Comparative Study on Combination of Serum Procalcitonin, Serum Albumin & Lactate in Predicting the Prognosis for Emergency Abdominal Surgeries.

Submitted by :DR. BOMMU JEEVAN REDDY

P.G. in Department of General Surgery

Dissertation Submitted to

BLDE (DEEMED TO BE UNIVERSITY) SHRI.B. M. PATIL MEDICAL COLLEGE HOSPITAL & RESEARCH CENTRE, VIJAYAPURA KARNATAKA

In partial fulfilment of the degree of

MASTER OF SURGERY

IN

GENERAL SURGERY

Under the guidance of

DR RAMAKANTH BALOORKAR.

Professor Department of General Surgery

Shri. B.M. Patil Medical College Hospital and Research Centre.

BLDE (DEEMED TO BE UNIVERSITY), Vijayapura,

Karnataka-586103

B.L.D.E. (DEEMED TO BE UNIVERSITY

SHRI B. M. PATIL MEDICAL COLLEGE, HOSPITAL AND RESEARCH CENTRE,

VIJAYAPURA, KARNATAKA

DECLARATION BY THE CANDIDATE

I hereby declare that this dissertation, "**Comparative Study on Combination of Serum Procalcitonin, Serum Albumin & Lactate in Predicting the Prognosis for Emergency Abdominal Surgeries."** is a bonafide and genuine research work carried out by me under the guidance of **DR RAMAKANTH BALOORKAR,** Professor, Department of General Surgery at BLDE (Deemed to be University), Shri B. M. Patil Medical College, Hospital and Research Centre, Vijayapura.

Date: _____

Place: Vijayapura **DR. BOMMU JEEVAN REDDY**

B.L.D.E. (DEEMED TO BE UNIVERSITY)

SHRI B. M. PATIL MEDICAL COLLEGE, HOSPITAL AND RESEARCH CENTRE,

VIJAYAPURA, KARNATAKA

CERTIFICATE BY THE GUIDE

This is to certify that the dissertation entitled "**Comparative Study on Combination of Serum Procalcitonin, Serum Albumin & Lactate in Predicting the Prognosis for Emergency Abdominal Surgeries"**

is a bonafide research work done by **DR. BOMMU JEEVAN REDDY** in partial fulfilment of the requirement for the degree of M.S. in General Surgery.

Date: _____

Place: Vijayapura

DR RAMAKANT BALOORKAR

PROFESSOR,

Department Of General Surgery

BLDE (DEEMED TO BE UNIVERSITY)

SHRI B. M. PATIL MEDICAL COLLEGE, HOSPITAL &RESEARCH CENTRE, VIJAYAPURA.

ENDORSEMENT BY THE HOD AND PRINCIPAL

This is to certify that the dissertation entitled "**Comparative Study on Combination of Serum Procalcitonin, Serum Albumin & Lactate in Predicting the Prognosis for Emergency Abdominal Surgeries"**

is a bonafide research work done by **DR BOMMU JEEVAN REDDY,** Under the guidance of **DR. RAMAKANTH BALOORKAR,** Professor, Department of GENERAL SURGERY at BLDE (Deemed to be University) Shri. B. M. Patil Medical College Hospital and Research Centre, Vijayapura.

DR. MANJUNATH KOTENNAVAR

Professor & Head of department
Department of General Surgery
B.L.D.E. (Deemed to be university 's)
Shri B. M.Patil Medical College, Hospital & Research Centre. Vijayapura
Date:
Place: Vijayapura

DR. ARAVIND V PATIL

Principal

B.L.D.E. (Deemed to be university 's)
Shri B. M.Patil Medical College, Hospital & Research Centre. Vijayapura
Date:
Place: Vijayapura

B.L.D..E (DEEMED TO BE UNIVERSITY

SHRI B. M. PATIL MEDICAL COLLEGE HOSPITAL & RESEARCH

CENTRE, VIJAYAPURA.

COPYRIGHT

DECLARATION BY THE CANDIDATE

I hereby declare that the BLDE (Deemed to be University), Karnataka, shall have the right to Preserve, use and disseminate this dissertation/thesis in print or electronic format for Academic / Research purposes.

Date **DR. BOMMU JEEVAN REDDY**

Place: Vijayapura

ACKNOWLEDGEMENT

The dissertation, being a work of cooperation and assistance, would be far from complete without due acknowledgement of the help gratefully received.

It is my rare and distinct privilege and honour to have the occasion to work under the table, valuable guidance and constant supervision of **DR. RAMAKANTH BALOORKAR**, Professor, Department of Surgery, Shri B M Patil Medical College, Vijayapura.

I am incredibly fortunate to benefit from his vast experience, valuable guidance, advice, and encouragement at each step of my study for the present dissertation. I express my gratitude and indebtedness and pay my respects to him for his keen interest in guiding me on the proper lines.

I acknowledge and express my humble gratitude and sincere thanks to my beloved teacher.

I sincerely thank **Dr Aravind Patil, Principal, Shri B M Patil Medical College, Vijayapura,** for his constant support and help in undertaking this study. **Dr. Manjunath Kotennavar**, Professor & Head of the Department of Surgery. Shri B M Patil Medical College, Vijayapura, for his constant help and support in undertaking this study.

My sincere thanks to my Teachers, **Dr Tejaswini Vallabha, Dr M.B Patil, Dr. Vikram Sindagikar Dr. Dayanand Biradar, Dr Vijaya Patil, Dr Girish Kullolli, Dr Deepak Chavan, Dr. B.T. Badadal, Dr Shailesh Kannur, Dr S.S Patil, Dr. Shruti Sheelin, Dr. Pradeep Jaju, Dr. Sanjeev Rathod, Dr. Veena Ghatneppagol, Dr. Aniketan Kv, Dr. Anand Suntan, Dr. Manjunath Savanth,Dr Vijayakumar Ishwarappagol,Dr Shivaraj ,Dr Avinash H and Dr. Darshan Gandhi** to all staff members of the Department of Surgery, have enriched me with their knowledge and experience.

My beloved seniors **Dr Prajwal, Dr Vinayak , Dr Jagadhish , Dr Santhan ,Dr Siddharth, Dr Chethan,Dr Abdul, Dr Prasad Biradar , Dr Ashwin Siddhesh,Dr Mannam Viswateja, Dr Shrihari V, Dr Karthik Reddy,Dr Rohan deepak gharpure, Dr Saketh Shetty, Dr Narendra Ballal, Dr Neha Babar, Dr Akshay Mudanur, Dr Priyatama Kumari, Dr Yashaswini T.**

My batchmates -**Dr Srinath, Dr Eswar, Dr Linette Pearl Mathias, Dr Hemanth, Dr Venkata Challa, Dr Shreeya D, Dr Divyange, Dr Satvik Phutane , Dr. Sai teja, Dr Vaishnavi Rds,, Dr Ajinkya Kavalkar**

My juniors **-Dr Sai Viswanth, Dr Nithesh, Dr Dheeraj, Dr venkatramanna, DrSushmitha, Dr likhit. Dr kanisk, Dr Mruthyunjay. Dr jazal, Dr Tejasvi**

I also thank Mrs. Vijaya Sorganvi, lecturer statistician for her guidance during my dissertation work.

I thank my parents Mr BOMMU KONDA REDDY and Mrs VENKATA SUBBAMMA ,my beloved wife Mrs DR SAI PRAKHYA NAIDU, my brother Mr BOMMU MANOHAR REDDY and Mr BOMMU PAVAN REDDY and My friend KARTHIK MATHURU for their constant support, help, patience, love and belief in me.

I express my sincere thanks to all the patients who constituted the keystones of my study. I want to express my deep appreciation to all my friends and colleagues for providing valuable tips and clues in completing this vast work. Moreover, finally, I must thank the Almighty I believe in, whose Omnipresence and blessings were always present during the study, and thank you for making all these wonderful people happen to me. I pray for continued benison and fruition.

Date: **DR. BOMMU JEEVAN REDDY**

Place-Vijayapura.

List of Tables

List of tables

List of graphs

Table of Contents

Introduction

Non-traumatic acute abdominal (NTAA) emergencies include spontaneous abdominal diseases that require prompt surgical intervention due to acute abdominal pain and/or soreness. Hospital presentation delays are prevalent in the majority of poor nations. Delays at the hospital can therefore result in additional physiological decline and poor surgical outcomes. In addition to other surgical preparations, patients need objective and timely resuscitation to maximize positive result[s. 1]

Emergency surgery is the term for surgical operations that cannot be safely delayed without having a negative impact on the clinical state of the patient. In most cases, it is carried out immediately after the patient is admitted to the hospital, usually few hours later. Compared to elective surgery, this scenario offers a unique setting since patients undergoing emergency procedures need closer observation because they are ill-prepared and may face additional complications from physiological illnesses and surgical stress. In practice, abdominal surgical emergencies are still common in all situations.

The risk of death is up to five times higher for patients who have abdominal surgical emergency than for those who undergo scheduled operations. "Emergency surgeries often carry a higher risk of complications due to acute physiological disturbances such as sepsis, hypovolemia, and electrolyte imbalances, along with the patient's inadequate preparation resulting from the urgent nature of the condition."

Furthermore, emergency patients frequently have comorbid diseases that are not optimized, which raises the likelihood of anesthetic problems following surgery. Furthermore, these deaths which range from 4.9 to 13.2% remain higher in developing nations. [2] Mortality rates following major emergency abdominal surgery (MAES) vary with population, ranging from 3.6 to 48%.

Conditions like intestinal blockage, perforation, or ischaemia that call for MAES are linked to discomfort, inflammation, and sepsis. The combination of surgical stress and systemic inflammation or hemodynamic instability increases the likelihood of organ failure and postoperative sequelae. [3]

There have only been a few single-center studies up until recently, and these procedures are linked to a substantial risk of death and morbidity. In the United Kingdom, the unadjusted 30-day death rate for emergency laparotomy is 14.9% for all patients and 24.4% for patients over 80.

Additionally, it revealed differences in clinical management and results between units, underscoring the necessity of a nationwide quality improvement initiative. Several professional associations have recognized that emergency surgical care standards are inadequate, especially when compared to elective surgery. [4]

"To enhance outcomes for high-risk patients undergoing emergency surgery, it is generally recommended to implement structured risk assessment, ensure proper perioperative resuscitation and stabilization, perform timely source control through early surgery, involve senior clinicians in patient management, prioritize cases in the emergency operating theatre, and provide access to critical care following surgery."

Emergency procedures differ from elective surgeries in that they require less preoperative time for thorough patient assessment, team coordination, and optimization. They are linked to increased mortality and complications following surgery. Staffing shortages and other organizational problems can cause emergency surgeries to be postponed, which raises the risk of complications and unfavorable outcomes.

Dedicated multidisciplinary teams and particular classifications for prioritizing urgent patients are necessary to address the problem of timely access to emergency surgical situations. Risk stratification networks and committed teams maximize resource use, minimizing complexities and delays in access. Because they are frequently performed in the midst of emergency conditions, abdominal emergency procedures necessitate a number of key steps for proper treatment, including as thorough assessment, focused follow-up exams, and prompt action to improve patient outcomes.

Given how common these surgeries are among the youthful, active population in emerging nations, they provide a serious challenge. [5]

The term "post-operative wound complications" refers to any unfavourable result that the patient or the surgeon may observe. Following any operation, these issues may arise, but early identification and

timely treatment are crucial for success. Infections at the surgical site and dehiscence of the incision and tissue are well-known postoperative problems in abdominal surgery. "The severity of these complications can range from mild cases needing only local wound care and antibiotics to severe cases involving multiple reoperations and significant mortality. In most instances, such complications lead to prolonged hospital stays and substantially increased healthcare expenses." [6]

Complications can often be separated into two categories: intraoperative and postoperative. Bleeding, bowel damage, urethral lesions, and bladder injuries are among the intraoperative complications that might arise due to intra-abdominal adhesions, anatomical issues, the surgeon's experience, and numerous other factors. Wound infection, anastomotic leakage, ileus, and bleeding are among the most common surgical consequences. [6]

"The primary goal of any surgical procedure is early and complication-free recovery. However, some patients may develop short-term or long-term issues, including fever, surgical site infections, wound dehiscence, anastomotic leakage, adhesive bowel obstruction, and incisional hernias." Post-operative discomfort, nausea, and vomiting are common. While emergency surgeries are the most common reason for these complications, elective treatments can sometimes result in them, which is concerning. [6]

In the past, local criteria like the level of contamination and the surgical method have been thought to be reliable indicators of wound dehiscence and surgical site infection. However, the importance of surgical technique has been overlooked in more recent research, while other studies have found that systemic characteristics including age, gender, lifestyle, and associated morbidity are important in the pathophysiology of these issues. [6]

Such events are significantly influenced by a number of factors, including the surgical site, the size and depth of the incision, the use of antibiotics, the equipment and suture material, the technique used to close the wound, patient-related factors including comorbidities, and lifestyle choices like smoking [6]

SSI continues to be a significant source of morbidity and mortality among hospitalized patients in spite of these initiatives. "This trend may be attributed to the increasing number of surgical patients who are elderly or suffer from various chronic, debilitating, or immunocompromising conditions, along with the emergence of antibiotic-resistant bacterial strains." [6]

Their combined evaluation may give a more thorough risk classification tool for EAS patients, even though each of these indicators offers useful prognostic information on its own. Lactate gives information about tissue perfusion and metabolic stress, albumin shows nutritional and inflammatory condition, and PCT shows the severity of the infection.

By including these factors, it may be possible to identify high-risk patients earlier and implement timely, focused interventions to enhance results. In order to ascertain if serum procalcitonin, albumin, and lactate could predict the outcome and prognosis of emergency abdominal procedures, this study was conducted.

Aims and objectives

Aim

1. The study aims to determine the ability of Serum procalcitonin, Serum albumin, Serum Lactate to predict the outcome and prognosis in emergency abdominal surgeries.

Objectives

1. To evaluate Serum procalcitonin, serum albumin and serum lactate as biochemical markers and clinical outcome in patients undergoing emergency abdominal surgeries.
2. To compare and assess the trend of these biochemical markers preoperatively and postoperatively in identifying the complications and its associated morbidity.

REVIEW OF LITERATURE

"In 2023, Fuxing Li et al. evaluated the prognostic value of the lactate-to-albumin (LA/ALB) and procalcitonin-to-albumin (PCT/ALB) ratios in patients with sepsis admitted to the intensive care unit (ICU). The study included a total of 340 adult patients diagnosed with sepsis. Both the LA/ALB and PCT/ALB ratios were analyzed in relation to patient survival and the severity of sepsis. Additionally, a separate cohort of 75 sepsis patients from a different medical facility was included for validation purposes."

In the derivation cohort, higher scores on the severity index, along with elevated lactate-to-albumin (LA/ALB) and procalcitonin-to-albumin (PCT/ALB) ratios, were significantly linked to increased mortality. Both the LA/ALB and PCT/ALB ratios also demonstrated a strong correlation with the severity score.

According to survival study, sepsis cases with elevated PCT/ ALB and LA/ ALB rates at ICU admission had a noticeably advanced 28- day mortality rate. With an AUC of 0.826, the prediction model that was erected using the LA/ ALB rate, PCT/ ALB rate, and lounge score showed good prophetic performance.

According to the study's findings, the LA/ ALB and procal- albumin rates at ICU admission offer useful prognostic data for soothsaying sepsis cases' 28- day death. The prognostic of sepsis cases is better assessed when these rates are combined with the lounge score. The prophetic significance of blood urea nitrogen/ albumin, lactate/ albumin, and procalcitonin/ albumin situations in uro-septic individualities was delved by Sahin A et al. 9 in 2023. A significant mortality rate for urosepsis was indicated by the fact that 97(62.1) of the 156 cases in the study had passed away by the 28th day. Both the lactate/ albumin rate and the blood urea nitrogen/ albumin rate were dramatically elevated in non-survivors. analogous patterns were seen in the 2-week death group, where the BUN/Alb rate in survivors and non-survivors was 9.62 & 15.8 respectively.

According to the study's findings, blood urea nitrogen/ albumin and lactate/ albumin rates are accurate early prognostic pointers for mortality in urosepsis cases, giving croakers useful instruments for threat assessment and concentrated treatment.

Serum lactate's function as a prophetic index for death in ER cases with colorful conditions was examined in a methodical review by Alshiakh SM. 10 The results showed that a tripartite increase in mortality threat was linked to lesser lactate situations(> 4 mmol/ L). likewise, lactate concurrence during a 6- hour period was a more dependable index of survival than admission lactate situations alone.

In order to ameliorate prognosis, the author came to the conclusion that routine monitoring of critically ill cases should include periodical lactate situations. In a retrospective study conducted in 2022, Gonca K et al. 11 delved the function of biomarkers in soothsaying surgical intervention and death in cases with intestinal blockage. There were 179 cases in all, with 41.3 taking surgery and 58.7 entering conservative care. The study found that elevated procalcitonin levels (PCT > 0.13 ng/mL) predicted the need for surgical intervention, with a sensitivity of 79% and specificity of 70.3%. Furthermore, a PCT of 0.65 ng/mL was associated with a sensitivity of 92.9% and a specificity of 78.1% for predicting mortality.

Significant correlations were also set up between surgical intervention and casualty rates and the rates of "C- reactive protein, lactate/ albumin, and blood urea nitrogen/ albumin." The authors came to the conclusion that PCT and associated biomarkers can be used as secure instruments to assess the mortality threat in cases with intestinal inhibition. The significance of PCT and CRP as medium of sepsis in postoperative cases was delved in a comprehensive study conducted in 2022 by Hassan J et al. 12

According to the findings, CRP situations> 50 mg/ L had a modest prophetic power for sepsis, whereas PCT situations> 1.0 ng/ mL had an 70 perceptivity and 77 particularity. Beforehand sepsis opinion was enhanced by the combination of PCT and CRP, especially in cases witnessing hepatobiliary and colorectal surgery.

In 2021, Massimo S et al. presented consensus statements addressing key aspects of procalcitonin (PCT) use throughout the surgical pathway. “The expert panel recognized PCT as a highly sensitive biomarker for bacterial infections, providing emergency and general surgeons with a valuable tool for the management of postoperative infections.”

In 2024, Ertugrul Altug et al. introduced the Procalcitonin/Albumin Ratio (PAR), which is determined by dividing the procalcitonin (PCT) level by the albumin (ALB) level. This ratio serves as an indicator of both the body’s inflammatory response and nutritional condition. Recent studies have highlighted PAR as a potential marker for poor prognosis in patients with sepsis.

The Procalcitonin/Albumin Ratio (PAR) can serve as a rapid, straightforward, and cost-effective marker for identifying sepsis, potentially reducing the financial burden on the healthcare system. Prompt and accurate assessment of prognosis is essential in patients diagnosed with sepsis to guide timely intervention and improve outcomes. The effectiveness of C- reactive protein(CRP), lactate, procalcitonin, albumin, and the procalcitonin/ albumin rate as pointers of infection on mortality in critically ill cases admitted to the ferocious care unit, as well as their associations with APACHE-II and lounge scores, were the subjects of a retrospective study conducted in 2020 by Dilek A et al. 15 61 cases in all were enrolled.

The procalcitonin/ albumin rate and lactate had a weak but favourable correlation with the APACHE- II score. There was a relatively inimical connection between the APACHE- II score and albumin position. Procalcitonin and lactate situations were favourably identified with the lounge score. The procalcitonin/ albumin rate had a slight but favourable correlation with the lounge score.

In 2018, Spoto S et al. 16 conducted prospective cohort exploration to assess the individual mileage of procalcitonin in the opinion of bacterial infections following major abdominal surgery.

Postoperative infections were largely prognosticated by PCT situations of >1 ng/ mL on days one or two and >0.5ng/mL on days three. When it came to relating postoperative infections, PCT showed an 71 perceptivity and a 79 particularity, according to the receiver operating characteristic(ROC) wind study. also, cases who had PCT situations< 0.5 ng/ mL on day five were safely released beforehand and had a far dropped threat of surgical infections.</mark> According to the study's findings, routine postoperative PCT testing improves early infection discovery, enabling timely clinical intervention and bettering patient issues in major abdominal surgeries.

Labgaa I et al. 17(2017) delved the prophetic utility of early postoperative albumin decline(ΔAlb) in prognosticating complications following major abdominal surgery. Serum albumin situations were assessed previous to and on postoperative days 0, 1, 2, and 3 for 138 cases witnessing abdominal surgery. According to the results, serum albumin significantly dropped snappily after surgery, which was harmonious with the modified Estimation of Physiologic Capability and Surgical Stress. also, there was a high correlation between ΔAlb and the length of sanitarium stay, total postoperative problems, and an increase in CRP.

Beforehand postoperative albumin drop is an independent predictor of poor surgical issues, as seen by the threefold increased threat of problems linked to a ΔAlb ≥ 10 g/ L on the first postoperative day. Generation of medical scholars and trainee croakers have been tutored that digital rectal examination is an essential part of the clinical examination needed in any case with abdominal pain suspected of having abdominal or pelvic pathology [18]

According to Mohammadreza et al. (2018), the evaluation of a patient presenting with acute abdominal symptoms should begin with a detailed history and thorough physical examination. Acute abdominal pain and palpable masses are key clinical features of rectus sheath hematoma, which can often be misdiagnosed as other conditions such as appendicitis, abscesses, abdominal wall tumors, hernias, diverticular disease, or various gynecological and urinary tract disorders during differential diagnosis.

Yu – SAN Tee et al [20] Acute abdominal pain can arise from various underlying conditions, including appendicitis, perforated peptic ulcer, acute pancreatitis, ruptured sigmoid diverticulum, ovarian torsion, volvulus, ruptured aortic aneurysm, splenic or hepatic lacerations, and intestinal ischemia.

According to P. Maruna et al.[21], procalcitonin (PCT) is considered a highly specific biomarker for diagnosing bacterial infections and sepsis. PCT levels typically remain low in cases of viral infections, chronic inflammation, or postoperative states. Since the liver is likely a principal source of inflammatory PCT production, different forms of ileus serve as useful models of non-infectious gastrointestinal stimulation. These involve localized cytokine release, the portal venous system, and hepatic inactivation of PCT. Ileus, defined as a partial or complete functional obstruction of the intestines, may result from conditions such as intestinal ischemia, abdominal wound infections, or electrolyte disturbances.

Juliette C. et al.[22] studied patients hospitalized with peritonitis secondary to gastrointestinal perforations. These individuals were managed using a PCT-guided algorithm, which led to a reduction in the average duration of antibiotic therapy by three days, although this reduction was not statistically significant. Interestingly, higher initial PCT levels on postoperative days 0 or 1 appeared to correlate with prolonged antibiotic use and a greater risk of postoperative infectious complications.

Mark E. et al.[23] found that elevated serum lactate levels are strongly linked to increased morbidity and mortality across various groups of critically ill patients. Madan K. et al. noted that normal PCT levels are typically below 5 ng/mL. Procalcitonin has been recognized as an early indicator of severe bacterial infection and systemic inflammation. In healthy individuals, levels remain extremely low, and elevated concentrations—such as values above 0.75 mmol/L—can help

clinicians identify patients at higher risk of mortality. This suggests that current lactate reference ranges for critically ill individuals may need reevaluation.

Jafar Malmir et al.[28] examined the diagnostic potential of procalcitonin and C-reactive protein (CRP), both inflammatory biomarkers, in the context of sepsis. Kirstrn de Burlet et al.[29] reported that acute abdominal pain accounts for 5–10% of all emergency department visits and may result from a wide spectrum of conditions, ranging from minor, self-limiting disorders to life-threatening emergencies. Timely and precise diagnosis is essential to initiate prompt treatment and achieve the best possible outcomes. Acute abdomen is a critical clinical entity often caused by infection, inflammation, vascular blockage, or mechanical obstruction. Patients typically present with a sudden onset of abdominal pain, often accompanied by nausea or vomiting, and most appear visibly unwell. [30]

EPIDEMIOLOGY

Although exact statistics may vary, abdominal pain is estimated to contribute to approximately 7% to 10% of visits to emergency departments (EDs). According to the National Hospital Ambulatory Medical Care Survey data from 1999 to 2008, as referenced by the Centers for Disease Control and Prevention (CDC), abdominal pain was the chief complaint in about 12.5% of patients categorized as emergent or urgent in 2008, and it accounted for roughly 11% of total emergency room visits during that period. Non-specific abdominal pain is diagnosed in around one-third of individuals with stomach discomfort. Acute renal colic affects another 30%.

Etiology

Acute appendicitis, cholecystitis, pancreatitis, and diverticulitis are among the common causes of an acute abdomen. One cause of acute abdomen is acute peritonitis, which can be brought on by a ruptured hollow viscus or as a side effect of inflammatory bowel illness or cancer. Mesenteric ischemia and ruptured abdominal aortic aneurysm are two vascular events that might result in an acute abdomen. Acute stomach discomfort can also be a symptom of urologic disorders such as pyelonephritis and ureteral colic. Acute abdominal pain is frequently attributed to small intestinal blockage by authors. Appendicitis is the most frequent cause of acute abdominal pain in children. 30

Pathophysiology

The scope of this review does not include the pathophysiology of each disease condition. The causes include blockage (cholecystitis, appendicitis) and infection (diverticulitis, appendicitis). Gut malrotation is one example of an anatomical abnormality. Certain diseases have a correlation with age: vascular crises, diverticulitis, and cholecystitis are more common in older adults.

Due in great part to the dual innervation of the belly, both visceral and somatic, the classic manifestations of diverticulitis, pancreatitis, cholecystitis, and appendicitis occur. Innervating the viscera, visceral nerves are a component of the autonomic nervous system. In addition to the severe smooth muscle contraction associated with colic, these nerves are vulnerable to mechanical distention, inflammation, and ischemia. Usually midline, the pain is deep, dull, and poorly localized. Pain radiates to the epigastrium from embryonic foregut organs like the stomach, liver, pancreas, and gallbladder. The periumbilical region, the hindgut, the large bowel, and the rectum, as well as the midgut, small bowel, and appendix, are located in the lower abdomen. The parietal peritoneum receives feeling from somatic sensory nerves. Better localized and more acute is somatic pain. Somatic pain indicates inflammation of the peritoneum. An illustration would be a

pain over McBurney's point when the parietal peritoneum is irritated by an infected or burst appendix. Because spinal cord segments belonging to somatic and visceral afferent nerve fibers are shared, somatic pain can be referred to the visceral area. This explains why the right scapula may be affected by cholecystitis.

History and evaluation

The purpose of the history and physical examination is to rule out certain diagnosis and recommend others. Acute care doctors are well-versed in the ways in which various disease entities manifest. A vascular incident like mesenteric ischemia may be the cause of the sudden onset of discomfort. When an abdominal aortic aneurysm (AAA) ruptures or leaks, syncope may indicate blood loss. There are several causes of acute abdomen, and they all appear in similar ways. Initially, appendicitis is said to cause dull periumbilical pain that gradually moves to the lower right quadrant. It is expected that ovarian torsion would begin with abrupt, unilateral, lower abdomen discomfort that waxes and wanes and is accompanied by vomiting. Unfortunately, most illnesses don't show up in a traditional way.

Different quadrants of pain indicate different diagnosis. Acute diverticulitis typically affects the lower left quadrant, whereas cholecystitis typically affects the upper right or epigastrium. Diagnosing a patient with a clear-cut acute abdomen is often straightforward. However, recognizing a developing abdominal emergency in patients presenting with subtle or nonspecific early symptoms can be significantly more difficult.

The medical history from the past may be significant. The risk of abdominal aortic aneurysm is increased by hypertension. The social history of alcohol consumption and potential pancreatitis is also helpful. The physical examination needs to be prompt and targeted. Clinicians must remain vigilant, as abnormal vital signs or concerning features such as changes in facial expression, skin color and temperature, or altered mental status may indicate that a patient is in critical condition. A thorough abdominal examination is necessary. It is necessary to evaluate bowel noises. It's critical to palpate for masses,

discomfort, rebound, and guarding. Every patient with stomach pain must have a rectal examination, according to traditional teaching. According to the literature, rectal exams don't provide any more information, at least not when it comes to appendicitis. When gastrointestinal (GI) bleeding or prostate problems are detected, a rectal examination is unquestionably necessary.

EVALUATION

Once more, prompt initial diagnosis and management of acute abdominal pain are essential. Treatment and assessment should take place at the same time. Diagnostic procedures include imaging and blood work. Myocardial infarction can be ruled out as the source of apparent severe stomach pain in persons over 40 with the use of a 12-lead electrocardiogram. Knowing whether a patient has atrial fibrillation or mesenteric ischemia is crucial. Lipase, a complete metabolic profile, and a complete blood count (CBC) are typically measured. It is necessary to order a lactate in cases of sepsis or mesenteric ischemia. Cholecystitis, hemoperitoneum, hydronephrosis, and the existence of an abdominal aortic aneurysm can all be diagnosed with a bedside ultrasound in the emergency room in less than five minutes. Diagnosing an acute abdomen is now considerably easier because of multislice helical CT scanning. The intravenous (IV) contrast is enough in most situations. It takes time and is typically not required to use oral contrast. MRI is typically not used because of the time commitment in a patient who may be unstable.

MANAGEMENT

Rapid, vigorous fluid resuscitation with sufficient large bore IV access is necessary when hypotension and tachycardia indicate blood loss, hypovolemia, or sepsis. When sepsis, peritoneal spillage or infection are in the differential, prompt administration of broad-spectrum antibiotics that cover gram-negative enteric pathogens is recommended. Vital sign resuscitation should be continued while sick patients are being monitored. The standard of care is to use opioids to relieve pain adequately. The application of antiemetics is also crucial. A surgeon should be called immediately if physical findings or presentation raise the possibility of a surgical emergency. Before beginning potentially time-consuming tests, the surgeon must be consulted.

In conclusion, the acute abdomen is made up of a number of intrabdominal processes that need to be diagnosed and treated quickly. Regardless of how it manifests, an acute abdomen must always be identified. It is essential to have prompt, adequate testing and concurrent resuscitation therapy. It is also essential to visit a surgeon as soon as possible if the disease is even potentially surgical.

COMPLICATIONS

If not promptly treated, an acute abdomen can lead to serious complications, including sepsis, bowel necrosis or gangrene, the formation of fistulas, and potentially death.

Methods

Study design

A prospective observational study

Study setting

The study was done at the department of general surgery, B.L.D.E. (D.U.)'s Shri
B.M. Patil Medical College, Hospital, and Research Centre, Vijayapur, Karnataka, India. The hospital is a tertiary care center that provides advanced surgical and medical care to a diverse patient population.

Study duration

March 2023 to March 2025 (24 months), including patient recruitment, data collection, and follow-up assessments.

Study population

The study included patients undergoing emergency abdominal surgeries at the department of general surgery, B.L.D.E. (D.U.)'s Shri B.M. Patil Medical College, Hospital, and Research Centre, Vijayapura, Karnataka.

Inclusion criteria

- Patients aged >18 years undergoing emergency abdominal surgeries.
- Consented subjects

Exclusion criteria

- Subjects who had received chemotherapy or radiation therapy.
- Patients diagnosed with malignancies.
- Immunocompromised patients or those with chronic infections.

Sample size

The minimum required sample size was determined to be 77 patients based on statistical calculations. The anticipated mean ± standard deviation of lactate among emergency abdominal surgery patients was 8.3 ± 3.3 before surgery and 5.3 ± 4.2 after surgery. At 90% power and a significance level of 5% (two-sided) were used to detect a true difference in means.

Sampling technique

A consecutive sampling technique was used to recruit participants. All patients who met the inclusion criteria and were admitted to the general surgery department for emergency abdominal surgeries during the study period were approached for participation. Written informed consent was obtained after explaining the study objectives, potential risks, and benefits. Patients were then enrolled based on availability and willingness to participate. Cases were monitored preoperatively and postoperatively to assess variations in biochemical markers and their correlation with clinical outcomes.

Study procedure

All eligible patients underwent preoperative assessment, including routine blood investigations, biochemical marker analysis, and radiological examinations as per standard hospital protocols. Serum procalcitonin, serum albumin, and serum lactate levels were measured preoperatively and postoperatively on day 3. The type of emergency abdominal surgery, intraoperative findings, and duration of surgery were recorded. Postoperative complications such as sepsis, wound infections, anastomotic leaks, and prolonged hospital stay were documented. Patients were followed up until discharge, and their clinical progress was monitored.

Data collection

Patient data were collected through structured case report forms. Preoperative clinical history, demographic details, and laboratory parameters were recorded. Serum procalcitonin, serum albumin, and lactate levels were analyzed using standard biochemical assays in the hospital laboratory. Postoperative complications, duration of hospital stay, and any adverse outcomes were

documented. Follow-up assessments were conducted to evaluate the association of these biochemical markers with surgical prognosis.

Study tools

- Patient case report forms
- Laboratory test reports for serum procalcitonin, serum albumin, and serum lactate
- Standard hospital records for clinical and surgical data

Independent and outcome variables

Independent variables

- Age
- Gender
- BMI
- Comorbid conditions (diabetes, hypertension, cardiac diseases)
- Type of emergency abdominal surgical condition
- Preoperative and postoperative biochemical marker levels

Outcome variables

- Postoperative serum procalcitonin, serum albumin, and lactate levels
- Postoperative complications (surgical site infection)
- Duration of hospital stay
- Mortality rate

Statistical analysis

Data were compiled using Microsoft Excel and subsequently analyzed with SPSS software version 20. Continuous variables were presented as mean ± standard deviation, while categorical variables were described in terms of frequencies and percentages. For normally distributed continuous data, paired t-tests were used to compare preoperative and postoperative levels of biochemical markers. In cases where data were not normally distributed, the Wilcoxon signed-rank test was employed. Categorical variables were compared using the chi-square test. A p-value of less than 0.05 was considered indicative of statistical significance. The analysis aimed to explore the relationship between serum procalcitonin, serum albumin, and lactate levels with surgical outcomes and the incidence of postoperative complications.

Results

Table 1: Distribution of Age

Category	Frequency (n)	Percentage (%)
20-40	16	20.78
41-60	44	57.14
>60	17	22.08

This table presents the distribution of age categories among the study participants. A total of 77 participants were categorized into three age groups: 16 (20.78%) were in the 20-40 age group, 44 (57.14%) were in the 41-60 age group, and 17 (22.08%) were in the >60 age group.

The majority of the participants belonged to the 41-60 age group.

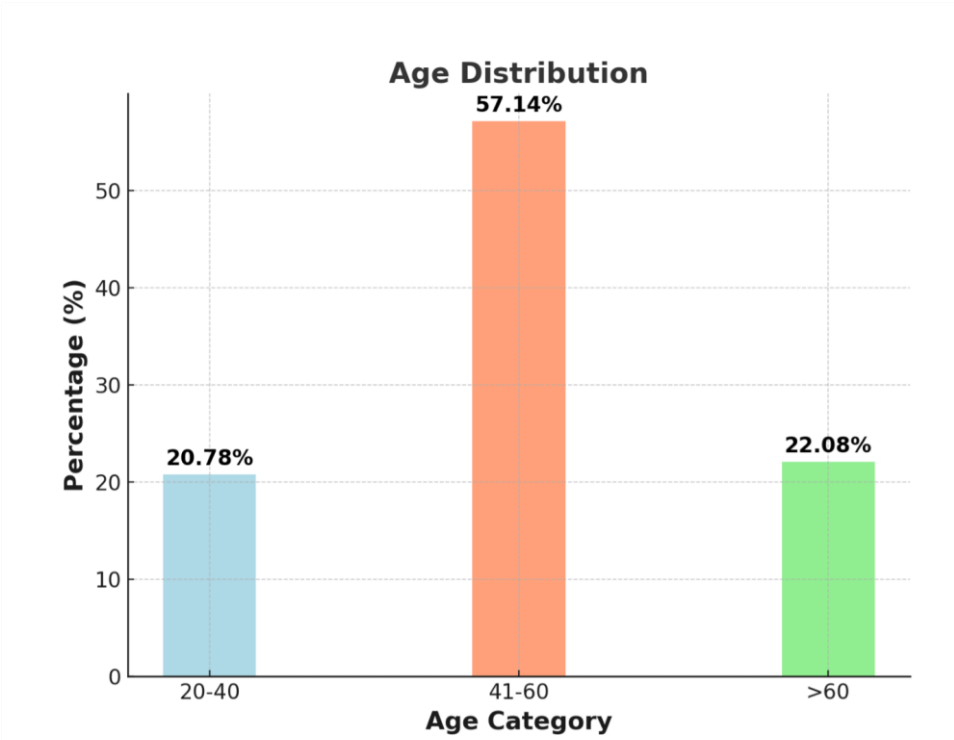


Table 2: Distribution of Gender

Category	Frequency (n)	Percentage (%)
Female	25	32.47
Male	52	67.53

The distribution of gender among the participants is shown in this table. Out of 77 participants, 25 (32.47%) were female, and 52 (67.53%) were male.

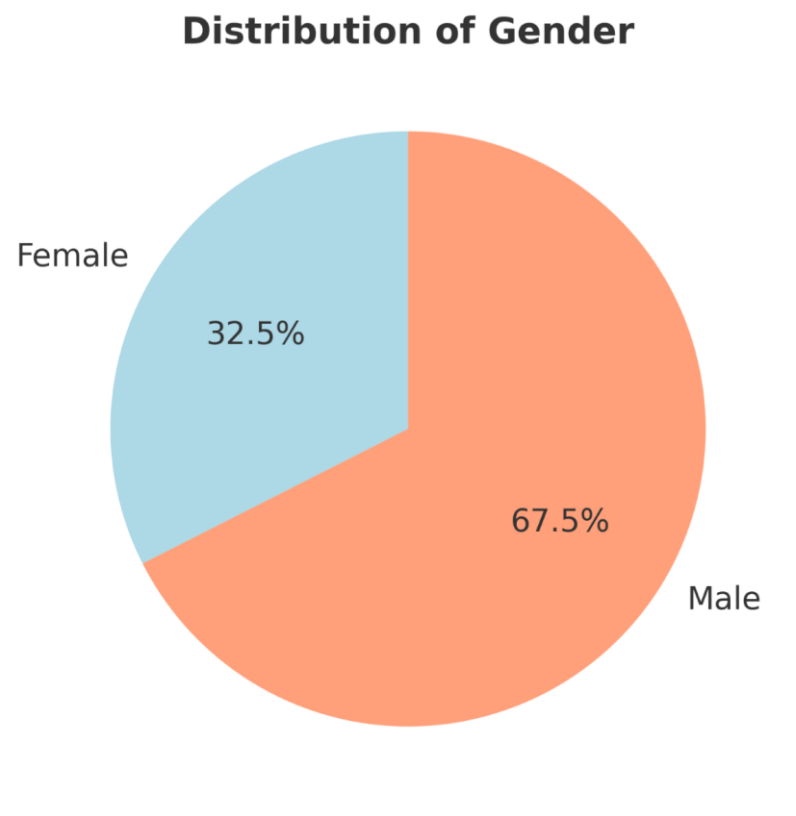


Table 3: Distribution of BMI

Category	Frequency (n)	Percentage (%)
Underweight	2	2.63
Normal	28	36.84
Overweight	20	26.32
Obese	26	34.21

This table displays the BMI distribution of the participants. Among 76 participants, 2 (2.63%) were underweight, 28 (36.84%) had normal BMI, 20 (26.32%) were overweight, and 26 (34.21%) were classified as obese.

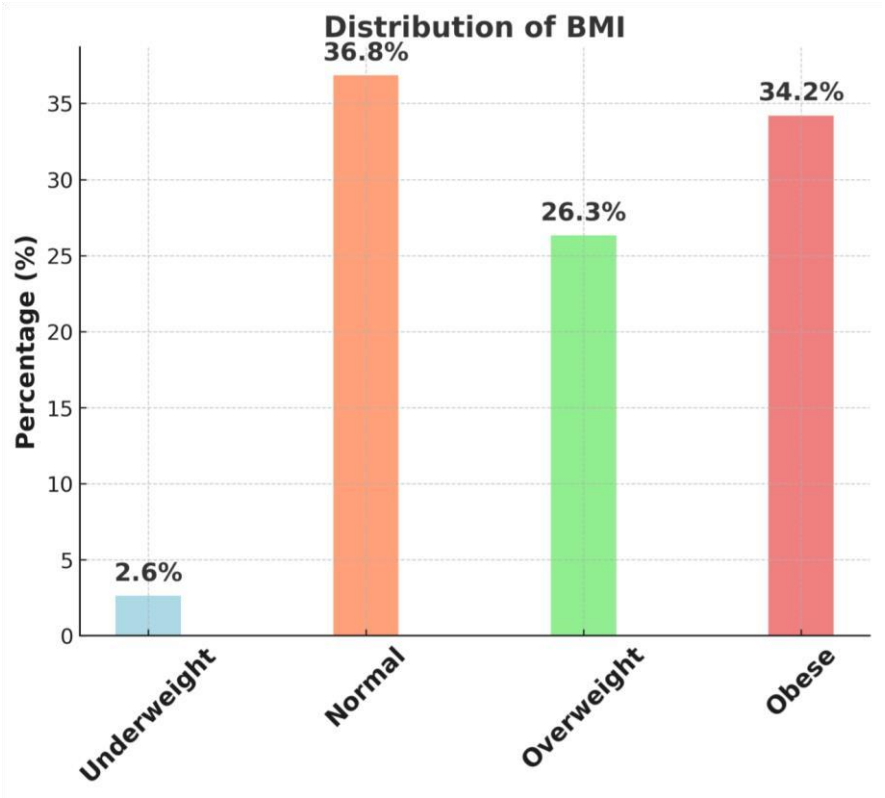


Table 4: Distribution of Comorbidities

Category	Frequency (n)	Percentage (%)
Both	18	23.68
Diabetes	14	18.42
Hypertension	21	27.63
None	23	30.26

This table presents the distribution of comorbidities among 76 participants. A total of 18 (23.68%) had both diabetes and hypertension, 14 (18.42%) had diabetes, 21 (27.63%) had hypertension, and 23 (30.26%) had no comorbidities.

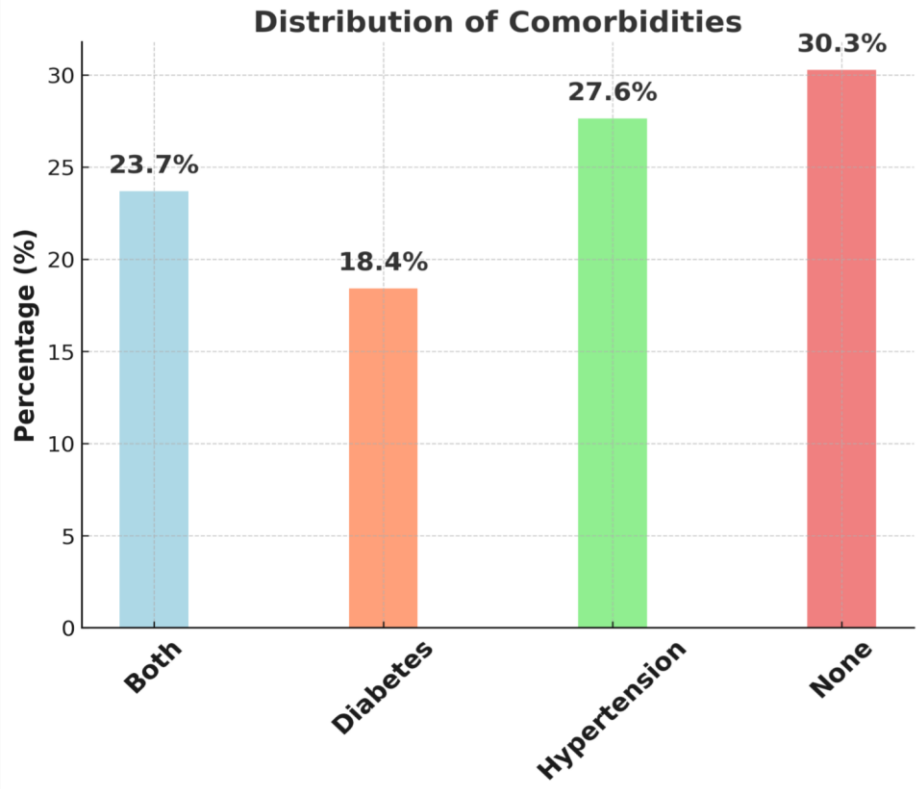
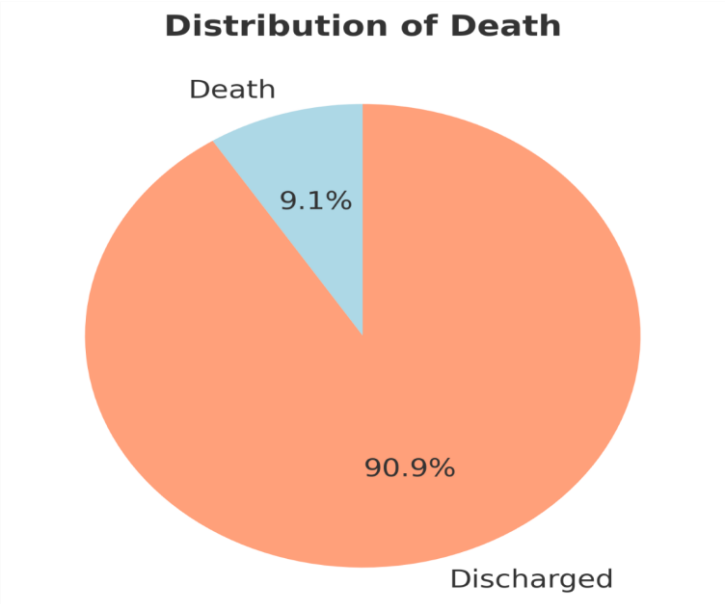


Table 5: Distribution of Death



This table shows the distribution of death among the participants. Out of 77 participants, 7 (9.09%) died, while 70 (90.91%) were discharged.

Table 6: Distribution of Hospital Stay

Category	Frequency (n)	Percentage (%)
<=7 days	10	14.29
8-14	41	58.57
>14 days	19	27.14

The hospital stay duration of 70 participants is summarized in this table. A total of 10 (14.29%) stayed for ≤7 days, 41 (58.57%) stayed for 8-14 days, and 19 (27.14%) stayed for more than 14 days.

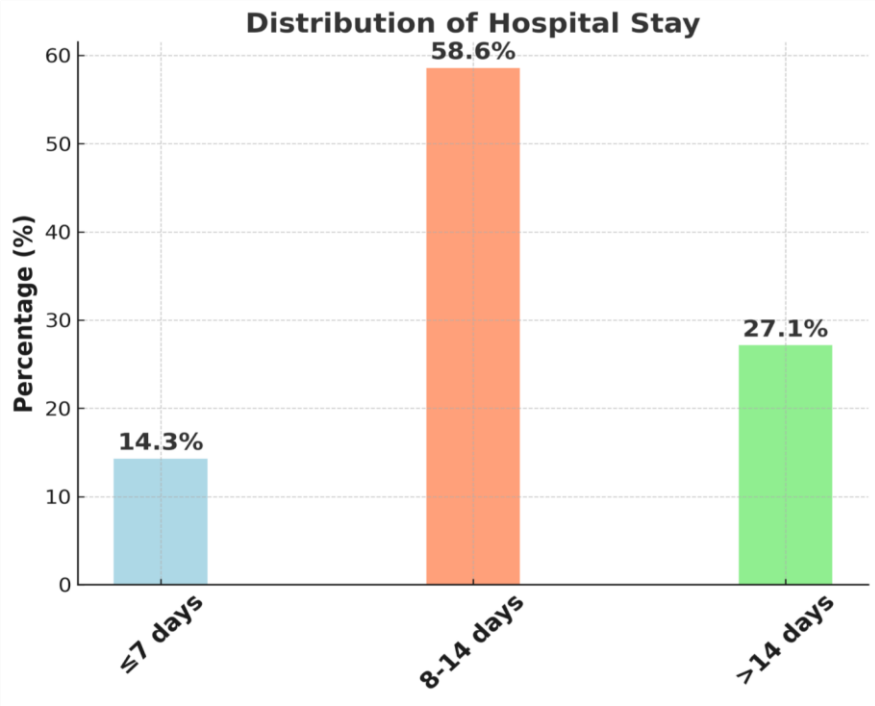


Table 7: Distribution of Wound Infection

Category	Frequency (n)	Percentage (%)
Absent	33	47.14
Present	37	52.86

This table presents the distribution of wound infection among 70 participants. A total of 33 (47.14%) had no infection, while 37 (52.86%) had wound infection.

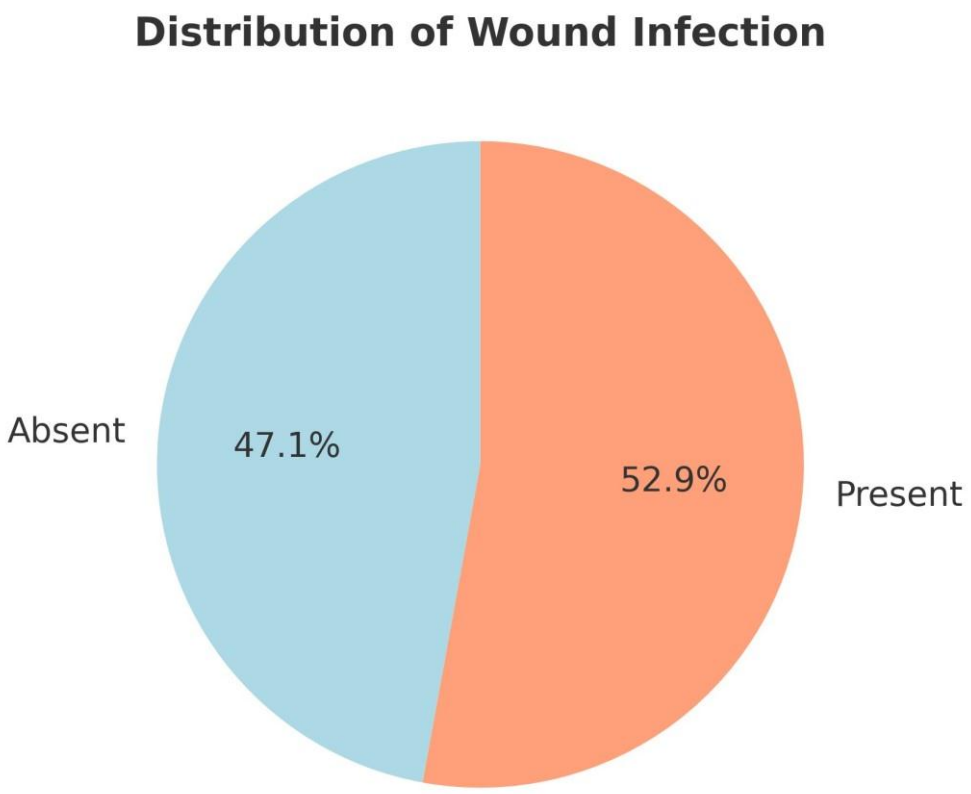


Table 8: Comparison of Procalcitonin Levels (Pre OP vs postoperative day 3)

Groups	Mean	SD	t	p-value
Pre OP	1.68	1.32	0.81	0.42
Postoperative Day 3	1.54	1.63		

This table compares procalcitonin levels preoperatively and on postoperative day 3. The mean (SD) preoperative level was 1.68 (1.32), while on postoperative day 3, it was 1.54 (1.63). The t-value was 0.81, and the p-value was 0.42, indicating no statistically significant difference.

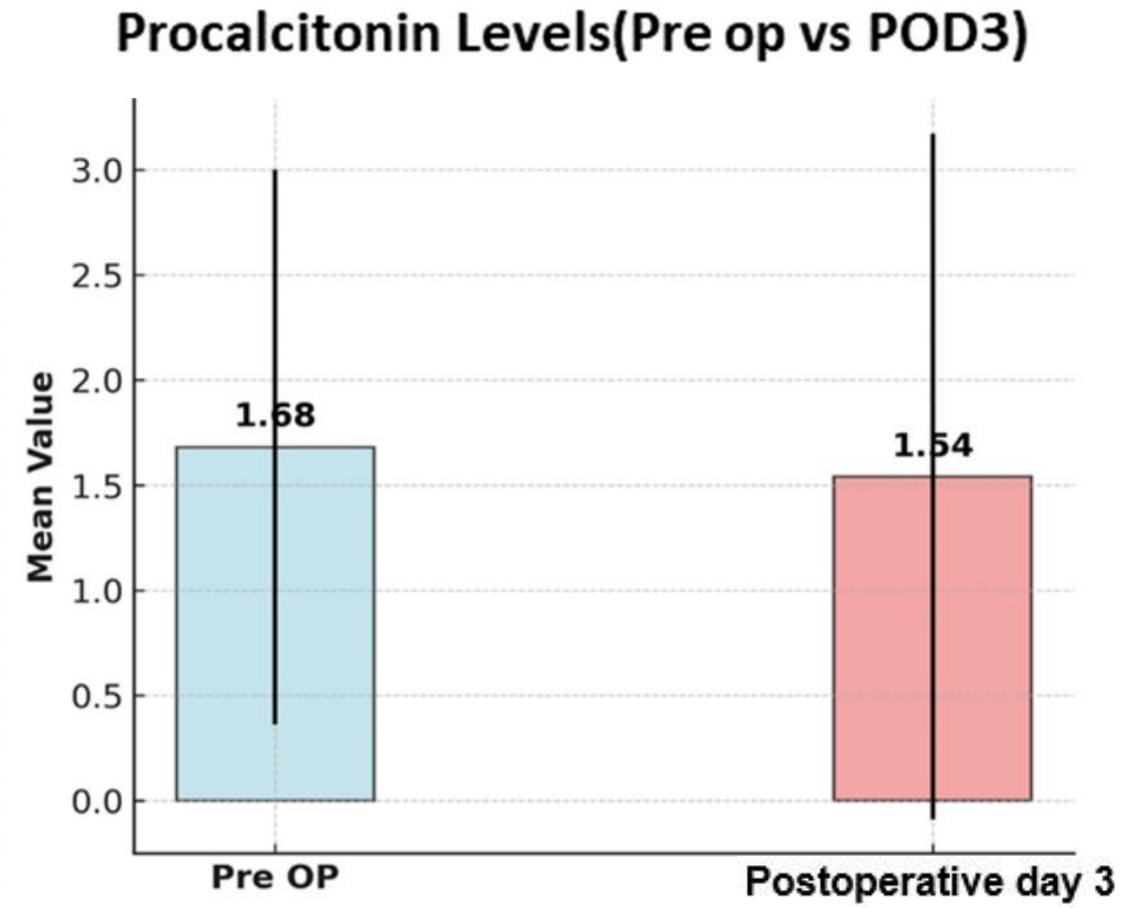


Table 9: Comparison of Albumin Levels (Pre OP vs postoperative day 3)

Groups	Mean	SD	t	p-value
Pre OP	2.84	0.61	2.07	0.042
Postoperative Day 3	2.59	0.67		

This table compares albumin levels preoperatively and on postoperative day 3. The mean (SD) preoperative albumin level was 2.84 (0.61), while on postoperative day 3, it was 2.59 (0.67).

The t-value was 2.07, and the p-value was 0.042, indicating a statistically significant reduction in albumin levels postoperatively.

Albumin Levels (Pre OP VS Postoperative Day 3)

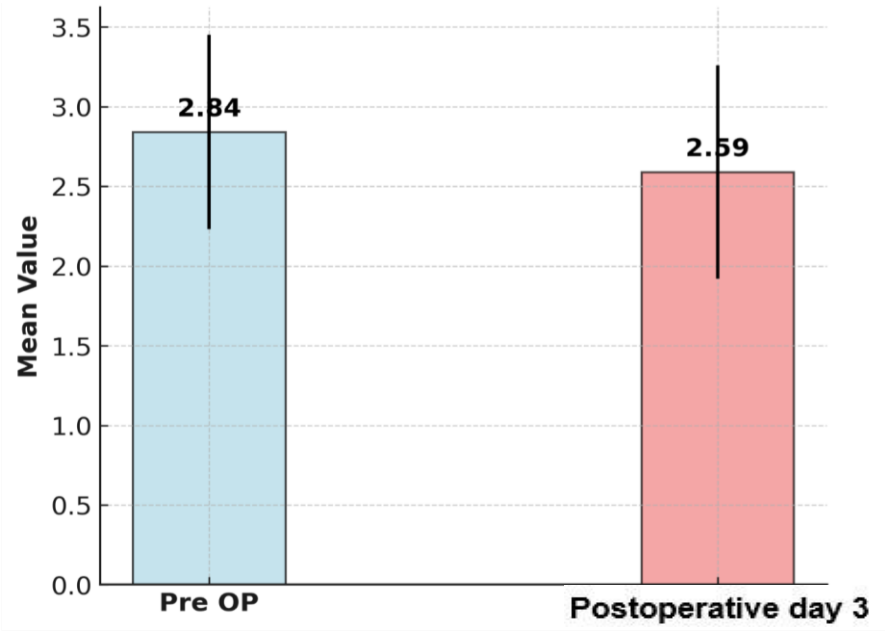


Table 10: Comparison of Lactate Levels (Pre OP vs postoperative day 3)

Groups	Mean	SD	t	p-value
Pre OP	2.9	1.29	3.47	0.001
Postoperative Day 3	2.38	1.14		

This table compares lactate levels preoperatively and on postoperative day 3. The mean (SD) preoperative lactate level was 2.90 (1.29), while on postoperative day 3, it was 2.38 (1.14). The t-value was 3.47, and the p-value was 0.001, indicating a statistically significant reduction in lactate levels postoperatively.

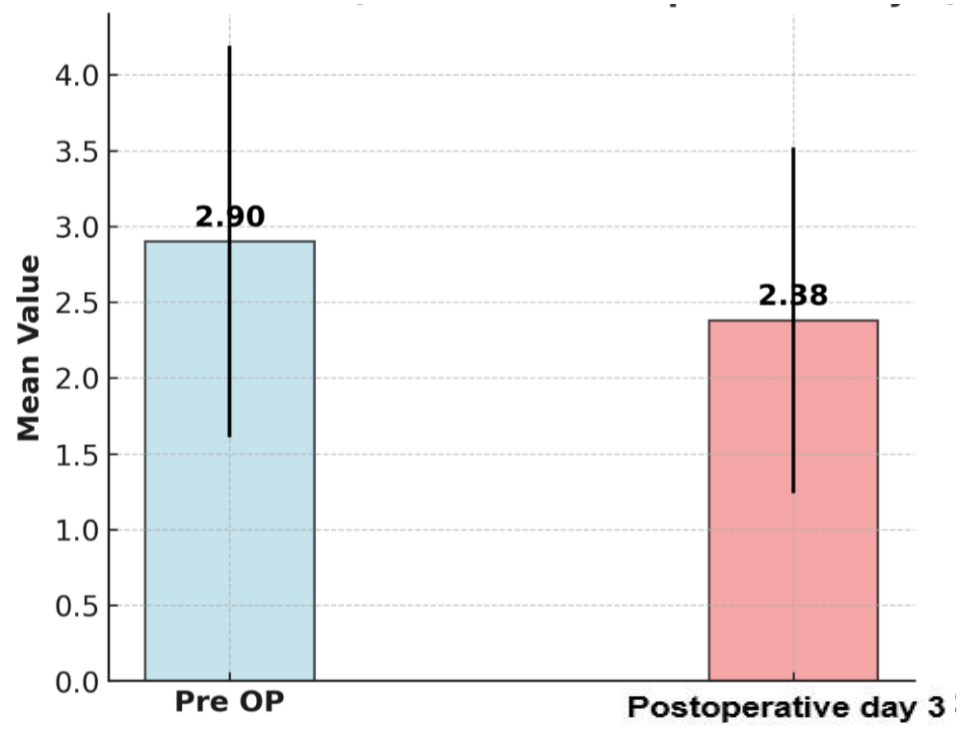


Table 11: Comparison of Procalcitonin Levels by Outcome

Time Points	Death Mean (SD)	Discharged Mean (SD)	t-value	p-value
Pre OP	2.14 (1.25)	1.64 (1.32)	0.97	0.336
Postoperative Day 3	3.81 (0.92)	1.32 (1.51)	4.29	0.0001

This table compares procalcitonin levels among participants who died and those who were discharged. The mean (SD) preoperative level was 2.14 (1.25) in the death group and 1.64 (1.32) in the discharged group, with a t-value of 0.97 and p-value of 0.336. On postoperative day 3, the mean (SD) was 3.81

(0.92) in the death group and 1.32 (1.51) in the discharged group, with a t-value of 4.29 and p-value of 0.0001, indicating a significant difference.

Table 12: Comparison of procalcitonin levels in death

S no	Age	Sex	Pre operative procalcitonin	Post operative procalcitonin
1)	58 yrs	Male	1.2	3.2
2)	65 yrs	Female	3.2	4.2
3)	48 yrs	Male	1.5	2
4)	65 yrs	Female	0.5	4.3
5)	64 yrs	Female	4.2	4
6)	28 yrs	Male	2.2	4.5
7)	45 yrs	Male	2.2	4.5

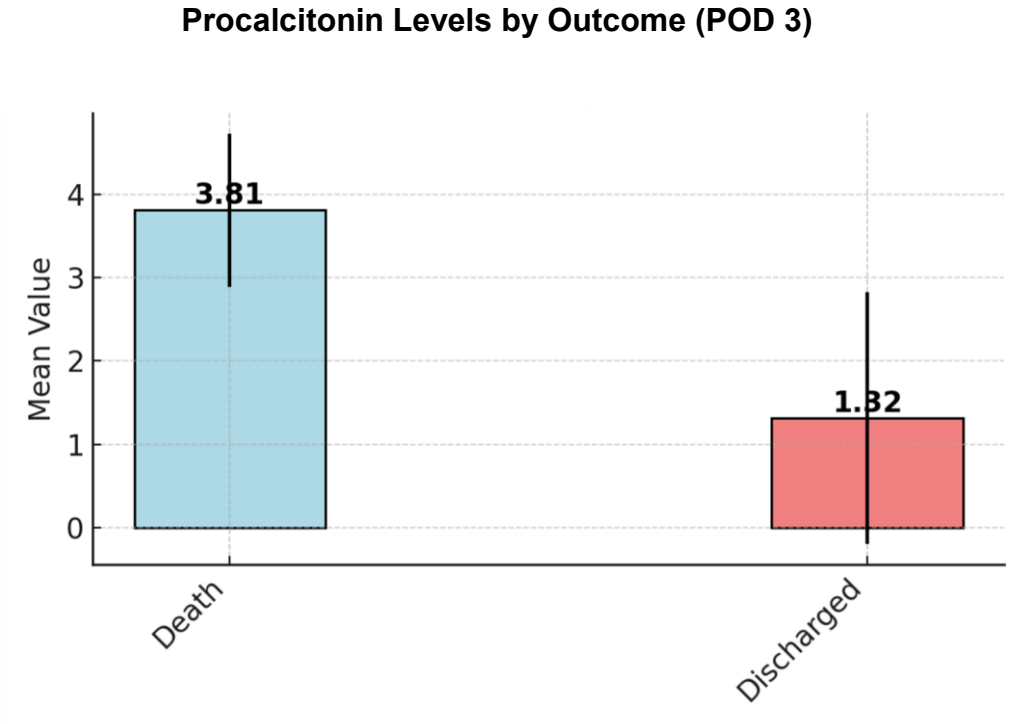


Table 13: Comparison of Albumin Levels by Outcome

Time Points	Death Mean (SD)	Discharged Mean (SD)	t-value	p-value
Pre OP	2.69 (0.55)	2.86 (0.62)	-0.70	0.485
Postoperative Day 3	2.36 (0.58)	2.61 (0.68)	-0.96	0.338

This table compares albumin levels among participants who died and those who were discharged. The mean (SD) preoperative level was 2.69 (0.55) in the death group and 2.86 (0.62) in the discharged group, with a t-value of -0.70 and p-value of 0.485. On postoperative day 3, the mean (SD) was 2.36 (0.58) in the death group and 2.61 (0.68) in the discharged group, with a t-value of -0.96 and p-value of 0.338.

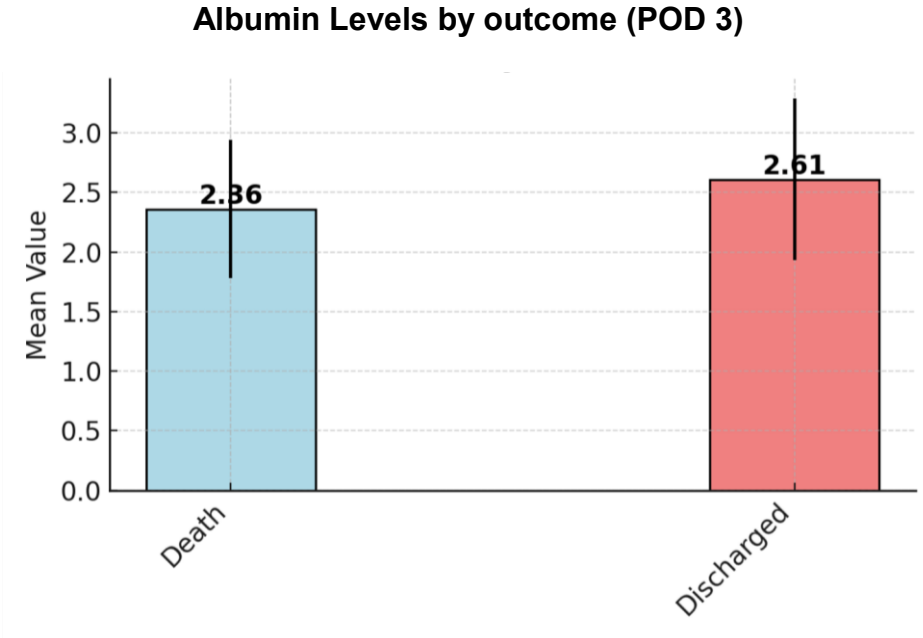


Table 14: Comparison of Lactate Levels by Outcome

Time Points	Death Mean (SD)	Discharged Mean (SD)	t-value	p-value
Pre OP	3.77 (2.94)	2.81 (0.99)	1.91	0.059
Postoperative Day 3	3.61 (1.91)	2.26 (0.98)	3.16	0.002

This table compares lactate levels among participants who died and those who were discharged. The mean (SD) preoperative level was 3.77 (2.94) in the death group and 2.81 (0.99) in the discharged group, with a t-value of 1.91 and p-value of 0.059. On postoperative day 3, the mean (SD) was 3.61 (1.91) in the death group and 2.26 (0.98) in the discharged group, with a t-value of 3.16 and p-value of 0.002, indicating a significant difference.

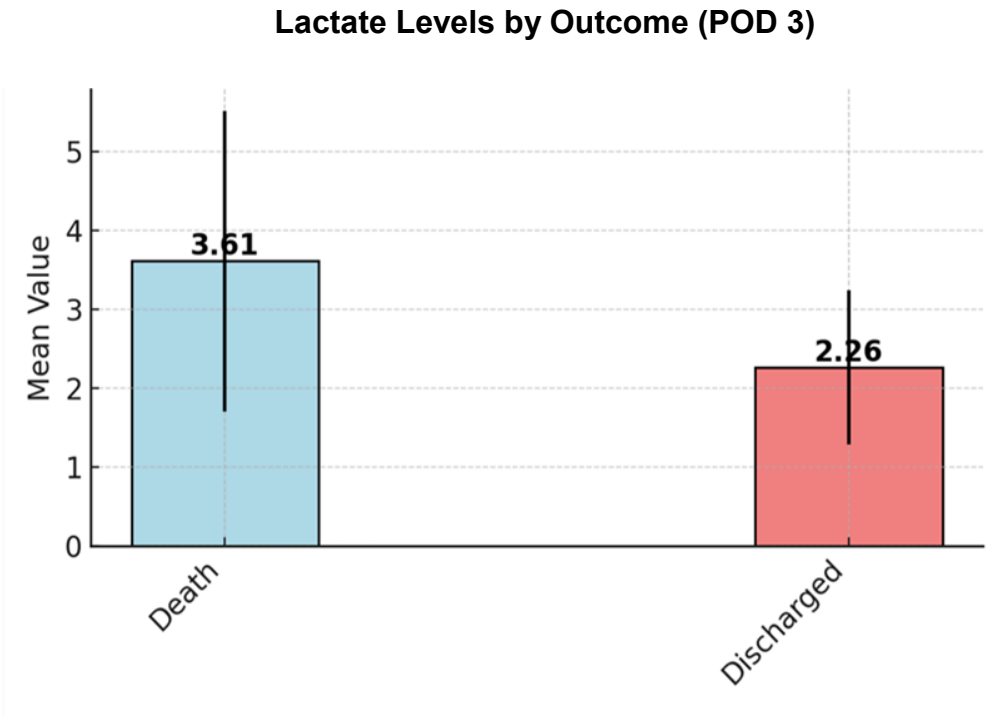


Table 15: Comparison of Procalcitonin Levels by Hospital Stay

Time Points	≤7 days Mean (SD)	>7 days Mean (SD)	t-value	p-value
Pre OP	2.96 (1.60)	1.42 (1.14)	3.72	0.0004
Postoperative Day 3	0.74 (0.35)	1.41 (1.61)	-1.31	0.194

This table compares procalcitonin levels based on hospital stay duration. The mean (SD) preoperative level was 2.96 (1.60) in patients with ≤7 days of stay and 1.42 (1.14) in those with

>7 days of stay, with a t-value of 3.72 and p-value of 0.0004, indicating a significant difference.

On postoperative day 3, the mean (SD) was 0.74 (0.35) in the ≤7 days group and 1.41 (1.61) in the >7 days group, with a t-value of -1.31 and p-value of 0.194.

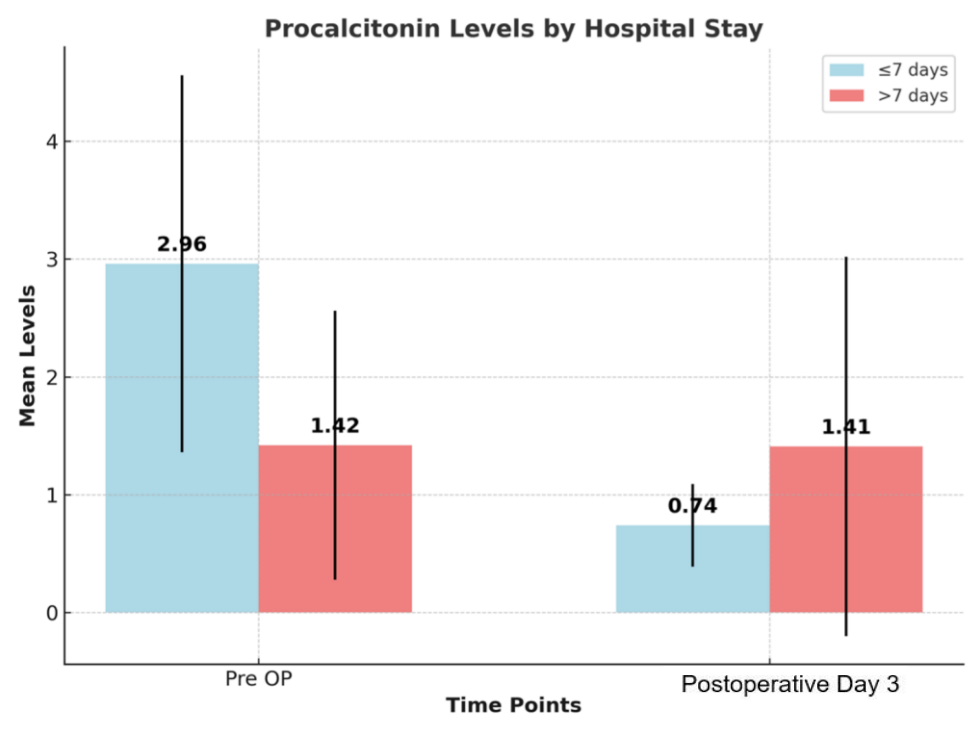


Table 16: Comparison of Albumin Levels by Hospital Stay

Time Points	≤7 days Mean (SD)	>7 days Mean (SD)	t-value	p-value
Pre OP	2.44 (0.56)	2.93 (0.60)	-2.38	0.020
Postoperative Day 3	2.93 (0.76)	2.56 (0.66)	1.60	0.114

This table compares albumin levels based on hospital stay duration. The mean (SD) preoperative level was 2.44 (0.56) in the ≤7 days group and 2.93 (0.60) in the >7 days group, with a t-value of -2.38 and p-value of 0.020, indicating a significant difference. On postoperative day 3, the mean (SD) was 2.93 (0.76) in the ≤7 days group and 2.56 (0.66) in the >7 days group, with a t-value of 1.60 and p-value of 0.114.

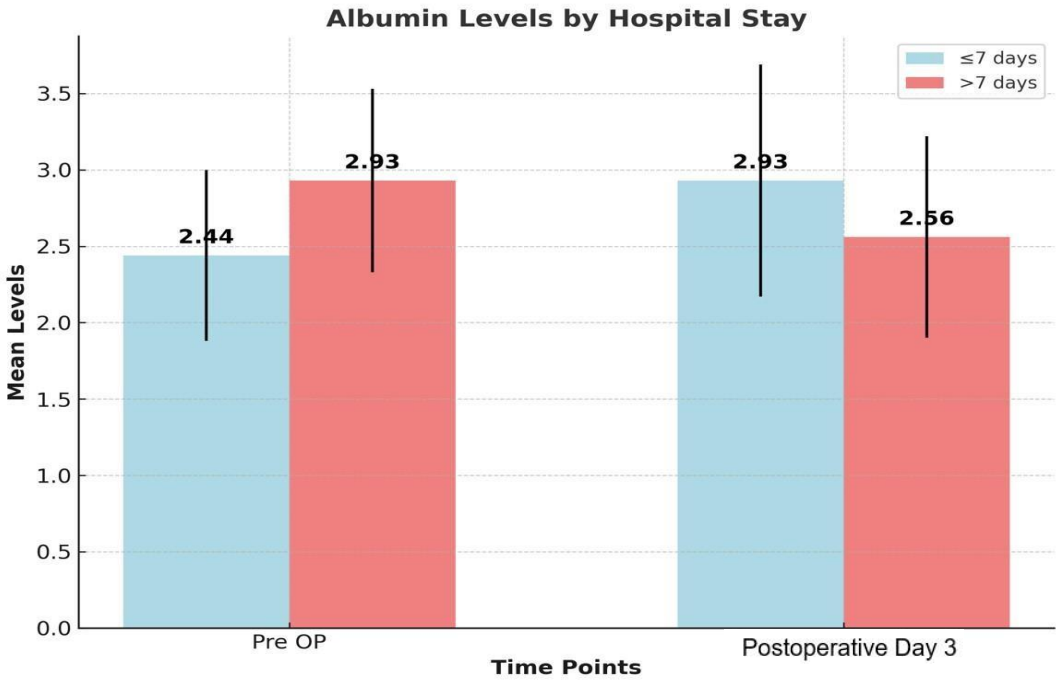


Table 17: Comparison of Lactate Levels by Hospital Stay

Time Points	≤7 days Mean (SD)	>7 days Mean (SD)	t-value	p-value
Pre OP	3.90 (1.54)	2.63 (0.74)	4.17	0.0001
Postoperative Day 3	1.74 (0.57)	2.35 (1.01)	-1.85	0.068

This table compares lactate levels based on hospital stay duration. The mean (SD) preoperative level was 3.90 (1.54) in the ≤7 days group and 2.63 (0.74) in the >7 days group, with a t-value of 4.17 and p-value of 0.0001, indicating a significant difference. On postoperative day 3, the mean (SD) was 1.74 (0.57) in the ≤7 days group and 2.35 (1.01) in the >7 days group, with a t-value of -1.85 and p-value of 0.068.

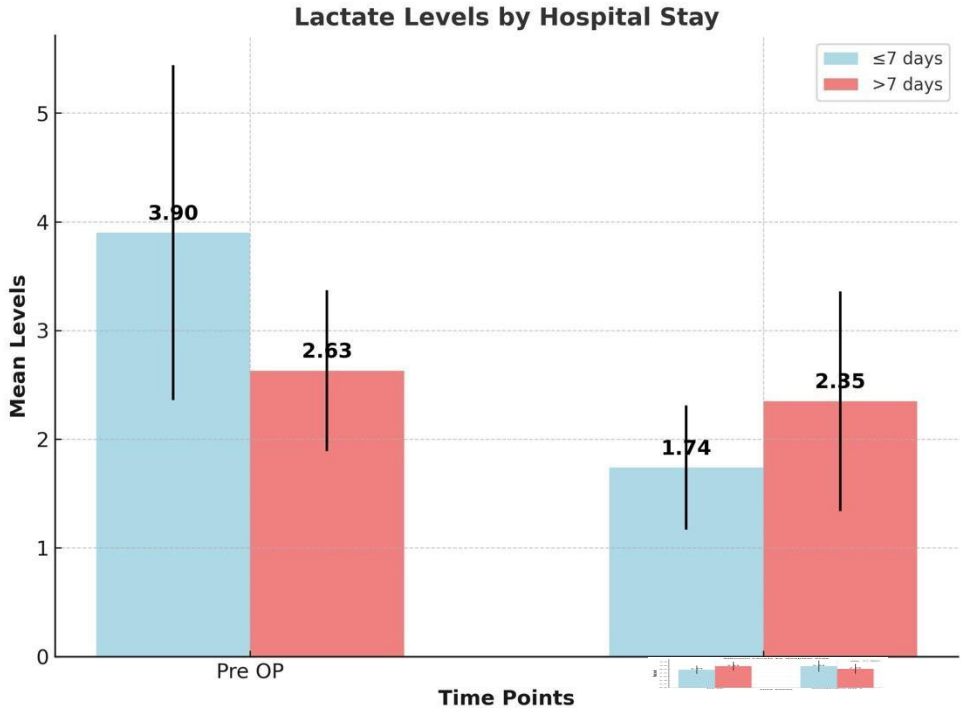


Table 18: Comparison of Procalcitonin Levels by Wound Infection

Time Points	No infection Mean (SD)	Infection Mean (SD)	t-value	p-value
Pre OP	1.56 (1.43)	1.71 (1.23)	-0.47	0.637
Postoperative Day 3	0.56 (0.51)	1.99 (1.77)	-4.47	<0.001

This table compares procalcitonin levels based on the presence of wound infection. The mean (SD) preoperative level was 1.56 (1.43) in the no infection group and 1.71 (1.23) in the infection group, with a t-value of -0.47 and p-value of 0.637. On postoperative day 3, the mean (SD) was 0.56 (0.51) in the no infection group and 1.99 (1.77) in the infection group, with a t- value of -4.47 and p-value <0.001, indicating a significant difference.

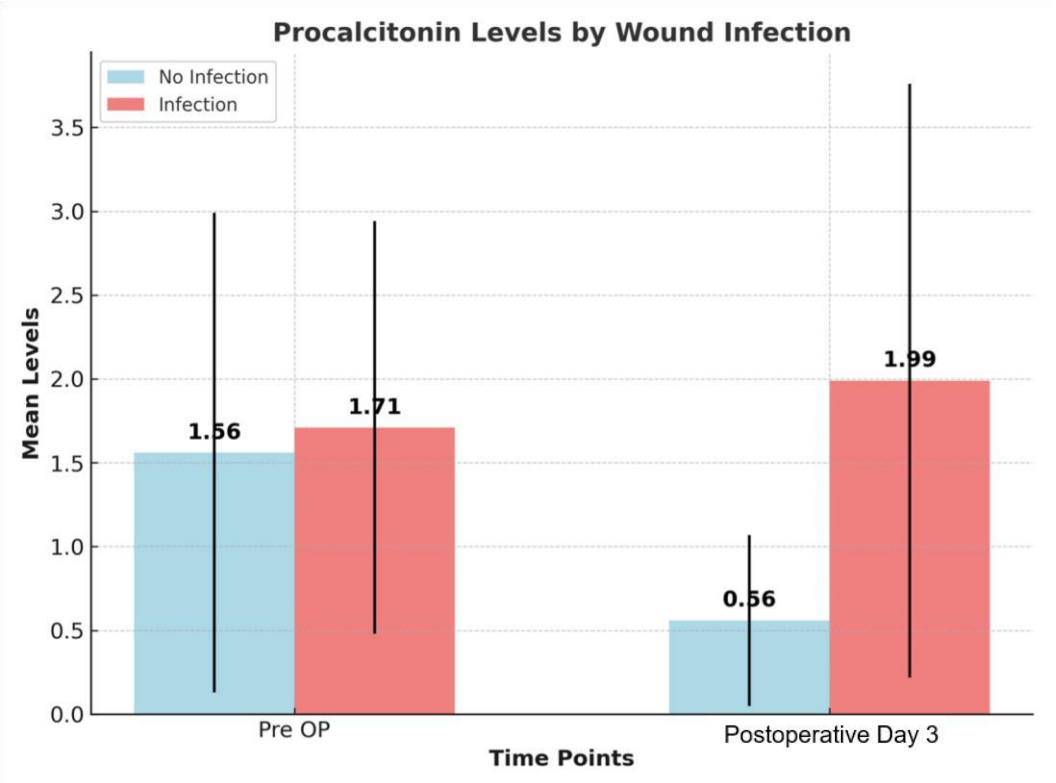


Table 19: Comparison of Albumin Levels by Wound Infection

Time Points	No infection Mean (SD)	Infection Mean (SD)	t-value	p-value
Pre OP	2.89 (0.60)	2.83 (0.63)	0.41	0.683
Postoperative Day 3	2.82 (0.73)	2.43 (0.58)	2.45	0.017

This table compares albumin levels based on the presence of wound infection. The mean (SD) preoperative albumin level was 2.89 (0.60) in the no infection group and 2.83 (0.63) in the infection group, with a t-value of 0.41 and a p-value of 0.683. On postoperative day 3, the mean (SD) was 2.82 (0.73) in the no infection group and 2.43 (0.58) in the infection group, with a tvalue of 2.45 and a p-value of 0.017, indicating a statistically significant difference.

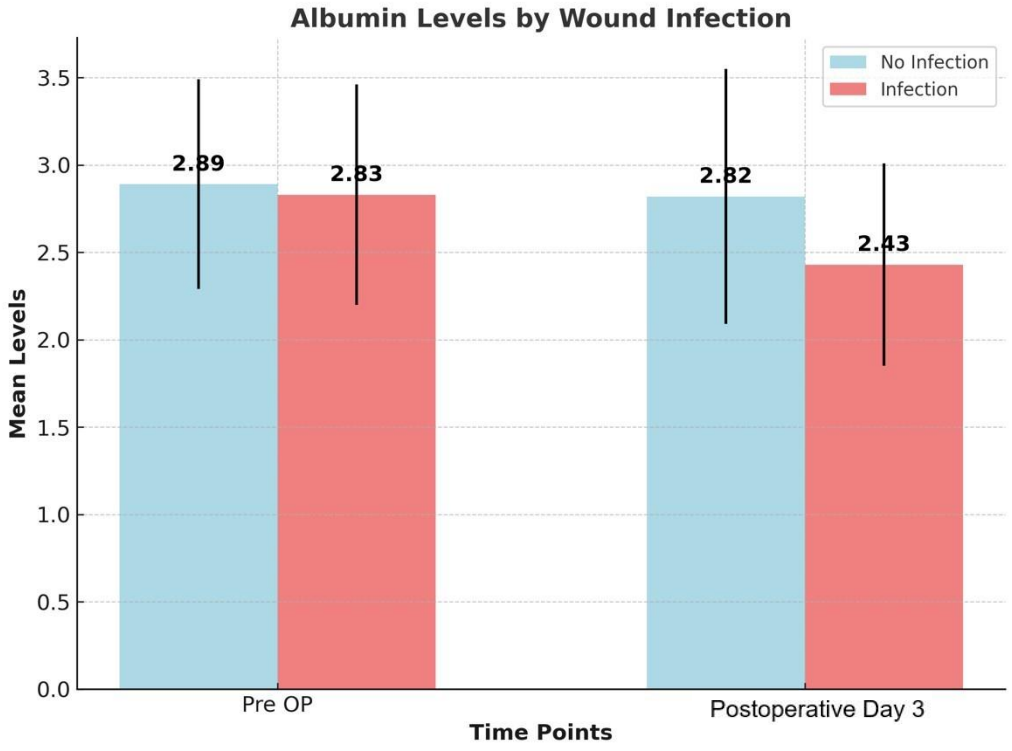
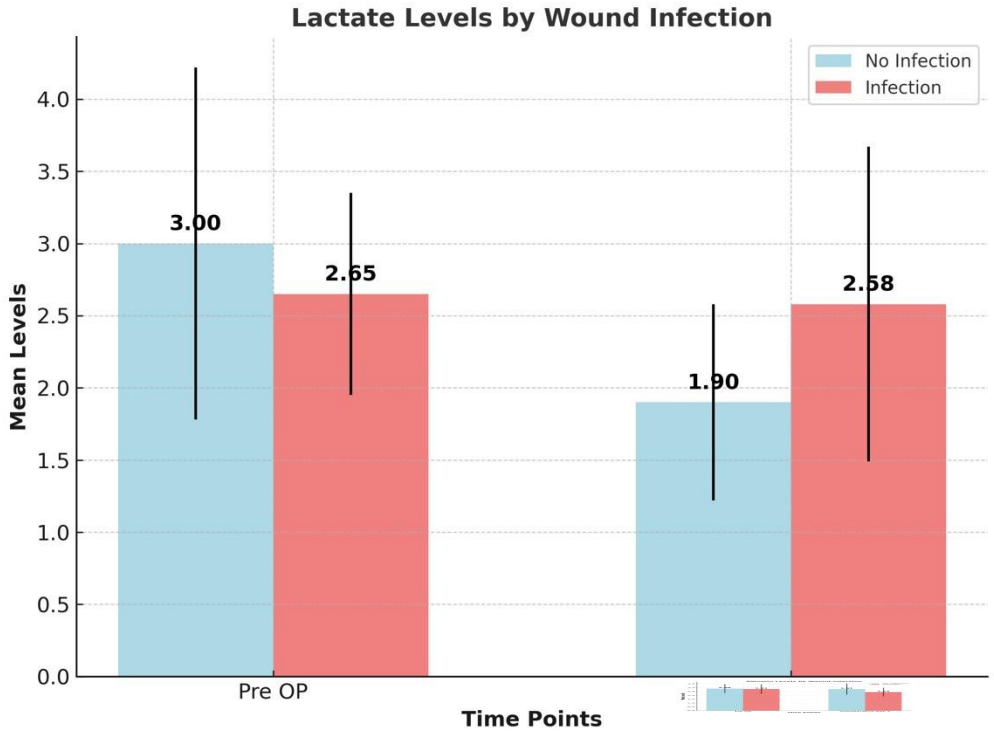


Table 20: Comparison of Lactate Levels by Wound Infection

Time Points	No infection Mean (SD)	Infection Mean (SD)	t-value	p-value
Pre OP	3.00 (1.22)	2.65 (0.70)	1.51	0.137
Postoperative Day 3	1.90 (0.68)	2.58 (1.09)	-3.10	0.003

This table compares lactate levels based on the presence of wound infection. The mean (SD) preoperative lactate level was 3.00 (1.22) in the no infection group and 2.65 (0.70) in the infection group, with a t-value of 1.51 and a p-value of 0.137. On postoperative day 3, the mean (SD) was 1.90 (0.68) in the no infection group and 2.58 (1.09) in the infection group, with a tvalue of -3.10 and a p-value of 0.003, indicating a statistically significant difference.



DISCUSSION

In the present study, the majority (57.14%) of the participants belonged to the 41-60 age group. Of these, 32.47% were female, and 67.53% were male. Regarding body mass index (BMI), 36.84% had a normal BMI, 26.32% were overweight, and 34.21% were obese. In terms of comorbidities, 23.68% had both diabetes and hypertension, 18.42% had diabetes, 27.63% had hypertension, and 30.26% had no comorbidities. Li F et al. [8] reported a mean age of 56 years with 58.2% males and 41.8% females. In their study, 24.12% were hypertensives, 26.18% were diabetics, and
11.76% had pleural effusion.
Sahin A et al. [9] reported a mean age of 70.23 years, with 53.85% males. Dilek A et al. [15] observed a mean age of 69 years, with 57.4% males and 42.6% females. Approximately 88.5% of participants had comorbidities, with 41% having hypertension and 31.1% having diabetes mellitus.
In terms of clinical profile, the present study recorded a mortality rate of 9.09%, with 90.91% of the participants being discharged. Hospital stay duration was ≤7 days in 14.29% of cases, 58.57% stayed for 8-14 days, and 27.14% stayed for more than 14 days. Around 52.86% had wound infections. Comparatively, Sahin A et al. [9] reported a significantly higher mortality rate of 48%. Whereas Dilek A et al. [15] reported a mean hospital duration of 6.7 days.

When comparing preoperative and postoperative day 3 levels of procalcitonin, albumin, and lactate, the present study found that the difference in procalcitonin levels was statistically not significant, whereas the reduction in albumin and lactate levels was statistically significant. Similarly,

Xie D et al. [22] observed a significant reduction in albumin levels postoperatively.
Further comparison of preoperative and postoperative day 3 levels of procalcitonin, albumin, and lactate among dead and discharged patients in the present study revealed a significant decline in procalcitonin and lactate levels among the discharged group, suggesting that a lack of decline in these markers is a risk factor for mortality. However, there was no significant difference in albumin levels between the groups.
Li F et al. [8] found that higher levels of lactate, procalcitonin, and albumin were significantly correlated with higher mortality. Sahin A et al. [9] noted higher lactate and albumin levels among non-survivors.

Gonca K et al. [11] reported that elevated levels of procalcitonin, lactate, and albumin were significantly associated with mortality. Alshiakh SM et al. [10] emphasized that higher serum lactate was significantly associated with increased mortality.

Dilek A et al. [15] reported that elevated procalcitonin, serum lactate, and albumin levels were positively correlated with APACHE II and SOFA scores, which are important markers for predicting mortality.
In comparing the preoperative and postoperative day 2 levels of procalcitonin, albumin, and lactate among patients with hospital stays of ≤7 days and >7 days, the present study found significantly lower preoperative values of all three markers among those who stayed ≤7 days.
Spoto S et al. [16] found that increased procalcitonin levels (>1 ng/ml) were significantly associated with longer hospital stays.
Regarding the comparison of these markers among patients with and without wound infections, the present study observed significantly lower postoperative levels of procalcitonin, albumin, and lactate among those without wound infections.

Hassan J et al. [12] stated that raised procalcitonin levels indicate progression to wound infection and sepsis. Massimo S et al. [13] also found that increased procalcitonin levels were significantly associated with a higher incidence of wound infection. Dilek A et al. [15] reiterated that elevated levels of procalcitonin, serum lactate, and albumin were positively correlated with APACHE II and SOFA scores, supporting their relevance in infection prediction. Spoto S et al. [16] again noted that procalcitonin levels above 1 ng/ml were significantly associated with increased wound infection.

Summary

This study investigates the prognostic utility of serum procalcitonin, albumin, and lactate in patients undergoing emergency abdominal surgeries. A total of 77 patients were enrolled, predominantly male (67.53%) and mostly aged 41–60 years. The study assessed preoperative and postoperative (Day 3) levels of the three biomarkers and correlated them with clinical outcomes such as mortality, hospital stay duration, and wound infection.

- Procalcitonin levels significantly increased on postoperative Day 3 in patients who died or had wound infections.

- Albumin levels showed a significant postoperative decrease overall and were lower in patients with wound infections, though differences by mortality and hospital stay were not statistically significant.

- Lactate levels decreased postoperatively overall but remained significantly higher in patients who died, had prolonged hospital stays, or developed infections.

- Notably, procalcitonin on Day 3 and lactate levels were strong indicators of poor outcomes, while albumin was more modestly predictive, especially in relation to wound infection.

Conclusion

The combination of serum procalcitonin, albumin, and lactate provides valuable prognostic insights in the postoperative monitoring of patients undergoing emergency abdominal surgeries. Elevated procalcitonin and lactate, especially on postoperative Day 3, are strongly associated with increased mortality, longer hospital stays, and wound complications. Serum albumin levels, while less predictive of mortality, correlate significantly with wound infections.

Procalcitonin is reliable, highly sensitive, and affordable and highly practicable biomarker in patients undergoing emergency laparotomy . Therefore, regular monitoring of these biomarkers can enhance early detection of complications and guide clinical decision-making for better outcomes.

Strengths and limitations

Strengths:

- The study includes a comprehensive evaluation of preoperative and postoperative biochemical markers, providing valuable insights into their role in surgical outcomes.

- The use of both paired and independent t-tests allows for robust comparisons between time points and outcome-based subgroups.

- The study provides clinically relevant findings that can aid in postoperative monitoring and risk stratification.

Limitations:

- The sample size is relatively small, limiting the generalizability of the findings.

- The study is limited to a single centre, which may not represent broader patient populations.

References

1. Godfrey M, Ally H, Daniel W, Samwel C. Preoperative waiting time and outcomes of non-traumatic emergency abdominal surgeries: Insights from zonal referral hospital in northern Tanzania, a reference for health centers with similar capacities. 2023;14:100202.

2. Abdourahmane N, Ledem T, Mamadou S, Papa D, Khadim N. Prevalence and mortality rate of abdominal surgical emergencies in sub- Saharan Africa: a systematic review and meta- analysis. BMC Surgery. 2024;24:35.

3. Rune M, Jackob B and Ismail G. Implementing bundle care in major abdominal emergency surgery: Long- term mortality and comprehensive complication index. World J Surg. 2023;47(1):106-118.

4. E. Barrow, ID Anderson, S Varley, AC Pichei, CJ Peden, DI Saunders, D Murray. Current UK practice in emergency laparotomy. Ann R Coll Engl. 2013;95:599-603.

5. Hamza H, Rania E, Wiam E, Mocef C, Taofik K and Khalil A. Determinants of delays in non-traumatic emergency abdominal surgeries: A prospective analysis. JAMMR. 2024

6. BD Dhaigude, Shilpi S, Priti S, Merry Francis, Keyur P, Vipul M. Post-operative wound complication following emergency and elective abdominal surgeries.

7. Jawaid M, Masood Z, Iqbal SA. Post-operative complications in a general surgical ward of a teaching hospital. Pak J Med Sci. 2006;22:171-175.

8. Li F, Ye Z, Zhu J, Gu S, Peng S, Fang Y, et al. Early Lactate/Albumin and Procalcitonin/Albumin Ratios as Predictors of 28-Day Mortality in ICU-Admitted Sepsis Patients: A Retrospective Cohort Study. Med Sci Monit. 2023;29:e940654

9. Şahin A, Bayrakçı S, Aslan S. An analysis of lactate/albumin, procalcitonin/albumin, and blood urea nitrogen/albumin ratios as a predictor of mortality in uroseptic patients. Rev Assoc Med Bras. 2023;69(11):e20230422.

10. Alshiakh SM. Role of serum lactate as prognostic marker of mortality among emergency department patients with multiple conditions: A systematic review. SAGE Open Med. 2023;11.

11. Gonca K, Muge G, Selen A, Basak T, Cem I, Adem K et al. Do biomarkers have predictive value in the treatment modality of the patients diagnosed with bowel obstruction? Rev. Assoc. Med. Bras. 2022;68(1).

12. Hassan J, Khan S, Zahra R, Razaq A, Zain A, Razaq L, et al. Role of procalcitonin and C-reactive protein as predictors of sepsis and in managing sepsis in postoperative patients: a systematic review. Cureus. 2022;14(11):e31067

13. Massimo S, Luca A, Michele B, Fausto C, Maurizo C, Francesco C, Francesco Di Marzo et al. The role of procalcitonin in reducing antibiotics across the surgical pathway. World J Emerg Surg. 2021;16:15.

14. Adem Cakir, Doganay Can, Kemal Sener, Ertugrul Altug. An investigation of procalcitonin/albumin ratio as a predictor of mortality in patients with sepsis; May 2024

15. Dilek A, Basa C, Bensu B, Hilmi K, Ramiz Y, Tuba O et al. Evaluation of the relationship between C- reactive protein, lactate, procalcitonin and albumin levels and procalcitonin/ albumin ratio with SOFA and APACHE- II scores in Emergency ICU patients. Eurasian Journal of Emergency Medicine. 2020;19(2):98-104.

16. Spoto S, Valeriani E, Caputo D, Cella E, Fogolari M, Pesce E, et al. The role of procalcitonin in the diagnosis of bacterial infection after major abdominal surgery: Advantage from daily measurement. Medicine. 2018;97(3):e9496.

17. Labgaa I, Joliat GR, Kefleyesus A, Mantziari S, Schäfer M, Demartines N, et al. Is postoperative decrease of serum albumin an early predictor of complications after major abdominal surgery? A prospective cohort study in a European centre. BMJ Open. 2017;7(4):e013966.

18. Elhardello OA, MacFie J. Digital rectal examination in patients with acute abdominal pain. Emerg Med J. 2018.

19. Maleki Verki M, Motamed H. Rectus Muscle Hematoma as a Rare Differential Diagnosis of Acute Abdomen; a Case Report. Emerg. 2018;6(1):e28.

20. Li PH, Tee YS, Fu CY, Liao CH, Wang SY, Hsu YP, Yeh CN, Wu EH. The Role of Noncontrast CT in the Evaluation of Surgical Abdomen Patients. Am Surg. 2018 Jun.

21. P. MARUNA, R. FRASKO, R. GÜRLICH Plasma Procalcitonin in Patients with Ileus. Relations to Other Inflammatory Parameters. Physiol Res 57: 481-486, 2008

22. Juliette C. Slieker, Steve Aellen, Philippe Eggimann,Valentine Guarnero, Markus Schäfer, and Nicolas Demartines Procalcitonin-Guided Antibiotics after Surgery for Peritonitis: A Randomized Controlled Study. Hindavi gastroenterology research and practice volume 2017 Article ID 3457614

23. Mark E. Mikkelsen, MD, MS; Andrea N. Miltiades, BA; David F. Gaieski, MD; Munish Goyal, MD; Barry D. Fuchs, MD; Chirag V. Shah, MD, MS; Scarlett L. Bellamy, SCD; Jason D. Christie, MD, MS Serum lactate is associated with mortality in severe sepsis independent of organ failure and shock

24. Comparative Study of Serological Markers in Patients Presenting With Acute Abdomen to a Tertiary Care Hospital in Western Rajasthan Dr. Madan K, Dr. Rajesh K N Dr. Latika Sharma, Dr. Ram Ratan Yadav Dr. Awadhesh Kumar DOI: 10.9790/0853-1506033942

25. Philipp Schuetz, Werner Albrich and Beat Mueller Procalcitonin for diagnosis of infection and guide to antibiotic decisions: past, present and future . BMC Medicine 2011, 9:107

26. Kiyemba Henry', Kadondi Merab', Muyanja Leonard' Kintu-Luwaga Ronald', Kakembo Nasser' and Galukande Moses Elevated serum lactate as a predictor of outcomes in patients following major abdominal surgery at a tertiary hospital in Uganda BMC Surg 2021 21-319

27. Alistair D Nicho|, Moritoki Egi, Ville Pettila, Rinaldo Bellomo, Craig Frenchs, Graeme Hart, Andrew Davies, Edward Stachowski, Michael C Readet, Michael Bailey and David James Cooper. Relative hyperlactatemia and hospital mortality in critically ill patients: a retrospective multi-centre study .Critical care 2010, 14: R25

28. Jafar Malmir (MD) , Ehsan Bolvardi (MD) , Monavar Afzal Aghaee (MD) Serum lactate is a useful predictor of death in severe sepsis and septic shock Rev Clin Med 2014; Vol 1

29. Kirsten de Burlet, Anna Lam, Peter Larsen, Elizabeth Dennet Acute abdominal pain-changes in the way we assess it over a decade, October 2017, Vol 130 No 1463

30. John W, Sarang K and Elvita D. Acute abdomen. National library of Medicine. StatPearls;2025 Available from: https://www.ncbi.nlm.nih.gov/books/NBK459328/

BLDE

(DEEMED TO BE UNIVERSITY)

Declared as Deemed to be University u/s 3 of UGC Act, 1956

Accredited with 'A' Grade by NAAC (Cycle-2)

The Constituent College

SHRI B. M. PATIL MEDICAL COLLEGE, HOSPITAL & RESEARCH CENTRE, VIJAYAPURA

BLDE (DU)/IEC/ 989/2022-23 10/4/2023

INSTITUTIONAL ETHICAL CLEARANCE CERTIFICATE

The Ethical Committee of this University met on **Saturday, 18th March, 2023 at 11.30 a.m. in the CAL Laboratory, Dept. of Pharmacology,** scrutinizes the Synopsis/ Research Projects of Post Graduate Student / Under Graduate Student /Faculty members of this University /Ph.D. Student College from ethical clearance point of view. After scrutiny, the following original/ corrected and revised version synopsis of the thesis/ research projects has been accorded ethical clearance.

TITLE: "A COMPARITIVE STUDY ON COMBINATION OF SERUM PROCALCITONIN, SERUM ALBUMIN & LACTATE IN PREDICTING THE PROGNOSIS FOR EMERGENCY ABDOMINAL SURGERIES".

NAME OF THE STUDENT/PRINCIPAL INVESTIGATOR: DR.BOMMU JEEVAN REDDY.

NAME OF THE GUIDE: DR. RAMAKANTH BALOORKAR, PROFESSOR
DEPT. OF GENERAL SURGERY.

Dr. Santoshkumar Jeevangi
Chairperson
IEC, BLDE (DU),
VIJAYAPURA

Chairman,
Institutional Ethical Committee,
BLDE (Deemed to be University)
Vijayapura

Dr.Akram A. Naikwadi
Member Secretary
IEC, BLDE (DU),
VIJAYAPURA

MEMBER SECRETARY
Institutional Ethics Committee
BLDE (Deemed to be University)
Vijayapura-586103. Karnataka

Following documents were placed before Ethical Committee for Scrutinization,

- Copy of Synopsis/Research Projects
- Copy of inform consent form
- Any other relevant document

Smt. Bangaramma Sajjan Campus, B. M. Patil Road (Sholapur Road), Vijayapura - 586103, Karnataka, India.
BLDE (DU): Phone: +918352-262770, Fax: +918352-261300, Website: www.bldedu.ac.in, E-mail: office@bldedu.ac.in
College: Phone: +918352-262730, Fax: +918352-263019, E-mail: hosprsc.principal@bldedu.ac.in

B.L.D.E. (DEEMED TO BE UNIVERSITY)

SHRI B.M.PATIL MEDICAL COLLEGE HOSPITAL AND

RESEARCH CENTER, VIJAYAPURA-586103

INFOME CONSENT FOR PARTICIPATION IN DISSERTATION/RESEARCH

I, the undersigned, , S/O D/O , aged years, resident of do hereby state/declare that Dr. BOMMU JEEVAN REDDY of Shri. B. M. Patil Medical College Hospital and Research Centre have examined me thoroughly on at (place) and it has been explained to me in my language about the study. Further Dr. **BOMMU JEEVAN REDDY** informed me that he is conducting a dissertation/research titled — " **Comparative Study on Combination of Serum Procalcitonin, Serum Albumin & Lactate in Predicting the Prognosis for Emergency Abdominal Surgeries.**

" Under the guidance of Dr. RAMAKANTH BALOORKAR requesting my participation in the study. I will also be contacted on phone at times necessary to ask regarding my condition. Further Doctor has informed me that my participation in this study will help in the evaluation of the results of the study which is a useful reference to the treatment of other similar cases in the future.

The Doctor has also informed me that information given by me, observations made/ photographs/ video graphs taken upon me by the investigator will be kept secret and not assessed by a person other than me or my legal hirer except for academic purposes.

The Doctor did inform me that though my participation is purely voluntary, based on the information given by me, I can ask any clarification during the treatment/study related to diagnosis, the procedure of treatment, the result of treatment, or prognosis. At the same time, I have been informed that I can withdraw from my participation in this study at any time if I want or the investigator can terminate me from

the study at any time but not the procedure of treatment and follow-up unless I request to be discharged.

After understanding the nature of dissertation or research, diagnosis made, mode of treatment. I am giving consent for the blood and other essential investigations and also for the follow-up.

I the undersigned Shri / Smt under my full conscious state of mind agree to participate in the said research/dissertation.

Signature of the patient: Signature of doctor:

Date:

Place:

CONFEDENTIALITY

I understand that medical information produced by this study will become a part of this hospital record and will be subjected to the confidentiality and privacy regulation of this hospital. Information of a sensitive, personal nature will not be a part of the medical records but will be stored in the investigator's research file and identified only by a code number. The code key connecting name to the numbers will be kept in a separate secure location.

If the data are used for publication in the medical literature or teaching purposes, no names will be used and other identifiers such as photographs and audio or videotapes will be used only with my special written permission. I understand that I may see the photograph and videotapes and hear audiotapes before giving this permission

REQUEST FOR MORE INFORMATION:

I understand that I may ask more questions about the study at any time. **DR BOMMU JEEVAN REDDY** is available to answer my questions or concerns. I understand that I will be informed of any significant new findings discovered during this study, which might influence my continued participation. If during this study, or later, I wish to discuss my participation in or concerns regarding this study with a person not directly involved, I am aware that the social worker of the hospital is available to talk with me. And that a copy of this consent form will be given to me for careful reading.

REFUSAL OR WITHDRAWAL OF PARTICIPATION:

I understand that my participation is voluntary and I may refuse to participate or may withdraw consent and discontinue participation in the study at any time without prejudice to my present or future care at this hospital.

I also understand that **Dr. BOMMU JEEVAN REDDY** will terminate my participation in this study at any time after he has explained the reasons for doing so and has helped arrange for my continued care by my

physician or therapist if this is appropriate

INJURY STATEMENT:

I understand that in the unlikely event of injury to me/my ward, resulting directly to my participation in this study, if such injury were reported promptly, then Medical treatment would be available to me, but no further compensation will be provided.

I understand that by my agreement to participate in this study, I am not waiving any of my legal rights.

I have explained the purpose of this research, the procedures required, and the possible risks and benefits, to the best of my ability and the patient‘s language.

DATE: -

DR RAMAKANTH BALOORKAR DR BOMMU JEEVAN REDDDY

(GUIDE) (INVESTIGATOR)

STUDY SUBJECT CONSENT STATEMENT:

I confirm that Dr. BOMMU JEEVAN REDDY has explained to me the purpose of this research, the study procedure that I will undergo, and the possible discomforts and benefits that I may experience, in my language. I have been explained all the above in detail in my language and I understand the same. Therefore, I agree to give my consent to participate as a subject in this research project.

(PARTICIPANT) (WITNESS)

DATE DATE

PROFORMA

- CASE NUMBER: WARD/UNIT:
- NAME: DATE OF ADMISSION :
- AGE/SEX: DATE OF DISCHARGE:
- IP NUMBER: OPD NUMBER:
- OCCUPATION: ADDRESS::
-
- CHIEF COMPLAINTS :
-
- HISTORY OF PRESENTING ILLNESS:
-
-
- PAST HISTORY:
-
- PERSONAL HISTORY:
- Dietary Habits-
- Appetite-
- Sleep-
- Bowel and bladder habits-
- Habits-
-
- SURGICAL HISTORY:
- FAMILY HISTORY :
-

PROFORMA

- GENERAL PHYSICAL EXAMINATION:
- Appearance-
- Attitude-
- Built-Well / Moderate / Poor
- Nourishment- Well / Moderate / Poor
- Weight- kg
- Height- cm
- BMI- kg/m2
- Tongue-
- Pallor-
- Icterus-
  Cyanosis-
- Clubbing-
- Pedal edema-
- Generalized lymphadenopathy-
- VITALS:
- Temperature-
- Pulse- bpm
- Spo2-
- Blood Pressure- mmHg
- Respiratory Rate- pm

PROFORMA

- GENERAL PHYSICAL EXAMINATION:
- Appearance-
- Attitude-
- Built-Well / Moderate / Poor
- Nourishment- Well / Moderate / Poor
- Weight- kg
- Height- cm
- BMI- kg/m2
- Tongue-
- Pallor-
- Icterus-
  Cyanosis-
- Clubbing-
- Pedal edema-
- Generalized lymphadenopathy-
- VITALS:
- Temperature-
- Pulse- bpm
- Spo2-
- Blood Pressure- mmHg
- Respiratory Rate- pm

PROFORMA

- SYSTEMIC EXAMINATION:
- . RESPIRATORY SYSTEM:
- . CARDIOVASCULAR SYSTEM:
- . CENTRAL NERVOUS SYSTEM:
- PER ABDOMEN

	Name		Age	IP NO	BMI	Comorbidities	DIAGNOSIS	PROCALCITONIN_PREOP	PROCALCITONIN_POD3	ALBUMIN_PREOP	ALBUMIN_POD3	LACTATE_PREOP	LACTATE_POD3	SURGICAL SITE INFECTION	HOSPITAL STAY	OUTCOME
1	BASANINGAPPA ROTTI	M	48	237765	23.5	None	Gangrenous bowel secondary to sma	4.2	1	2.1	3.8	2	1	Absent	7	Discharged
2	BHOWRAVVA	F	71	34183	27.4	None	Large intestinal obstruction secondary to sigmoid colon stricturous growth	1	0.2	3.2	2.8	2.2	2.9	Present	16	Discharged
3	BAGAVANTRAO.K	M	66	34654	19.8	Diabetes	Hollow viscus perforation	2.2	3.2	2.5	2.7	3	4.2	Present	17	Discharged
4	MAHADEV MALAGAN	M	43	98756	28.4	Hypertension	Hollow viscus perforation	1	0.2	3.5	2.1	2.1	0.8	Absent	7	Discharged
5	NINGAVVA M PUJARI	F	45	37719	26.9	Hypertension	Hollow viscus perforation	4.2	1	2.1	2.8	5.2	2	Absent	6	Discharged
6	SHARANAPPA LOHAR	M	58	37927	34	None	sigmoid colon perforation	1.2	3.2	3.2	2.5	3.8	2.9	Present	15	Death
7	BASANGOUDA	M	64	40068	19.1	None	perforated gall bladder with peritonitis	2.2	3.2	2.5	2.7	3	4.2	Present	11	Discharged
8	SIDDAN GOUDA BASAVARAJ	M	22	42790	18.5	Both	stab injury with perforation to proximal jejunum with grade 1 liver laceration	1.2	0.5	3.1	2.1	3.2	2.2	Absent	5	Discharged
9	SIDDAPPA HUNNAPA	M	40	45744	30.2	None	Hollow viscus perforation	2.2	4.5	2.2	1.8	2.2	3.5	Present	15	Discharged
10	MALLU GURAPPA	M	30	45738	23.5	Hypertension	Ileal perforation	0.5	0.3	3.4	2.1	2.1	2.2	Present	10	Discharged
11	SHIVAYOAGPPA	M	70	48738	30.3	Both	Pre pyloric perforation	0.5	0.1	2.4	3.8	2.5	0.9	Present	9	Discharged
12	LAXMI SOMALINGA	F	22	49031	20.2	None	abdominal tuberculosis	1.2	2.2	4.5	2.2	2.5	1.8	Present	14	Discharged
13	PARSAPPA BASAPPA	M	60	50073	31.4	None	right sided strangulated recurrent inguinal hernia	4.23	4.6	2.4	2.1	3.2	2	Present	15	Discharged
14	KAMALA BAI SAJJAN	F	65	50490	25.4	Both	ileo ileal intussception with acute small bowel obstruction	3.2	4.2	3.2	2.5	3.8	2.9	Present	20	Death
15	SAI BANNA NINGAPPA	M	55	52786	20.6	Diabetes	mesentric ischaemia with gangrenous small bowel	2.2	4.5	2.2	1.8	2.2	3.5	Present	8	Discharged

16	MALLAPPA	M	65	54569	30.3	Hypertension	prepyloric perforation	0.4	2.5	3.3	2.2	2.5	1.9	Absent	9	Discharged
17	LAXMAN SHIVAPPA	M	75	55998	33	Hypertension	Acute mesentric ischemia with gangrenous distal ileum	2.2	3.2	2.5	2.7	3	4.2	Present	20	Discharged
18	DHARMARAJ SHANTHAPPA	M	24	56643	29.9	Diabetes	Hollow viscus perforation with peritonitis	0.2	0.2	3.9	2.4	2.1	2.2	Absent	8	Discharged
19	RAMAN GOUDA BIRADAR	M	45	94761	18.5	Hypertension	Ileo ileal intususception with sub acute small bowel obstruction	4.2	5	2.1	2.8	5.2	2	Present	15	Discharged
20	BHIMRAY MADAR	M	68	94113	21.9	Both	Hollow viscus perforation	1	0.2	2.1	4.2	5.7	2.2	Absent	7	Discharged
21	GOVIND TIPPANA	M	28	98756	19.7	Hypertension	sub acute intestinal obstruction	0.4	1.5	3.3	3.2	2.5	1.9	Absent	9	Discharged
22	SHUSHILA PRADEEP	F	50	79228	28.3	Diabetes	Sigmoid volvulus	2.2	4.5	2.2	1.8	2.2	3.5	Present	8	Discharged
23	DAYANAND	M	32	11519	30.5	None	hollow viscous perforation	0.8	1.2	3.8	3.1	3.2	2	Present	8	Discharged
24	DHAREPPA SIDDAPPA	M	36	254049	30.9	Hypertension	Hollow viscous perforation with peritonitis	1	0.2	3.5	2.1	2.1	0.8	Present	11	Discharged
25	MALLAPPA	M	65	390758	29.4	None	prepyloric perforation	0.5	0.3	3.4	2.1	2.1	2.2	Present	9	Discharged
26	MUTTAPPA TALWAR	M	65	16433	32.5	Hypertension	Mesentric ischemia with gangrenous small bowel	4.2	1	2.4	2.3	2.1	2.5	Present	10	Discharged
27	VEELAKANTH RATHOD	M	60	100125	28.1	None	perforation of distal end of descending colon	0.5	1.8	2	1.5	3.3	2.1	Present	15	Discharged
28	NILAVVA	F	42	91697	21.6	Both	pre pyloric perforation	1.8	2.2	2.1	3.5	3	2.2	Present	15	Discharged
29	NINGAPPA SIDDRAMAPPA	M	78	18952	34.5	Hypertension	pyloric perforation	0.2	0.2	3.9	2.4	2.1	2.2	Absent	10	Discharged
30	PRAKASH	M	48	32431	25	Both	pre pyloric perforation	1.5	2	2.2	3.5	10.2	7.8	Present	20	Death

30	PRAKASH	M	48	32431	25	Both	pre pyloric perforation	1.5	2	2.2	3.5	10.2	7.8	Present	20	Death
31	RATANAMMA	F	32	289518	26.7	Hypertension	Acute intestinal obstruction	1	0.2	3.2	2.8	2.2	2.9	Absent	8	Discharged
32	NAFISABANNU	M	57	105947	33.2	Hypertension	splenic abscess with ihd	0.5	0.3	3.4	2.1	2.1	2.2	Present	9	Discharged
33	SAVITA	F	31		19.6	Diabetes	peitonitis with gangerenous distal ileum	4.2	1	2.4	3.3	2.1	2.5	Absent	10	Discharged
34	MR S B PATIL	M	71	47153	31.4	Diabetes	Sigmoid volvulus with pelvic ileus	1	0.2	3.2	2.8	2.2	2.9	Absent	14	Discharged
35	NAFISABAVVANA	M	55	165947	19.2	Both	splenic abscess	0.25	0.1	2.2	4.2	2.1	0.7	Present	11	Discharged
36	SHRISHAIL	M	44	36320	24.6	Both	sigmoid volvulus with pyloric perforation	1	0.2	3.5	2.1	2.1	0.8	Absent	9	Discharged
37	SIDDRAM	M	62	170754	33.4	Diabetes	hollow viscous perforation	1.2	0.5	3	2.2	3.2	2.2	Present	20	Discharged
38	BAVYASHREE	F	20	235351	32.3	Hypertension	Ileal perforation	0.5	0.1	2.4	3.8	2.5	0.9	Absent	14	Discharged
39	MAHADEVI	F	45	18936	30.7	None	hollow viscous perforation	2.2	3.2	2.5	2.7	3	4.2	Present	20	Discharged
40	SHARANABAI	F	65	30525	22.9	Both	small bowel obstruction	0.5	4.3	3.4	2.1	2.1	2.2	Present	15	Death
41	SUDHABAI	F	64	196683	25.4	Both	acute intestinal obstruction	4.2	4	2.4	2.3	2.1	2.5	Present	20	Death
42	AISHWARYA	F	21	34654	22.2	Hypertension	blunt abdominal trauma	1.2	0.5	3.1	2.1	3.2	2.2	Absent	10	Discharged
43	IRRAPPA	M	52	273783	27.1	None	peritonitis with appendicular perforation	4.2	1	2.1	2.8	5.2	2	Absent	7	Discharged
44	CHANDABAI	F	62	4473	24	None	prepyloric perforation	1.2	0.5	3	2.2	3.2	2.2	Absent	10	Discharged
45	LAXMAN	M	32	244864	23.2	None	small bowel obstruction	1.2	0.5	3.1	2.1	3.2	2.2	Absent	15	Discharged
46	KAMALABAI	F	66	162605	19.4	Hypertension	incisional hernia with dense adheshion	0.25	0.1	2.2	4.2	2.1	0.7	Absent	8	Discharged
47	PARASAPPA	M	32	11519	32	Both	hollow viscous perforation	1	0.8	3.2	3.1	2	1.5	Absent	10	Discharged

48	NINGAPPA	M	28	245934	27	None	hollow viscous perforation	2.2	4.5	2.2	1.8	2.2	3.5	Present	15	Death
49	BHAGYASREE	F	20	235351	26.4	None	Ileal perforation	1	0.2	2.1	4.2	5.7	2.2	Absent	12	Discharged
50	MAHADEVI	F	50	378579	23.9	Both	hollow viscous perforation	0.1	0.2	2.4	3.2	1.6	1.8	Present	16	Discharged
51	SUDHABAI	F	54	11153	21.5	Both	acute intestinal obstruction	1.2	0.5	3	2.2	3.2	2.2	Absent	14	Discharged
52	MALLAPPA	M	65	390758	34.2	Hypertension	prepyloric perforation	0.2	0.2	3.9	2.4	2.1	2.2	Present	16	Discharged
53	LAXMAN SHIVAPPA	M	75	55998	32.6	Both	Acute mesentric ischemia with gangrenous distal ileum	1.2	0.5	3.1	2.1	3.2	2.2	Absent	14	Discharged
54	DHARAMA RAJ SHANTAPPA	M	25	56643	22.3	Both	hollow viscous perforation	1	0.2	3.5	2.1	2.1	0.8	Present	15	Discharged
55	RAMAN GOUDA BIRADAR	M	45	94761	29.4	Both	ileo caecal intussusception	2.2	4.5	2.2	1.8	2.2	3.5	Present	15	Death
56	BHIMRAY MADAR	M	68	94113	31.1	Diabetes	Prepyloric perforation	2.2	4.5	2.2	1.8	2.2	3.5	Present	14	Discharged
57	GOVIND TIPPANA	M	28	98756	31.8	None	Acute intestinal obstruction	1	0.2	3.5	2.1	2.1	0.8	Absent	24	Discharged
58	SUSHEELA PRADEEP	F	50	79228	28.2	Hypertension	sigmoid volvolus	3.2	1.2	3.2	2.5	3.8	2.9	Present	9	Discharged
59	DAYANAND SADASHIVAYYA	M	32	11519	31.2	None	Hollow viscous perforation	0.25	0.1	2.2	4.2	2.1	0.7	Absent	10	Discharged
60	BHAGWANTH RAO	M	66	34654	29.3	None	hollow viscous perforation	1	0.2	3.2	2.8	2.2	2.9	Absent	14	Discharged
61	NILAVVA	F	42	91697	23.5	Both	pre pyloric perforation	4.23	4.6	2.4	2.1	3.2	2	Present	15	Discharged
62	NINGAPPA SIDDRAMAPPA	M	78	18952	34.8	Hypertension	Peritonitis secondary to hollow viscous perforation	1.2	0.5	3	2.2	3.2	2.2	Absent	14	Discharged
63	SIDDAPPA HOMNAPPA	M	40	45744	25.3	Hypertension	hollow viscous perforation	1.2	0.5	3.1	2.1	3.2	2.2	Absent	5	Discharged
64	MALLUGURAPPA	M	30	45738	25.5	Diabetes	Ileal perforation	1	0.2	3.2	2.8	2.2	2.9	Absent	14	Discharged
65	SIDDAPPA HOMNAPPA	M	40	45744	23.4	None	hollow viscous perforation	1	0.2	3.5	2.1	2.1	0.8	Present	11	Discharged
66	MALLUGURAPPA	M	30	45738	31	Diabetes	ileal perforation	2.2	4.5	2.2	1.8	2.2	3.5	Present	15	Discharged
67	SHIVAYOGAPPA SHEKAPPA	M	39	30525	34.6	None	Prepyloric perforation with peritonitis	2.2	3.2	2.5	2.7	3	4.2	Present	17	Discharged
68	LAXMI SOMALINGA	F	81	274914	34.1	None	abdominal tuberculosis	4.2	1	2.1	2.8	5.2	2	Absent	6	Discharged
69	PARSAPPA BASSAPPA	M	70	47153	21.3	Diabetes	right sided strangulated recurrent inguinal hernia	0.5	0.3	3.4	2.1	2.1	2.2	Present	10	Discharged
70	KAMALABAI	F	65	50490	22.2	Both	ileal intussception with acute small bowel obstruction	3.2	1.2	3.2	2.5	3.8	2.9	Present	9	Discharged
71	SHIVALINAGAPPA	M	60	254049	31.9	Diabetes	Hollow viscus perforation with peritonitis	0.2	0.2	3.9	2.4	2.1	2.2	Absent	8	Discharged
72	AARATI	F	51	289504	21	Diabetes	acute intestinal obstruction	2.2	3.2	2.5	2.7	3	4.2	Present	11	Discharged
73	LAXMIBAI	F	79	273783	21.9	Hypertension	Hollow viscus perforation	4.2	1	2.1	2.8	5.2	2	Absent	7	Discharged
74	LAALU JADAV	M	60	260665	24	Hypertension	Mesentric ischemia with gangrenous small bowel	0.5	0.3	3.4	2.1	2.1	2.2	Present	9	Discharged
75	MURGESH P	M	51	11519	25.5	None	Hollow viscous perforation	2.2	3.2	2.5	2.7	3	4.2	Present	20	Discharged
76	KANTI	M	40	4977	27.5	Diabetes	prepyloric perforation	4.2	1	2.1	3.8	2	1	Absent	7	Discharged
77	JAGADEV	M	50	1955	30	None	Peritonitis secondary to appendicular perforation	0.5	0.3	3.4	2.1	2.1	2.2	Present	9	Discharged