E-ISSN 2250-0944
ISSN 2250-1150
doi: 10.31838/ijprt/16.02.196

Research Article

Clinicodemographic Profile of Patients Admitted With Acute Appendicitis: A Hospital-Based Cross-Sectional Study

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Received: 02.06.26, Revised: 05.07.26, Accepted: 04.08.26

ABSTRACT

Background: Acute appendicitis is one of the most common surgical emergencies worldwide, yet its clinical presentation, diagnostic pathway, and disease severity vary across populations. Locally generated clinicodemographic data can help refine diagnostic pathways and anticipate complicated disease.

Objective: To describe the clinicodemographic profile, diagnostic workup, operative findings, and outcomes of patients admitted with acute appendicitis, and to compare clinical and laboratory parameters between complicated and uncomplicated disease.

Methods: This hospital-based cross-sectional study included 200 consecutive patients admitted with a clinical diagnosis of acute appendicitis over a 12-month period. Demographic details, symptom duration, clinical signs, Alvarado score, laboratory parameters, imaging findings, operative details, and histopathological outcomes were recorded. Diagnostic performance of the Alvarado score, ultrasonography, and computed tomography was assessed against the final histopathological diagnosis. Complicated (gangrenous/perforated) and uncomplicated appendicitis were compared using the chi-square and independent-samples t-test as appropriate.

Results: The mean age was 28.6 ± 11.4 years with a male-to-female ratio of 1.4:1. Migratory right iliac fossa pain was present in 71.0% and fever in 47.0% of patients. Ultrasonography demonstrated a diagnostic accuracy of 81.8%, rising to 96.2% with computed tomography in equivocal cases. Histopathology confirmed acute appendicitis in 92.0% of specimens (negative appendectomy rate 6.0%), with gangrenous or perforated appendicitis in 35.0% of confirmed cases. Symptom duration beyond 48 hours, an Alvarado score ≥7, and elevated C-reactive protein were significantly more frequent among patients with complicated appendicitis (all $p<0.001$).

Conclusion: Acute appendicitis in this cohort predominantly affected young adults with a male preponderance and typical clinical features. Delayed presentation and elevated inflammatory markers were strongly associated with complicated disease, underscoring the value of early clinical recognition and judicious imaging in reducing perforation-related morbidity.

Keywords: Acute Appendicitis, Alvarado Score, Clinicodemographic Profile, Negative Appendectomy, Perforated Appendicitis, Ultrasonography.

INTRODUCTION

Acute appendicitis remains one of the most frequent causes of acute abdomen requiring emergency surgical intervention, with a lifetime risk of approximately 7–8% and peak incidence in the second and third decades of life.[1] Despite being extensively studied, its clinical presentation continues to show considerable variation across populations, and misdiagnosis or delayed diagnosis remains an important contributor to morbidity.[1] Global incidence estimates vary widely by region and healthcare setting, reflecting differences in diagnostic access, dietary patterns, and population age structure.[2]

Diagnosis is traditionally based on a combination of clinical history, examination findings, and supportive investigations, as outlined in contemporary evidence-based management guidelines.[3] The Alvarado score, a widely used clinical scoring system incorporating symptoms, signs, and laboratory parameters, was developed to standardise the early diagnosis of acute appendicitis[4] and has since been validated across multiple populations with variable sensitivity and specificity.[5] Imaging modalities play a complementary role: early studies demonstrated that liberal use of computed tomography (CT) improved diagnostic accuracy and reduced negative appendectomy rates,[6] while comparative meta-analyses of ultrasonography (USG) and CT have clarified their relative strengths, particularly in equivocal or atypical presentations.[7]

Laboratory parameters, including total leucocyte count and C-reactive protein, have also been shown to meaningfully improve diagnostic accuracy when combined with clinical scoring systems.[8] Management itself has evolved, with ongoing debate regarding the role of an initial trial of antibiotics versus early appendectomy for uncomplicated disease.[9] Surgical practice has correspondingly shifted over recent decades, with increasing adoption of minimally invasive approaches and greater emphasis on risk-stratified management pathways.[10]

Large multinational studies have highlighted substantial variability in disease severity at presentation, operative approach, and outcomes across different healthcare systems.[11] Regional data from lower- and middle-income settings have described patterns of delayed presentation and higher rates of complicated disease compared with high-income countries,[12] an observation reinforced by global comparative analyses linking healthcare access to management outcomes.[13] Epidemiological work has further shown that the incidence of perforated appendicitis, unlike uncomplicated disease, is disproportionately influenced by delays in diagnosis and treatment-seeking behaviour,[14] with age- and sex-specific patterns of perforation risk described in several population-based series.[15]

Given this backdrop of evolving diagnostic tools and persistent variability in presentation and severity, there remains a need for locally generated clinicodemographic data to inform diagnostic pathways, anticipate complicated disease, and guide resource allocation in routine surgical practice. This study was undertaken to describe the clinical, demographic, laboratory, imaging, and histopathological profile of patients admitted with acute appendicitis at a tertiary care teaching hospital, and to identify factors associated with complicated appendicitis.

MATERIALS AND METHODS

Study Design and Setting

This was a hospital-based cross-sectional observational study conducted in the Department of General Surgery of a tertiary care teaching hospital over a 12-month period. All patients admitted with a clinical diagnosis of acute appendicitis were screened for eligibility.

Participants

Patients of either sex, aged 12 years and above, admitted with a clinical diagnosis of acute appendicitis and subsequently undergoing appendectomy, were included. Patients with an appendicular lump or mass managed conservatively, those who underwent incidental appendectomy during unrelated surgery, pregnant patients, and those with incomplete medical records were excluded.

Data Collection

A structured proforma was used to record demographic details (age, sex), duration and nature of symptoms, clinical signs, Alvarado score at admission, laboratory parameters (total leucocyte count, C-reactive protein), imaging findings (ultrasonography and, where performed, computed tomography), intraoperative findings (position of appendix, surgical approach, gross appearance), postoperative complications, length of hospital stay, and final histopathological diagnosis.

Outcome Definitions

Complicated appendicitis was defined as gangrenous or perforated appendicitis confirmed on operative and histopathological findings; uncomplicated appendicitis comprised catarrhal and suppurative appendicitis. Negative appendectomy was defined as a histopathologically normal appendix in a patient operated for suspected acute appendicitis. Diagnostic performance of the Alvarado score (cut-off ≥7), ultrasonography, and CT was calculated against the final histopathological diagnosis as the reference standard.

Statistical Analysis

Data were analysed using SPSS v29.0. Continuous variables are presented as mean ± standard deviation and compared using the independent-samples t-test; categorical variables are presented as frequencies and percentages and compared using the chi-square or Fisher's exact test, as appropriate.

Sensitivity, specificity, positive predictive value, and diagnostic accuracy were calculated for each diagnostic modality. A two-sided p-value <0.05 was considered statistically significant.

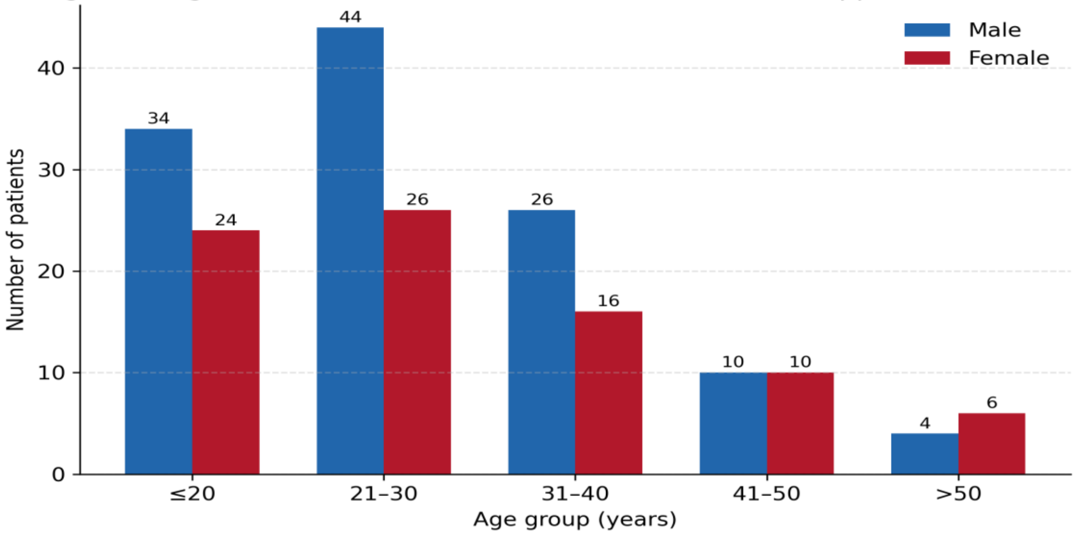
RESULTS

A total of 200 patients admitted with a clinical diagnosis of acute appendicitis were included in the study. The demographic and clinical profile is summarised in Table 1 and Figure 1.

Table 1. Demographic and Clinical Characteristics (N=200)

Characteristic	Value	Percentage / SD
Age, years (mean ± SD)	28.6	± 11.4
Age ≤20 years, n (%)	58	29.0%
Age 21–30 years, n (%)	70	35.0%
Age 31–40 years, n (%)	42	21.0%
Age 41–50 years, n (%)	20	10.0%
Age >50 years, n (%)	10	5.0%
Male sex, n (%)	118	59.0%
Female sex, n (%)	82	41.0%
Duration of symptoms, hours (mean ± SD)	32.6	± 18.4
Symptom duration >48 hours, n (%)	48	24.0%
Migratory periumbilical-to-RIF pain, n (%)	142	71.0%
Nausea/vomiting, n (%)	166	83.0%
Anorexia, n (%)	152	76.0%
Fever (>37.5°C), n (%)	94	47.0%
Guarding/rebound tenderness, n (%)	130	65.0%
Rovsing's sign positive, n (%)	88	44.0%

Figure 1. Age and Sex Distribution of Patients with Acute Appendicitis (n=200



Diagnostic workup and the comparative performance of the Alvarado score, ultrasonography, and CT against the final histopathological diagnosis are shown in Table 2 and Figure 2. Ultrasonography was performed in 176 patients (88.0%) and CT in 26 patients (13.0%) with equivocal findings.

Table 2. Diagnostic Workup and Comparative Diagnostic Performance

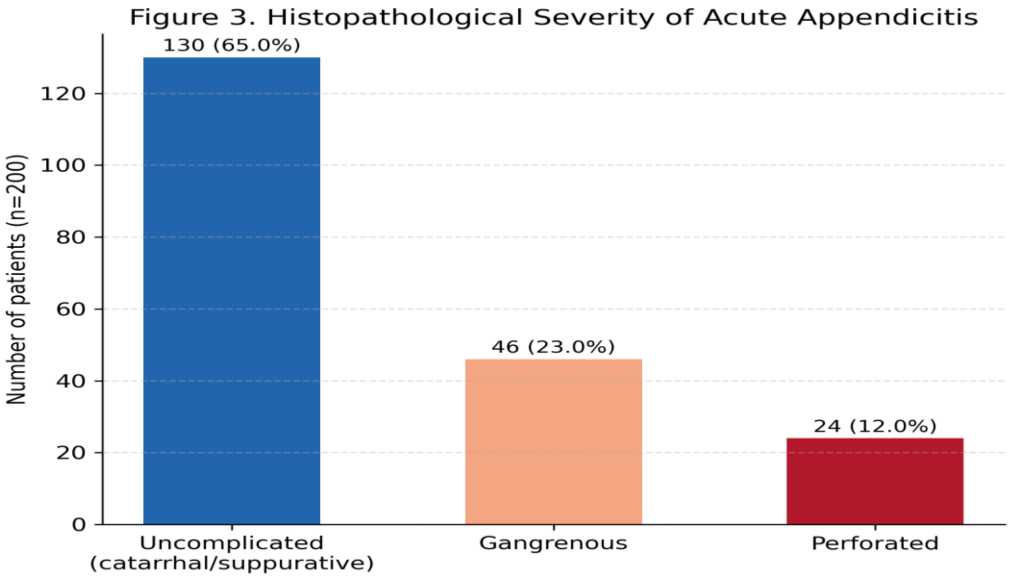
Modality	Sensitivity (%)	Specificity (%)	PPV (%)	Accuracy (%)
Alvarado score ≥7 (n=200)	78.3	62.5	93.5	76.0
Ultrasonography (n=176)	84.1	66.7	95.5	81.8
CT abdomen, equivocal cases (n=26)	95.8	100.0	100.0	96.2

Clinical assessment + USG combined	89.7	70.0	96.4	87.0

Mean total leucocyte count was 13.6 ± 4.1 ×10³/μL and C-reactive protein was elevated (>10 mg/L) in 168 patients (84.0%). Intraoperative and histopathological findings are summarised in Table 3 and Figure 3.

Table 3. Operative and Intraoperative Findings

Parameter	Number (n=200)	Percentage (%)
Open appendectomy	142	71.0
Laparoscopic appendectomy	58	29.0
Retrocecal position	116	58.0
Pelvic position	44	22.0
Subcecal position	18	9.0
Paracecal position	14	7.0
Preileal position	8	4.0
Mean operative duration, open (min, mean ± SD)	52.4 ± 14.2	—
Mean operative duration, laparoscopic (min, mean ± SD)	68.7 ± 16.9	—



Histopathology confirmed acute appendicitis in 184 of 200 specimens (92.0%); 12 specimens (6.0%) showed a histopathologically normal appendix (negative appendectomy), and 4 specimens (2.0%) showed alternative pathology. Of the confirmed cases, uncomplicated (catarrhal/suppurative) appendicitis accounted for 130 patients (65.0%), gangrenous appendicitis for 46 patients (23.0%), and perforated appendicitis for 24 patients (12.0%). Postoperative outcomes, and a comparison of clinical and laboratory parameters between complicated and uncomplicated appendicitis, are presented in Table 4.

Table 4. Comparison of Complicated Versus Uncomplicated Appendicitis and Postoperative Outcomes

Parameter	Complicated (n=70)	Uncomplicated (n=130)	p-value
Symptom duration >48 hours, n (%)	38 (54.3)	24 (18.5)	<0.001
Mean TLC, ×10³/μL (mean ± SD)	16.8 ± 4.6	12.1 ± 3.2	<0.001
CRP elevated, n (%)	68 (97.1)	100 (76.9)	<0.001
Alvarado score ≥7, n (%)	62 (88.6)	74 (56.9)	<0.001
Surgical site infection, n (%)	12 (17.1)	6 (4.6)	0.002

Length of hospital stay, days (mean ± SD)	6.8 ± 2.4	3.6 ± 1.5	<0.001

DISCUSSION

This cross-sectional study of 200 patients admitted with acute appendicitis describes a clinicodemographic pattern broadly consistent with previously reported series, with a predominance of young adults, a male-to-female ratio favouring men, and classical migratory right iliac fossa pain in the majority of patients. These findings mirror large multinational observational data describing acute appendicitis as predominantly a disease of the second and third decades with variable but generally male-predominant sex distribution.[11] Regional variation in age and disease severity has also been described in population-based series from other low- and middle-income settings, reinforcing the value of locally generated data.[12,13]

The diagnostic performance observed in this study — with the Alvarado score showing moderate sensitivity and specificity, and imaging substantially improving diagnostic accuracy — is consistent with prior systematic reviews of the Alvarado score[5] and comparative analyses of ultrasonography and CT.[7] The marked improvement in accuracy achieved with CT in equivocal cases reproduces earlier observations that liberal CT use reduces diagnostic uncertainty and negative appendectomy rates,[6] while the incremental value of combining clinical assessment with ultrasonography supports a stepwise, resource-conscious diagnostic pathway rather than reflexive CT use in all patients, consistent with current management guidelines.[3] The contribution of inflammatory markers such as C-reactive protein to diagnostic accuracy in this cohort is similarly in keeping with meta-analytic evidence supporting their use alongside clinical scoring systems.[8,18]

The negative appendectomy rate of 6.0% in this series compares favourably with historical rates exceeding 15–20% reported before the routine use of imaging, and is consistent with contemporary series reporting low negative appendectomy rates in settings with liberal access to ultrasonography and CT.[19] Nonetheless, a residual rate of negative appendectomy highlights the persistent diagnostic overlap between acute appendicitis and other causes of right iliac fossa pain, and reinforces the role of imaging in equivocal presentations rather than reliance on clinical assessment alone.[7]

The proportion of complicated (gangrenous or perforated) appendicitis in this cohort — just over one-third of confirmed cases — is comparable to figures reported in several hospital-based series and reflects, at least in part, the delay between symptom onset and surgical intervention. The strong association observed between symptom duration beyond 48 hours and complicated disease is consistent with epidemiological data demonstrating that the incidence of perforated appendicitis, unlike uncomplicated disease, is disproportionately driven by delayed presentation rather than intrinsic disease biology.[14] Age- and sex-specific differences in perforation risk described in earlier population-based analyses[15] may further explain some of the variability in complication rates observed across age groups in this cohort. The predominant use of open appendectomy in this cohort reflects local surgical practice and resource availability rather than a clinical contraindication to laparoscopy; comparative series and systematic reviews have consistently shown that laparoscopic appendectomy is associated with shorter hospital stay and fewer wound infections, albeit with longer operative time, without meaningful differences in major complication rates.[16,17] Wider adoption of laparoscopic appendectomy, where feasible, may therefore further reduce the postoperative morbidity observed in this study, particularly among patients with complicated disease. Trends toward earlier diagnosis, more selective imaging, and evolving debate regarding non-operative management of uncomplicated appendicitis[9] are also likely to shape future clinicodemographic profiles of hospitalised appendicitis, an evolution that longitudinal registry-based studies comparing administrative and pathology-confirmed incidence have begun to document.[20]

This study has several limitations. Its single-centre, cross-sectional design limits generalisability and precludes assessment of causal relationships between delay in presentation and disease severity. Diagnostic performance figures for CT are based on a relatively small subgroup of equivocal cases, which may overestimate accuracy. Additionally, symptom duration was based on patient-reported history and may be subject to recall bias. Prospective, multicentre studies incorporating standardised imaging protocols and longer-term follow-up would help validate these findings and further refine risk-stratified diagnostic pathways.

CONCLUSION

Acute appendicitis in this cohort predominantly affected young adults with a male preponderance and classical clinical features, and was associated with a low negative appendectomy rate in the context of liberal imaging use. Delayed presentation, elevated inflammatory markers, and higher Alvarado scores were significantly associated with complicated appendicitis, highlighting the importance of early clinical recognition, judicious use of imaging in equivocal cases, and prompt surgical intervention in reducing perforation-related morbidity.

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