3% of patients receiving esmolol ($p < 0.001$) (Table 3).

Transient bradycardia (HR <50 bpm) occurred more commonly in the esmolol group than in the lignocaine group (6.1% vs 1.5%, $p = 0.02$). Hypotension, defined as a MAP reduction greater than 20% from baseline, was observed in 4.0% of patients in Group E and 2.0% in Group L, although this difference was not statistically significant ($p = 0.24$). The requirement for atropine and ephedrine was low and comparable between groups. No patient experienced oxygen desaturation below 92%, and new-onset arrhythmias were rare in both groups (Table 3). All adverse hemody-

dynamic events were transient and responded appropriately to standard intraoperative management.

Discussion

In this randomized, double-blind trial involving 396 patients who completed the study protocol, administration of esmolol at a dose of $1.5 \text{ mg} \cdot \text{kg}^{-1}$ as an intravenous bolus 2 minutes prior to laryngoscopy resulted in more effective attenuation of the acute hemodynamic response to laryngoscopy and endotracheal intubation compared with lignocaine at the same dose ($1.5 \text{ mg} \cdot \text{kg}^{-1}$). The superiority of esmolol was most evident immediately following intubation (T2) and at 1 minute thereafter (Table 3), with the effect persisting-although gradually diminishing-up to 5 minutes post-intubation¹⁻³.

Interpretation of main findings

Esmolol significantly reduced both the magnitude and incidence of acute tachycardia and hypertension. This aligns with its pharmacologic behavior-rapid β_1 -receptor blockade reducing heart rate, myocardial contractility, and reflex sympathetic surges⁴⁻⁵. Lignocaine, while known to attenuate airway reflexes, produced a smaller hemodynamic blunting effect with the dosing and timing used in this study⁶⁻⁷. The lower pre-laryngoscopy HR and MAP values in the esmolol group (Table 1) indicate a pre-emptive hemodynamic stabilizing effect.

The clinical importance of reducing this response varies with patient baseline cardiovascular risk. While transient surges in HR and MAP are usually tolerated in ASA I-II patients, they may provoke myocardial ischemia, cerebrovascular compromise, or worsening intracranial hypertension in high-risk individuals⁸⁻¹⁰. These findings therefore support preferential esmolol use when enhanced hemodynamic control is clinically desirable.

Safety and adverse events

Esmolol was associated with a higher incidence of transient bradycardia (6.1% vs 1.5%). Most cases resolved with atropine or conservative measures. Hypotension was infrequent and comparable between groups. Esmolol's ultrashort half-life remains an advantage, as adverse effects typically dissipate rapidly once infusion or bolus exposure ends⁴⁻¹¹. No serious arrhythmias or cardiac events occurred.

Comparison with prior literature

Previous smaller trials have shown variable outcomes, largely owing to differences in dosing, timing, opioid co-administration, anaesthetic depth, and methodology. Studies using lower esmolol doses ($0.5\text{--}1 \text{ mg} \cdot \text{kg}^{-1}$) reported modest attenuation of hemodynamic responses¹²⁻¹⁴, whereas higher doses, as used here, have demonstrated more substantial suppression with acceptable

safety¹⁵. Lignocaine results in literature are similarly heterogeneous, with airway topicalization or earlier bolus timing occasionally yielding stronger effects^{6,16}. The standardized protocol employed in the present study enhances clarity when comparing these two agents head-to-head.

Strengths and limitations

Key strengths include the large sample size ($n = 400$ randomized, 396 analyzed), strict protocol adherence, and multiple peri-intubation measurement timepoints. These factors mitigate bias and enable a high-resolution characterization of acute hemodynamic patterns.

However, several limitations exist. The single-center design may restrict generalizability; high-risk cardiac patients were excluded, limiting application to those with severe coronary or valvular disease. Additionally, only one dosing regimen per drug was used; alternative esmolol bolus or infusion strategies and different lignocaine timings might produce different comparative outcomes. Combination therapy (e.g., esmolol plus lignocaine), which might offer additive protection, was not explored. Finally, the study did not assess postoperative cardiac biomarkers such as troponin, which could have provided insight into myocardial injury associated with hemodynamic surges.

Clinical implications and recommendations

For most low-risk patients undergoing elective surgery, either agent is acceptable. However, when suppression of intubation-induced sympathetic surges is essential – such as in coronary artery disease, severe hypertension, or raised intracranial pressure – esmolol $1.5 \text{ mg} \cdot \text{kg}^{-1}$ administered 2 minutes before laryngoscopy appears superior. Clinicians should remain vigilant for transient bradycardia and have atropine readily available. Lignocaine continues to serve as a suitable alternative when β -blockade is contraindicated or when the primary objective is reduction of airway reflexes rather than hemodynamic blunting.

Future research

Future multicenter studies including high-risk cardiac populations, evaluating varied esmolol bolus or infusion regimens, and exploring esmolol – lignocaine combinations would advance understanding. Investigations incorporating perioperative myocardial injury markers, neurophysiologic outcomes, and optimal administration timing – including topical airway anesthesia – would further refine clinical practice.

Conclusion

Esmolol $1.5 \text{ mg} \cdot \text{kg}^{-1}$ administered 2 minutes prior to laryngoscopy provides more effective attenuation of the increases in heart rate and mean arterial pressure associ-

ated with laryngoscopy and endotracheal intubation than lignocaine $1.5 \text{ mg} \cdot \text{kg}^{-1}$ in ASA I–II adult patients. Although esmolol was linked to a higher incidence of transient bradycardia, its overall safety profile remained acceptable. Therefore, esmolol is recommended when more pronounced control of the hemodynamic response is required, provided that appropriate monitoring is ensured.

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Case Report

Prolonged survival in advanced gallbladder carcinoma following multimodal palliative management : A case report

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Abstract

Background: Gallbladder carcinoma (GBC) is the most frequent cancer of the biliary tract. When caught at an advanced stage, the outlook is poor, with patients typically surviving for less than six months. Reports of survival beyond one year are uncommon and may offer insights into prognostic factors and management strategies.

Case Presentation: A 60-year-old female patient presented with right upper quadrant pain, worsening jaundice, loss of appetite, and weight loss, along with pale stools. Diagnostic imaging confirmed advanced gallbladder carcinoma complicated by a blockage in the biliary tract. The patient underwent cholecystectomy with external biliary drainage followed by systemic chemotherapy using a gemcitabine–carboplatin regimen.

Results: Serial imaging demonstrated partial disease stabilization for several months. The patient maintained a good functional status and continued chemotherapy with supportive care, surviving more than 24 months from diagnosis despite eventual disease progression.

Conclusion: This case demonstrates that prolonged survival in advanced gallbladder carcinoma is achievable with individualized multimodal palliative management, including effective biliary decompression, timely chemotherapy, and comprehensive supportive care, highlighting the potential benefit of tailored treatment even in advanced disease.

Keywords: Gallbladder carcinoma, Advanced-stage cancer, Prolonged survival, Palliative chemotherapy, Biliary decompression

Received: 30 March 2025, **Accepted:** 20 April 2025

Introduction

Gallbladder cancer (GBC) is the most frequent malignancy of the biliary system and ranks as the sixth most common gastrointestinal cancer. Its occurrence varies by region, with incidence rates ranging from 8.5 per 100,000 in the U.S. to 13.6 per 100,000 in Asia¹. The prognosis of advanced GBC remains dismal, with a reported median survival of less than 6 months². Survival beyond one year is uncommon. Reporting rare cases of prolonged survival may provide insights into potential prognostic factors and management strategies that could improve outcomes in selected patients.

Case presentation

A 60-year-old female presented with a two-month history of progressive right upper quadrant abdominal pain, anorexia, unintentional weight loss, and intermittent jaundice. She also gave a history of dark urine and pale stool. On physical examination, there was anemia, mild icterus, and tenderness in the right hypochondrium.

Investigations

Laboratory investigations showed elevated serum bilirubin and alkaline phosphatase levels, with mildly raised transaminases. Serum CA 19-9 levels were elevated. Ultrasonogram of the abdomen revealed a

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gallbladder distended with a gallbladder neck mass. An abdominal CECT scan showed an irregular tumor at the gallbladder neck that had spread into the common hepatic duct and the porta hepatis. The mass also invaded nearby liver tissue, causing a backup of bile and resulting in dilated bile ducts (upstream biliary dilatation) (Figure 1). MRCP suggested cancer of the neck of the gallbladder and hepatic invasion with involvement of the right, left, and common hepatic duct with moderate biliary obstruction (Figure 1). Ultrasound-guided biopsy from hepatic SOL confirmed metastatic adenocarcinoma.

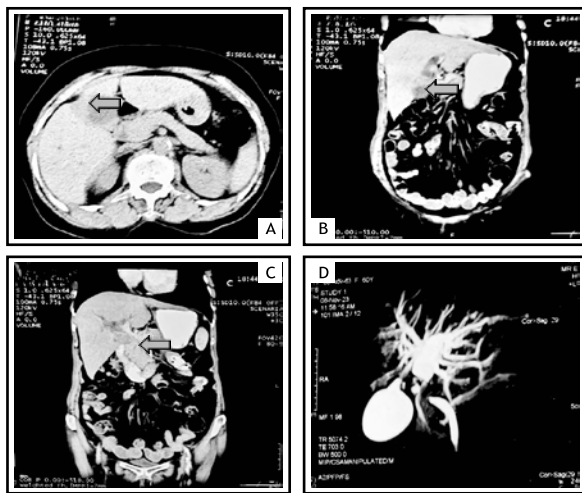


Figure 1. (A) Arrow showing liver metastasis; (B) Arrow showing gallbladder mass; (C) Showing growth in CHD; (D) MRCP showing upstream biliary dilatation

Treatment

Given the advanced nature of the disease, a multidisciplinary tumor board was formed, and a decision for palliative surgery was taken with possible biliary drainage, as this was staged as Vb.3. The patient went through cholecystectomy with external biliary drainage in November 2023. Per operative findings were a gallbladder mass at the neck involving the hepatic segments IVA, V, VI, and the common hepatic duct. Histopathological diagnosis was well-differentiated adenocarcinoma with a circumferential clear resection margin and pT3NXMX. Patient then went through systemic chemotherapy using a gemcitabine–carboplatin -based regimen for a total of 8 cycles until August 2024.

Outcome and follow-up

Serial imaging demonstrated partial disease stabilization for several months. A CT scan of the abdomen was performed before systemic chemotherapy. It showed hepatic metastasis with involvement of the adjacent gallbladder fossa (Figure 2). The following CT scan, conducted in March and September 2024, showed hepatic SOL in segment V of the right liver (Figure 3). After that, on our last follow-up in January 2026, we did

another CT scan of the abdomen as the patient presented with upper abdominal pain and reported same as before without any ascites, peritoneal metastasis and no lymphadenopathy (Figure 4). The patient maintained a good functional status (ECOG performance status 2) for a prolonged period with the external biliary drain (T-tube) (Figure 5A). Despite eventual disease progression, she survived for more than 24 months from the time of diagnosis, significantly exceeding the expected survival for advanced GBC (Figure 5B).

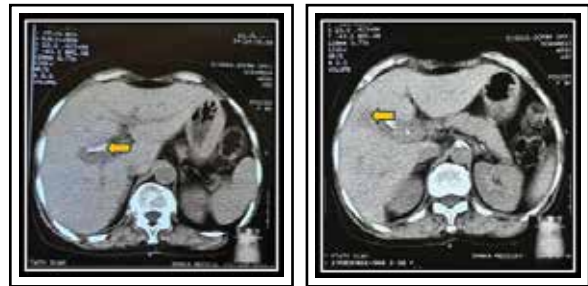


Figure 2. (A) Arrow showing EBD in confluence; (B) Arrow showing hepatic metastasis

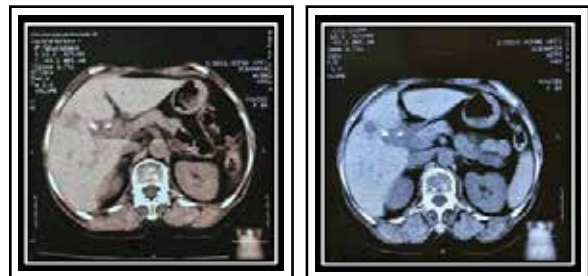


Figure 3. (A) CT scan in March 2024; (B) CT scan in September 2024

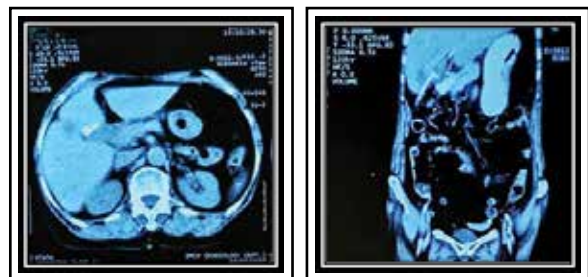


Figure 4. CT scan in January 2026



Figure 5. Recent photos of the patient with EBD in situ.

Gallbladder carcinoma is associated with one of the poorest prognoses among gastrointestinal malignancies. Advanced-stage disease is often rapidly progressive, and treatment is mainly palliative. In this case report, the patient was admitted with jaundice and anemia and diagnosed with advanced GBC. According to the UICC guideline, this case was defined as Stage Vb.³ The

8th edition of the AJCC staging system classifies this as a T3 tumor, which is advanced.⁴ For T3 and T4 tumors, the extent of appropriate resection is debatable. The NCCN guidelines make a blanket statement regarding principles for resection, including radical cholecystectomy (including segments IVb and V), lymphadenectomy, and extended hepatic or biliary resection as necessary to achieve negative margins.⁵ Our patient went through cholecystectomy, and as per the operation findings, the patient's tumor was unresectable, but had obstructive jaundice, so external biliary drainage was done. In advanced GBC, only 10%–35% of lesions are resectable.⁶ Cisplatin plus gemcitabine was associated with a significant survival advantage without substantial toxicity. For patients with advanced biliary tract cancer, a combination of cisplatin and gemcitabine is considered a standard and effective treatment regimen.⁷ Our patient initially received gemcitabine and cisplatin, but as renal function deteriorated, cisplatin was replaced with carboplatin.

To monitor for postoperative recurrence, patients underwent CT scans and ultrasounds every 3 months for the first two years, then every 6 months through year five. Tumor markers were checked even more frequently – every 1 to 3 months initially, then twice a year thereafter.⁸ The five-year survival rates dropped significantly by stage: from 91.8% in stage I down to 20.3% in stage IVb, with no survivors reaching the five-year mark in stage V.⁹

Factors that may have contributed to prolonged survival in this patient include good baseline performance status, early initiation and tolerability of chemotherapy, effective biliary decompression, absence of significant comorbidities and comprehensive supportive care. This case supports the concept that individualized multimodal palliative care can yield meaningful survival benefits in selected patients with advanced GBC.

Conclusion

Gallbladder carcinoma is a highly aggressive malignancy with a generally poor prognosis, particularly in its

advanced stages. This case report highlights the survival of a patient diagnosed with advanced GBC who survived for over 24 months, significantly exceeding the typical survival expectations for such advanced disease. This case underscores the importance of personalized, multimodal palliative care for selected patients with advanced gallbladder carcinoma, which may improve survival and quality of life.

Patient consent: The patient provided written informed consent to publish her case for academic purposes.

Conflict of interests: None declared.

Financial support: None declared

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