

Clinical Profile, Laboratory Parameters, and Radiological Correlation in Non-Traumatic Acute Abdomen: A Prospective Observational Study

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Abstract: ***Background:** Acute abdomen is a common surgical emergency, particularly challenging in resource-limited settings where CT is not routinely available. **Methods:** A prospective observational study of 50 patients with non-traumatic acute abdomen requiring surgical intervention was conducted at a tertiary care hospital from January 2024-December 2024. Clinical, laboratory, and radiological findings were correlated with operative diagnoses. **Results:** Abdominal pain was present in all patients (100%). Leukocytosis was observed in 80%. Pneumoperitoneum was detected in 36% of cases and correlated with perforation peritonitis in all instances. The most common operative diagnoses were perforation peritonitis (38%) and acute appendicitis (30%). Overall, preoperative and operative diagnostic agreement was strong. **Conclusion:** Integrated clinical assessment supported by basic imaging provides reliable diagnostic accuracy without routine CT. Early diagnosis and timely intervention remain essential to reduce morbidity in resource-limited settings.*

Keywords: acute abdomen; acute abdominal pain; perforation peritonitis; diagnostic accuracy; emergency surgery; laparotomy; India

1. Introduction

Acute abdomen represents a broad clinical spectrum of intra-abdominal pathology characterised by sudden-onset pain requiring urgent surgical assessment. It remains a leading cause of emergency admissions globally, encompassing conditions ranging from self-limiting inflammatory processes to life-threatening emergencies, including perforation peritonitis, intestinal obstruction, and mesenteric ischaemia. The condition places considerable demand on surgical and emergency medicine services, particularly in developing countries where late presentation and limited resources compound diagnostic difficulty [1].

The diagnostic challenge in acute abdomen arises from heterogeneous aetiology, overlapping clinical presentations, and variable disease progression. Patients with significant intra-abdominal pathology may present with non-specific symptoms, and delays in recognition increase the risk of complications including generalised peritonitis, sepsis, and multiorgan dysfunction [1]. Timely and accurate diagnosis is therefore critical in minimising morbidity and mortality.

While computed tomography has transformed diagnostic accuracy in high-resource settings, its availability during emergency presentations remains constrained in much of South Asia. In this context, the integrated pathway of clinical evaluation, laboratory investigations, and conventional imaging, such as plain abdominal radiography and ultrasonography, constitutes the standard diagnostic workup at most Indian teaching hospitals [2,3]. Clinical examination, including assessment of pain character, peritoneal signs, and

bowel sounds, continues to form the foundation of surgical decision-making [2]. Laboratory parameters, particularly total leukocyte count, serve as important adjuncts, though normal values do not exclude significant pathology [4]. Plain radiography retains value for detecting pneumoperitoneum and intestinal obstruction, while ultrasonography enhances sensitivity for appendicitis, free fluid, and biliary pathology [5,6].

In developing countries, the epidemiological profile of acute abdomen differs substantially from that reported in Western literature. Perforation peritonitis, often secondary to peptic ulcer disease, typhoid, or delayed appendicitis, represents a disproportionately high surgical burden, driven by delayed presentation, infectious etiology, and limited primary care access [7,8]. Understanding the clinical, laboratory, and radiological profile in a specific institutional context is valuable for both quality improvement and generating regionally relevant data.

Despite the volume of published literature on individual modalities, few prospective Indian studies have systematically evaluated the integrated diagnostic pathway and its correlation with operative findings across the full spectrum of acute abdominal pathology. Most available data are retrospective, single diagnosis focused, or do not explicitly examine diagnostic correlations.

Aims and Objectives

- 1) To describe the clinical, laboratory, and radiological profile of patients presenting with non-traumatic acute abdomen at a tertiary care teaching hospital in India

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- 2) To evaluate the correlation between preoperative findings and operative diagnosis;
- 3) To assess the utility of plain radiography and ultrasonography in guiding surgical decision-making in the absence of routine CT availability.

2. Materials and Methods

Study Design and Setting

This was a prospective observational study conducted at the Department of General Surgery, MGM Medical College and Hospital, Navi Mumbai, Maharashtra, India, over a twelve-month period from January 2024 to December 2024. The institution is a tertiary care teaching hospital serving a mixed urban and semi-urban catchment population in the Navi Mumbai region.

Sample Size and Sampling

A convenience sample of 50 consecutive eligible patients was enrolled over the study period. As this was an exploratory descriptive study, formal power calculation was not performed. This sample size is consistent with comparable single-center prospective studies in the Indian surgical literature [7,8].

Eligibility Criteria

Inclusion criteria: (1) age ≥ 15 years; (2) presentation with acute abdominal pain of less than seven days' duration; (3) a clear for surgical intervention.

Exclusion criteria: (1) traumatic etiology; (2) chronic or recurrent abdominal pain without acute exacerbation; (3) patients managed conservatively without surgical intervention.

Data Collection

All eligible patients were evaluated by the surgical team on presentation. A structured proforma was used to record demographic details, symptom history, and clinical examination findings including abdominal tenderness, guarding, rigidity, and bowel sounds. All examinations were conducted by a qualified surgical resident or consultant.

Investigations

Laboratory investigations: Complete blood count was performed in all patients. Total leukocyte count (TLC) was classified as leukocytosis where TLC exceeded $11.0 \times 10^9/L$. Renal function tests were obtained as per a clear clinical indication.

Radiological investigations: Plain erect abdominal radiography was performed in all patients. Abdominal ultrasonography was performed where clinically indicated. CT abdomen was selectively used based on clinical necessity and availability.

Operative Data

All patients underwent surgical intervention. Operative diagnosis was recorded by the operating surgeon and categorised as: perforation peritonitis, acute appendicitis, intestinal obstruction, acute cholecystitis, mesenteric ischaemia, or other. Preoperative diagnostic impression was compared with final operative diagnosis to assess correlation.

Statistical Analysis

Data were entered into Microsoft Excel and analysed using SPSS version 26.0. Categorical variables are expressed as frequencies and percentages. This was a descriptive study; no inferential statistical testing was performed.

Diagnostic Correlation Definition:

Diagnostic correlation was defined as agreement between the preoperative clinical-radiological diagnosis and the final operative diagnosis. Agreement was expressed as percentage concordance between preoperative and intraoperative findings.

Sampling Justification:

As this was an exploratory descriptive study, a formal sample size calculation was not performed. The sample size of 50 patients was considered adequate to identify trends and is consistent with similar single-centre prospective studies.

Imaging Selection Clarification:

Ultrasonography and CT imaging were performed based on a clear clinical indication, availability, and surgeon discretion. CT was not routinely used due to limited emergency accessibility.

Blinding:

Blinding was not performed, as this study reflects real-world clinical decision-making in an emergency setting.

Ethical Considerations

Informed consent was obtained from all participants prior to inclusion. No patient-identifying information is presented in this report.

3. Results

A total of 50 patients presenting with non-traumatic acute abdomen and requiring surgical intervention were enrolled over the study period.

Demographic Profile

The age distribution demonstrated a predominance of middle-aged and older patients. The largest proportion (40%, n=20) belonged to the 51–70 years age group, followed by 31–50 years (32%, n=16), 15–30 years (18%, n=9), and above 70 years (10%, n=5), as shown in Table 1.

Table 1: Age Distribution of Patients (n=50)

Age Group (years)	n	Percentage (%)
15–30	9	18
31–50	16	32
51–70	20	40
>70	5	10
Total	50	100

Clinical Presentation

Abdominal pain was the universal presenting complaint, present in all 50 patients (100%). Vomiting was the next most frequent symptom (64%, n=32), followed by fever (52%, n=26) and abdominal distension (40%, n=20). Abdominal tenderness was present in all patients on examination; peritoneal signs including guarding and rigidity were most

consistently documented in patients with perforation peritonitis, reflecting the degree of peritoneal soiling in this group (Table 2).

Table 2: Clinical Presentation of Patients with Non-Traumatic Acute Abdomen (n=50)

Symptom / Sign	n	Percentage (%)
Abdominal Pain	50	100
Vomiting	32	64
Fever	26	52
Abdominal distension	20	40

Laboratory Findings

Leukocytosis (TLC $>11.0 \times 10^9/L$) was identified in 80% of patients (n=40), indicating an underlying inflammatory or infective process in the majority. Normal leukocyte count was observed in the remaining 20% (n=10), demonstrating that a normal TLC does not exclude significant intra-abdominal pathology and reinforcing the primacy of clinical evaluation (Table 3).

Table 3: Laboratory Findings (n=50)

Finding	n	Percentage (%)
Leukocytosis (TLC $>11.0 \times 10^9/L$)	40	80
Normal leukocyte count	10	20

Radiological Findings

Pneumoperitoneum was detected on erect plain abdominal radiography in 36% of patients (n=18), indicating hollow viscus perforation. All patients in whom pneumoperitoneum was identified were confirmed to have perforation peritonitis at laparotomy, demonstrating strong correlation between radiological and operative findings. Ultrasonography findings correlated well with operative diagnosis in cases of acute appendicitis and acute cholecystitis, identifying appendiceal pathology, pericholecystic fluid, and free intraperitoneal fluid where present.

Operative Diagnosis

Perforation peritonitis was the most common operative diagnosis, identified in 38% of patients (n=19). Acute appendicitis accounted for 30% (n=15) and intestinal obstruction for 18% (n=9). Acute cholecystitis (8%, n=4) and mesenteric ischaemia (4%, n=2) were less frequent. One patient (2%) had an operative diagnosis categorised as other. Operative findings were consistent with preoperative clinical and radiological assessment in the majority of cases, demonstrating strong diagnostic agreement between preoperative assessment and operative findings. (Table 4).

Table 4: Distribution of Operative Diagnoses (n=50)

Operative Diagnosis	n	Percentage (%)
Perforation peritonitis	19	38
Acute appendicitis	15	30
Intestinal obstruction	9	18
Acute cholecystitis	4	8
Mesenteric ischaemia	2	4
Other	1	2
Total	50	100

4. Discussion

This prospective observational study characterises the clinical, laboratory, and radiological profile of patients presenting with non-traumatic acute abdomen at a tertiary care teaching hospital in Navi Mumbai, and evaluates the correlation between preoperative assessment and operative findings.

Three key findings were identified from the data:

1) The Integrated Diagnostic Pathway is Reliable Without Routine CT

The most clinically significant finding of this study is that a structured pathway, clinical examination supported by plain radiography and ultrasonography, provided sufficient diagnostic guidance to inform surgical decision-making in all 50 patients without the routine use of CT. This is particularly relevant to the Indian tertiary care context, where CT availability during out-of-hours emergency presentations remains inconsistent.

Clinical examination, specifically the assessment of peritoneal signs in combination with symptom history, remained the cornerstone of surgical triage. This is consistent with the conclusions of Sartelli et al. and Cartwright et al., who have emphasised that clinical acumen remains indispensable in emergency abdominal assessment regardless of imaging availability [2,9]. The identification of pneumoperitoneum in 36% of patients on plain radiography, with operative confirmation of perforation peritonitis in all such cases, further supports the diagnostic value of plain erect abdominal radiography as a frontline investigation in this setting [5]. Ultrasonography contributed meaningfully in cases of appendicitis and cholecystitis, corroborating established evidence for its utility in soft-tissue abdominal pathology [10].

2) The Perforation Peritonitis Burden Reflects a Regional Epidemiological Pattern

Perforation peritonitis was the operative diagnosis in 38% of patients, the highest single diagnosis in this cohort and substantially higher than reported in Western emergency surgical series, where acute appendicitis typically predominates [11,13]. This is consistent with Indian epidemiological data: Jhobta et al. reported perforation peritonitis as the leading cause of acute abdomen in a multicenter North Indian series, with peptic and typhoid perforation as the principal etiologies [8]. Sharma et al. similarly documented high perforation rates in Indian centers, attributing this to delayed presentation, high prevalence of *Helicobacter pylori*-associated peptic disease, and limited primary care access [7]. The operative profile in our cohort is comparable to findings reported in similar Indian tertiary care series [14].

The predominance of the 51–70 age group (40%) is consistent with the known epidemiology of peptic perforation, which peaks in the fifth and sixth decades in the Indian male population. The concentration of operative morbidity in this age group at this institution warrants prospective documentation and suggests a role for community-level interventions targeting early recognition and referral.

Leukocytosis in 80% of patients supports its value as a screening adjunct, though its absence in 20% of patients with confirmed surgical pathology reinforces the need to interpret TLC alongside clinical and radiological findings rather than in isolation [4,12].

3) Implications for Surgical Practice at Teaching Hospitals

The findings of this study support a structured approach to acute abdominal emergencies at Indian teaching hospitals, incorporating history, clinical examination, TLC, erect plain X-ray, and targeted ultrasonography as the primary diagnostic workup [15]. This structured pathway is sufficient for surgical triage in the majority of non-traumatic acute abdominal presentations and has direct implications for surgical training. Junior surgeons should be equipped to interpret this integrated diagnostic package confidently before defaulting to advanced imaging.

The strong correlation between preoperative clinical and radiological assessments and operative diagnoses across diagnostic categories reflects positively on institutional diagnostic quality and provides a baseline for ongoing audit.

5. Limitations

This study has several limitations. The sample size of 50 patients, while consistent with exploratory descriptive studies in this field, limits the depth of subgroup analysis. The single-centre design limits generalisability to settings with different case-mix profiles or resource configurations. CT of the abdomen was not uniformly available, precluding a direct comparison between conventional and advanced imaging pathways. Detailed sex stratification data and formal inferential statistical analysis were not included in this report; future studies with larger sample sizes and complete demographic documentation are recommended to build on these descriptive findings.

6. Conclusion

Non-traumatic acute abdomen remains a critical surgical emergency. This study demonstrates that structured clinical assessment combined with basic imaging provides reliable diagnostic accuracy with strong agreement to operative findings, even in the absence of routine CT. The high prevalence of perforation peritonitis reflects regional epidemiological patterns and underscores the need for early detection and timely intervention. These findings support the development of optimized, resource-appropriate diagnostic protocols in tertiary care settings.

Additional Information

Ethical Considerations

Informed consent was obtained from all participants prior to inclusion.

Author Contributions

Concept and design: Nishtha J Dhamecha, Ali Reza, Pallavi Kadam

Data acquisition and analysis: Nishtha J Dhamecha, Pelluri LS Susmitha, Samruddhi Chauhan

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Critical revision for intellectual content: Pallavi Kadam, Ali Reza

Supervision: Pallavi Kadam

Conflicts of Interest

All authors declare no financial relationships or other conflicts of interest in relation to this work.

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Figure Legends



Figure 1: Intraoperative photograph showing isolated inflamed appendix consistent with appendicular perforation.

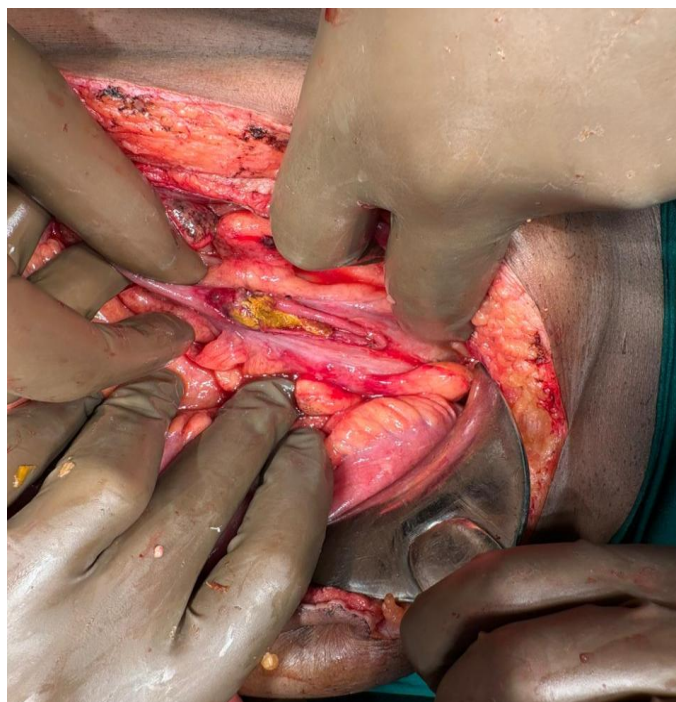


Figure 2: Intraoperative photograph showing sigmoid perforation with surrounding inflammation and peritoneal contamination.



Figure 3:Intraoperative photograph demonstrating dilated large bowels with band/stricture -s/o large bowel obstruction .

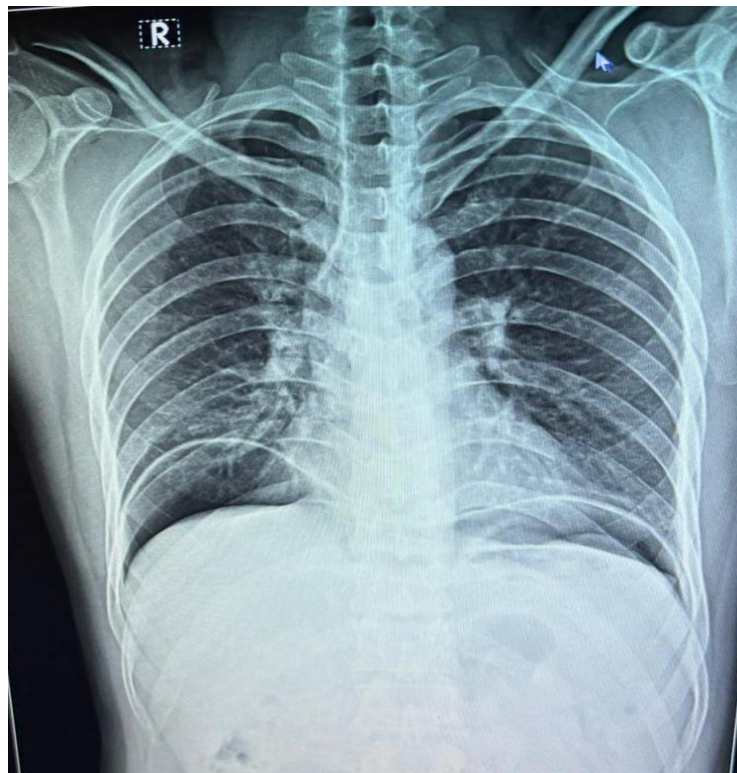


Figure 4: Radiological findings: plain radiograph demonstrating free intraperitoneal gas (pneumoperitoneum) in a patient with perforation peritonitis.



Figure 5: Radiological findings: plain radiograph demonstrating small bowel obstruction