Original Article

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Clinical Spectrum and Surgical Relevance of Abdominal CT Findings in Pediatric Surgery Patients in a Tertiary Center: A Retrospective Observational Study

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Abstract

Aim: Abdominal computed tomography (CT) is widely used in pediatric surgical practice despite concerns regarding radiation exposure and variability in diagnostic performance. This study aimed to characterize abdominal CT findings and their relationships with clinical indications, demographic characteristics, and surgical intervention in a tertiary pediatric surgical center.

Methods: This single-center retrospective observational study included all consecutive pediatric patients who underwent abdominal CT at a tertiary pediatric surgery center between July 1 and November 1, 2025. Demographic characteristics, clinical indications, CT findings, and surgical outcomes were analyzed. CT findings were categorized according to predefined diagnostic groups, and their association with surgical intervention was evaluated using appropriate statistical methods. Diagnostic performance measures, including sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and odds ratios (ORs) with 95% confidence intervals, were calculated where applicable.

Results: Among 401 pediatric patients, 94.0% demonstrated at least one pathological finding, while 6.0% had normal results. The mean age was 11.5±4.5 years, and 54.1% were male. The most common indications were suspected appendicitis, trauma, and pelvic/adnexal pathologies, with CT findings predominantly consisting of non-specific findings and appendiceal, trauma-related, and pelvic/adnexal pathologies. Computed tomography positivity was significantly associated with surgical intervention (30.0% vs. 4.2%, OR=9.84, p=0.007). The PPV and NPV of CT positivity for surgical intervention were 30.0% and 95.8%, respectively. The overall surgical intervention rate was 28.4%. Trauma cases were mostly blunt, with limited need for surgery (5.3%). Incidental findings were observed in 28.9% of patients. Mass lesions were uncommon and were most frequently located in the ovaries and liver.

Conclusion: Abdominal CT is commonly used for suspected appendicitis, trauma, and presentations related to pelvic or adnexal pathology. Despite a high CT positivity rate, the relatively low rate of surgical intervention indicates that CT functions as a complementary rather than a definitive tool in surgical decision-making. The high NPV suggests that negative CT findings were generally associated with non-operative management in clinically equivocal cases.

Keywords: Tomography, X-ray computed, ultrasonography, abdominal pain, child, tertiary care centers

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Introduction

Abdominal complaints in pediatric patients frequently present with diagnostic uncertainty and pose major obstacles to clinical decision-making due to their broad and age-dependent differential diagnosis (1). Delayed diagnosis of acute appendicitis in children is associated with increased morbidity and worse clinical outcomes, including higher rates of perforation and prolonged hospital stay, highlighting the clinical importance of timely and accurate diagnostic evaluation (2). According to current evidence-based guidelines, including the American College of Radiology (ACR) recommendations, ultrasonography (USG) is the first-line imaging modality for evaluating suspected abdominal pathology in pediatric patients (3).

Computed tomography (CT) should be reserved for selected cases in which USG findings are inconclusive, as supported by recent literature on pediatric imaging optimization (4). However, the diagnostic performance of USG may be limited due to operator dependency and interference from intestinal gas (5,6).

In such cases, CT allows rapid, comprehensive assessment of intra-abdominal pathology and aids in the detection of complications, particularly in clinically complex scenarios (7). CT has been shown to be an effective diagnostic modality in the evaluation of acute abdominal pain within structured diagnostic pathways (8). Additionally, CT plays a key role in evaluating and grading intra-abdominal injuries, especially in hemodynamically stable pediatric trauma patients (7). Given the potential risks associated with ionizing radiation in pediatric patients, CT should be used judiciously and performed in accordance with the ALARA principle, as its application has been shown to reduce unnecessary radiation exposure and support the use of alternative imaging modalities when appropriate (9). Furthermore, CT utilization varies significantly across institutions, reflecting differences in patient characteristics, clinical indications, and adherence to imaging guidelines, underscoring the need for center-specific evaluation and optimization of imaging practices (10). However, real-world patterns of CT utilization in tertiary pediatric surgical centers and their relationship with surgical decision-making remain insufficiently characterized.

We hypothesized that CT utilization in a tertiary pediatric surgical center reflects the complexity of referred cases and that CT findings are associated with surgical decision-making processes. Accordingly, the primary objective of this study was to characterize the spectrum of abdominal CT findings in a tertiary pediatric surgery center. The secondary objective was to evaluate the association with surgical intervention and demographic and clinical variables. This approach is expected to contribute to a more rational and evidence-based use of CT in pediatric surgical practice.

Materials and Methods

Compliance with Ethical Standards

This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Ethical approval was obtained from the University of Health Sciences Türkiye, Gaziantep City Hospital Non-Interventional Clinical Research Ethics Committee (approval no: 348/2025, date: 17.12.2025). Given the retrospective design of the study, the requirement for informed consent was waived by the committee. All data were anonymized, and personal identifiers were removed.

Study Design

The study was designed and reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology guidelines for observational studies.

This single-center retrospective observational study was conducted at a tertiary pediatric surgery center (University of Health Sciences Türkiye, Gaziantep City Hospital). All consecutive pediatric patients aged 0-17 years who underwent abdominal CT between July 1 and November 1, 2025, were initially assessed for eligibility. Patients were included regardless of indication, clinical presentation, or CT findings, ensuring consecutive inclusion and reducing sampling bias.

A stepwise imaging approach generally consistent with contemporary pediatric imaging recommendations, including the 2024 AAP guidance, was applied in routine clinical practice. Computed tomography was performed selectively when USG was inconclusive (defined as inadequate visualization of the target organ or discordance between sonographic findings and the clinical presentation), when it was technically limited, or when the examination could not be completed due to body habitus or patient non-cooperation. General CT indications included clinical deterioration or persistent symptoms despite initial evaluation, peritoneal signs (guarding, rebound tenderness), and elevated inflammatory markers (CRP elevation and leukocytosis), all suggesting significant intra-abdominal pathology.

For suspected appendicitis, CT was considered when USG was inconclusive, particularly when clinical findings raised concern for complicated appendicitis or remained discordant with sonographic findings. In trauma patients, CT indications included high-energy mechanism, hemodynamic instability, positive FAST examination, abdominal wall ecchymosis (seat belt sign), elevated liver enzymes (aspartat aminotransferaz >200 IU/L or alanin aminotransferaz >125 IU/L), hematuria (≥50 red blood cell/hpf), hematocrit below 30%, and thoracic wall trauma

with abnormal chest radiography. For a suspected intra-abdominal mass or tumor, CT was indicated when cross-sectional imaging was required for lesion characterization, staging, or surgical planning. In female patients presenting with acute pelvic pain, CT was performed when non-gynecological causes were suspected, in accordance with the recommendations of the European Society of Emergency Radiology.

For the remaining indications, CT was applied as follows: bowel obstruction/ileus, when ischemia, strangulation, or closed-loop obstruction was suspected; mesenteric lymphadenitis, when an alternative diagnosis was suspected or symptoms failed to resolve; gastrointestinal bleeding, when endoscopy was unavailable, contraindicated, or inconclusive; pancreatitis, when clinical severity markers or complications were suspected; urolithiasis, as a second-line modality, when obstruction or infection was suspected; hepatobiliary pathology and acute cholangitis, when ultrasound was equivocal and clinical suspicion persisted; gastrointestinal inflammatory conditions, including enteritis and colitis, when complications such as perforation or abscess were suspected; constipation, when structural or obstructive pathology or complications such as stercoral colitis, ischemia, or perforation were clinically suspected; and non-specific abdominal pain, when ultrasound was inconclusive. For heterogeneous "other" indications, CT was applied selectively when the initial clinical and sonographic evaluations were insufficient to establish a diagnosis or to exclude significant pathology. Incidental findings were documented separately and did not constitute independent CT indications.

Patient Selection

Of the 414 patients initially assessed for eligibility, 13 were excluded: 7 due to missing clinical or radiological data and 6 due to the absence of a documented pediatric surgical consultation. Patients without documented pediatric surgical consultations were excluded because surgical consultation records constituted an essential component of the clinical dataset used for outcome classification and management assessment. The final study cohort consisted of 401 patients (Figure 1).

Classification of Abdominal CT Findings

Abdominal CT findings were classified into two primary categories: normal (CT^-), defined as the complete absence of identifiable pathological findings, and pathological (CT^+), defined as the presence of any abdominal abnormality detectable on CT, including inflammatory, traumatic, obstructive, neoplastic, or urogenital conditions.

Clinical Subgrouping of CT Findings

Computed tomography-positive findings were further stratified into two clinically meaningful subgroups based on their typical management pathway in contemporary pediatric practice. The first subgroup—surgically relevant findings—encompassed conditions associated with a high likelihood of operative intervention, including perforated appendicitis, bowel obstruction (e.g., intussusception, volvulus), ovarian torsion, significant traumatic solid organ injuries [American Association for the Surgery of Trauma (AAST) Grade III or higher, or any grade with hemodynamic instability], and intra-abdominal neoplastic lesions.

The second subgroup—conservatively managed findings—consisted of pathologies typically amenable to nonoperative management according to current pediatric clinical guidelines, including mesenteric lymphadenitis, low-grade solid organ injuries (AAST Grade I-II) without hemodynamic compromise, urinary tract infections without obstructive uropathy, non-specific inflammatory changes, and pelvic inflammatory conditions.

This two-tiered classification was predefined prior to data extraction and was applied using final radiology reports and clinical records.

The classification framework was developed in accordance with contemporary pediatric surgical and emergency medicine management principles and finalized before data extraction.

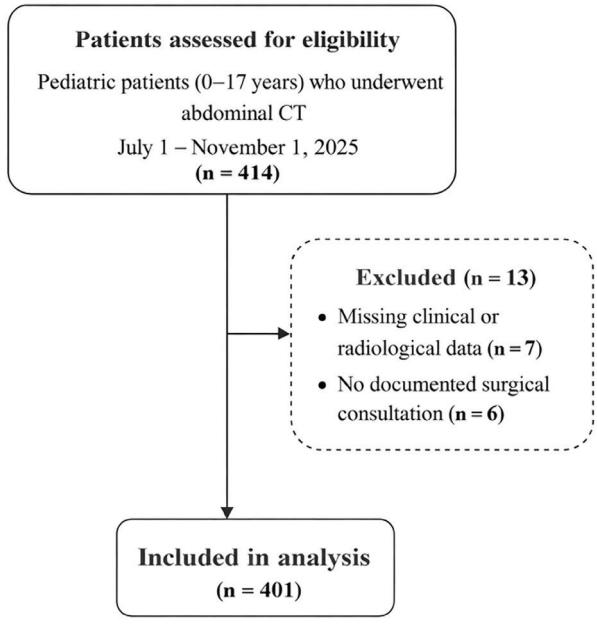

Figure 1. Flow diagram illustrating patient selection and inclusion process. Pediatric patients (0-17 years) undergoing abdominal CT between July 1 and November 1, 2025 were assessed for eligibility (n=414). Thirteen patients were excluded due to missing clinical or radiological data (n=7) or lack of documented surgical consultation (n=6). A total of 401 patients were included in the final analysis

CT: Computed tomography

Surgical intervention was not determined solely by CT findings; operative decisions were based on the integration of clinical presentation, physical examination findings, laboratory parameters, imaging results, and the judgment of the attending pediatric surgeon.

Incidental Findings

Abdominal CT findings that were not directly related to the presenting indication but were considered clinically relevant were recorded separately as incidental findings. These included, but were not limited to: incidental cysts (ovarian, renal, hepatic); congenital anatomical variations (horseshoe kidney, malrotation); incidental solid organ lesions; vascular anomalies; lymphadenopathy unrelated to the primary indication; and urolithiasis detected in patients presenting for non-urological complaints. Incidental findings were documented for subsequent clinical follow-up.

Outcome Definition

The primary outcome was the requirement for surgical intervention (yes/no), defined as operative management for confirmed or strongly suspected intra-abdominal pathology during the index hospitalization. Surgical decisions were made by the attending pediatric surgical team based on clinical, laboratory, and imaging findings, consistent with current evidence-based practice guidelines.

For suspected appendicitis, particular consideration was given to imaging findings, inflammatory markers, physical examination, and, when available, documented clinical scores such as the Alvarado score or the Pediatric Appendicitis Score.

In trauma cases, surgical intervention was indicated for hemodynamically unstable patients who were unresponsive to resuscitation or for those with evidence of hollow viscus injury, ongoing hemorrhage, or peritoneal signs. For adnexal pathology, surgical intervention was performed for suspected or confirmed ovarian torsion, for which timely diagnostic laparoscopy is indicated to preserve ovarian function; ovarian cysts were managed operatively only when associated with torsion, rupture, hemorrhage, or significant mass effect. For mass lesions, surgery was indicated when malignancy could not be excluded or when the lesion caused significant symptoms.

For intussusception, first-line management consisted of enema reduction; surgical intervention was warranted in patients who failed nonoperative management, were hemodynamically unstable despite resuscitation, had evidence of bowel compromise or ischemia, or had suspicion of a pathologic lead point. For gastrointestinal obstructive conditions, including ileus, surgical intervention was indicated in cases refractory to conservative management or with evidence of ischemia or perforation, consistent with the ACR Appropriateness Criteria for bowel obstruction management. For pancreatitis, surgical intervention was reserved for cases with infected necrosis, abdominal compartment syndrome refractory to conservative management, or perforated viscus. For gastrointestinal inflammatory conditions, including enteritis and colitis, surgical intervention was indicated when conservative management failed, peritoneal signs developed, or complications such as perforation or abscess formation were confirmed. For urolithiasis, surgical or endoscopic intervention was considered in cases of obstruction, superimposed urinary tract infection, intractable pain, or failure of spontaneous stone passage. In hepatobiliary pathology, intervention was indicated for biliary obstruction accompanied by clinical deterioration or failure of conservative management. Surgical intervention for gastrointestinal bleeding was indicated in cases of hemodynamic instability or ongoing hemorrhage unresponsive to endoscopic or conservative management. Mesenteric lymphadenitis and constipation were managed conservatively in all cases; surgical intervention was not indicated.

Non-specific CT findings were correlated with the clinical status, and surgical intervention was reserved for patients with progressive clinical deterioration or the development of peritoneal signs. In selected cases, surgical intervention may be considered despite negative imaging findings if progressive clinical deterioration or persistent peritoneal signs raise concern for significant intra-abdominal pathology.

Incidental findings did not independently constitute surgical indications, as detailed in the Incidental Findings section. Procedures included appendectomies, laparotomies, trauma-related interventions, and adnexal- or mass-related surgeries.

Statistical Analysis

All statistical analyses were performed using IBM SPSS Statistics for Windows, version 26.0 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean ± standard deviation or median (interquartile range), depending on data distribution, while categorical variables were presented as frequencies and percentages. Normality was assessed using the Shapiro-Wilk test.

Comparisons between independent groups were performed using the Student's t-test or Mann-Whitney U test, as appropriate. Categorical variables were analyzed using the chi-square test or Fisher's exact test.

Abdominal CT findings (CT^+/CT^-) and surgical intervention (yes/no) were defined as binary variables. The relationship between CT findings and the requirement for surgery was evaluated using 2 × 2 contingency tables.

No multivariable predictive modeling was performed, because the primary objective of this study was to

describe the spectrum of abdominal CT findings and to assess their association with surgical intervention rather than to develop a prediction model. Accordingly, model calibration, discrimination analyses (e.g., receiver operating characteristic curves), and internal validation procedures were not undertaken.

The association between CT findings and surgical intervention was evaluated using odds ratios (ORs) with 95% confidence intervals (CIs). In addition, sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were calculated to describe the relationship between CT findings and surgical intervention. A two-tailed p-value <0.05 was considered statistically significant.

Results

Among the 401 patients who underwent abdominal CT, 377 (94.0%) had at least one pathological finding (CT^+), whereas 24 (6.0%) had no pathological findings (CT^-). Demographic characteristics are summarized in Table 1. The mean age was 11.5±4.5 years, and 54.1% of patients were male.

Using surgical intervention as the reference outcome, the PPV was 30.0% and the NPV was 95.8%. Computed tomography positivity was significantly higher among females with pelvic/ovarian pathology (p<0.001), and these patients were older than those without pelvic pathology (13.27±3.42 vs. 10.64±4.11 years, p=0.002). The distribution of clinical indications is summarized in Table 2.

Suspected appendicitis, trauma, and pelvic/adnexal pathologies were the most common indications, whereas a heterogeneous "other" group accounted for 13.5% of cases. The most frequent CT findings were non-specific abnormalities, appendiceal pathology, trauma-related findings, and ovarian/adnexal pathology (Table 3; Figure 2).

Table 1. Demographic characteristics of the study population

Characteristic	Value
Total patients	401
Age, median (IQR)	12 (8-15)
Age, mean ± SD	11.5±4.5
Sex, n (%)	
Male	217 (54.1%)
Female	184 (45.9%)
Nationality, n (%)	
Turkish	337 (84.0%)
Non-Turkish	64 (16.0%)

Values are presented as mean ± standard deviation, median (interquartile range), or number (%)
SD: Standard deviation, IQR: Interquartile range

The relationship between clinical indications and CT-detected pathologies is illustrated in Figure 3. Acute abdominal pain was mainly associated with appendiceal pathology, trauma with trauma-related findings, and pelvic pain with ovarian/adnexal pathologies. Differences between ICD-10-coded preliminary diagnoses and CT-confirmed findings were observed, particularly for appendicitis, trauma, and ovarian and adnexal pathologies (Supplementary Table S1).

Table 2. Indications for abdominal CT (n=401)

Indication group	n	%
Suspected/confirmed appendicitis	91	22.7
Trauma	72	18.0
Pelvic/adnexal pathology	53	13.2
Gastrointestinal inflammation	31	7.7
Urolithiasis/urinary stone disease	25	6.2
Mesenteric lymphadenitis	21	5.2
Ileus/obstruction	15	3.7
Mass/neoplasm	9	2.2
Constipation	8	2.0
Hepatobiliary pathology	6	1.5
Gastrointestinal bleeding	5	1.2
Pancreatitis	4	1.0
Non-specific abdominal pain	7	1.7
Other	54	13.5
Total	**401**	**100.0**

Values are presented as number (%)
CT: Computed tomography

Table 3. Spectrum of CT findings and associated additional abnormalities

CT finding category	n (patients)	%	Additional findings, n (%)
Appendiceal pathology	87	21.7	18 (4.5)
Ovarian/adnexal pathology	39	9.7	10 (2.5)
Trauma-related findings	75	18.7	27 (6.7)
Gastrointestinal inflammatory/obstructive conditions	14	3.5	12 (3.0)
Urologic pathology	9	2.2	13 (3.2)
Mesenteric lymphadenitis	3	0.7	7 (1.7)
Neoplastic lesions	5	1.2	14 (3.4)
Other non-specific findings	169	42.1	15 (3.7)

Additional findings include incidental or secondary abnormalities detected on CT. Primary CT diagnostic categories are mutually exclusive. Additional findings are not mutually exclusive and were recorded independently of the primary CT diagnostic category; therefore, they could occur in patients from any primary category. Additional findings are presented as the number and percentage of the total study population (n=401)
CT: Computed tomography

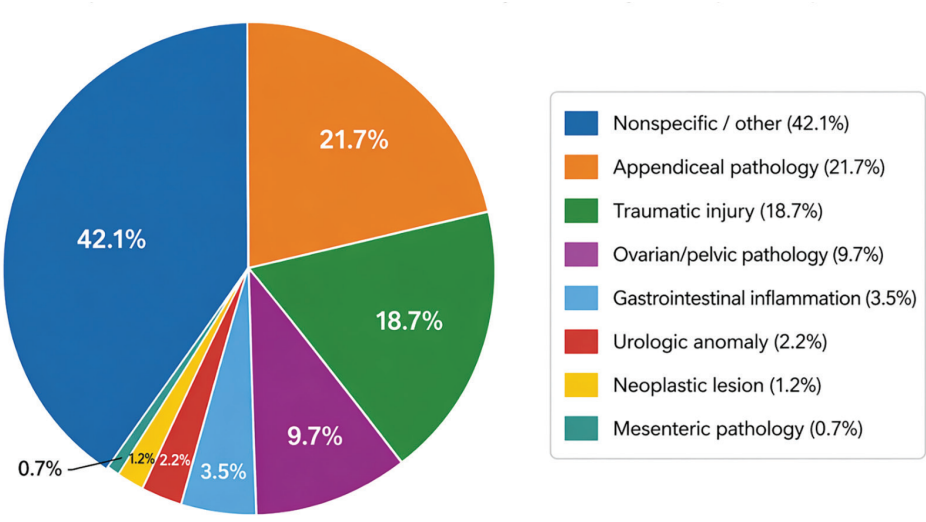

Figure 2. Proportional distribution of CT-detected diagnostic categories in pediatric patients (n=401). Non-specific/other findings (42.1%), appendiceal pathology (21.7%), and traumatic injury (18.7%) were the most frequently observed categories
CT: Computed tomography

Additional findings beyond the primary CT diagnostic categories were identified in 116 patients (28.9%) (Supplementary Table S2). Representative imaging findings are shown in Supplementary Figures S1 and S2. The distribution of indications for surgical consultation is presented in Figure 4. Acute appendicitis and trauma accounted for the majority of consultations.

Table 4 presents the association between CT findings and surgical intervention. Surgical intervention was performed in 113 (30.0%) CT-positive patients and in 1 (4.2%) CT-negative patient. Among the 24 CT-negative patients, one underwent surgical intervention because of progressive clinical deterioration and persistent peritoneal signs despite negative imaging findings. Computed tomography positivity was significantly associated with surgical intervention (p=0.007), with an OR of 9.84 (95% CI: 1.3-72.5), as illustrated in Figure 5.

Among the 75 trauma cases, 90.7% of injuries were blunt, and 5.3% of patients required surgical intervention. Detailed subgroup characteristics are presented in Supplementary Table S3.

A total of 20 mass lesions were identified in 13 patients (lesion-based analysis) (Supplementary Table S4). Nine patients underwent CT for a suspected mass or tumor, while lesions in four patients were detected incidentally.

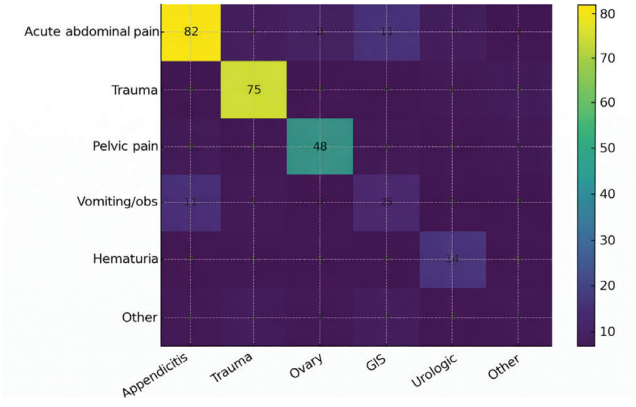

Figure 3. Heatmap illustrating the relationship between clinical indications and CT-detected diagnostic categories. Rows represent clinical indications, and columns represent CT diagnostic categories. Cell values indicate the number of patients
CT: Computed tomography

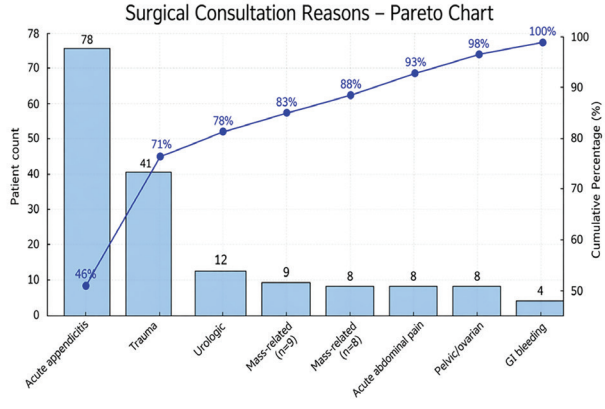

Figure 4. Distribution of indications for surgical consultation and cumulative contribution (Pareto chart). Bars represent the number of patients for each indication category, and the line represents the cumulative percentage
GI: Gastrointestinal

Table 4. Association between CT findings and surgical intervention					
	Surgery (–)	**Surgery (+)**	**Total**	**OR (95% CI)**	**p-value**
CT-negative	23	1	24	Reference	-
CT-positive	264	113	377	9.84 (1.3-72.5)	0.007
Total	287	114	401	-	-

Values are presented as number of patients. The association between CT findings and surgical intervention was evaluated using the chi-square test
OR: Odds ratio, CI: Confidence interval, CT: Computed tomography

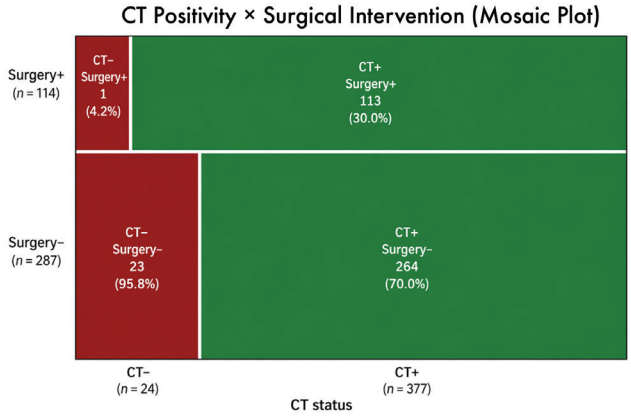

Figure 5. Association between CT positivity and surgical intervention (mosaic plot). The mosaic plot illustrates the relationship between CT findings (CT^+ vs. CT^-) and surgical intervention (yes/no). The size of each rectangle is proportional to the number of patients in each category
CT: Computed tomography

Discussion

In this tertiary pediatric surgical cohort, abdominal CT was most frequently performed for suspected appendicitis, trauma, and pelvic/adnexal pathology. The high CT positivity rate observed in our cohort (94.0%) suggests that abdominal CT was used selectively in patients with a relatively high pretest probability of significant pathology, rather than as a routine first-line imaging modality. This interpretation is supported by the distribution of CT indications observed in the study population. Furthermore, despite a high rate of pathological findings, surgical intervention was performed in only 28.4% of patients, indicating that CT findings frequently contributed to diagnostic clarification and to clinical assessment without necessarily leading to operative management.

The selective imaging pattern observed in our cohort differs from reports from general emergency settings, where CT utilization rates are substantially lower and patient populations are typically less enriched for surgical pathology (11-13). This finding likely reflects both the tertiary referral nature of our institution and the selective use of CT following initial clinical and ultrasonographic evaluation. The high CT positivity rate observed in the present study supports this interpretation and suggests that abdominal CT was primarily reserved for patients with persistent diagnostic uncertainty or concern for significant intra-abdominal pathology.

Our heatmap analysis demonstrated a strong alignment between clinical presentation and CT findings, particularly for acute abdominal pain and appendiceal pathology, trauma and trauma-related findings, and pelvic pain and ovarian/adnexal pathologies.

A substantial proportion of CT examinations were performed for heterogeneous "other" indications, reflecting the broad spectrum of clinical presentations encountered in pediatric emergency settings. This variability underscores the complexity of diagnostic decision-making and highlights the need for flexible, indication-based imaging strategies.

Subgroup analysis demonstrated significantly higher CT positivity among female patients with pelvic or ovarian pathologies ($p<0.001$). Patients with pelvic pathology were significantly older than those without pelvic pathology (13.27±3.42 vs. 10.64±4.11 years; $p=0.002$). These findings highlight the influence of age- and sex-related clinical characteristics on the spectrum of CT-detected pathology in pediatric patients.

These findings suggest the value of an indication-based imaging approach in pediatric emergency practice and should be interpreted within the context of a tertiary referral population.

Ovarian/adnexal pathology was identified in 39 patients (9.7%). These lesions may lead to clinically significant complications, including rupture, hemorrhage, and adnexal torsion (14). Together with the observed age- and sex-related differences, this finding highlights the important contribution of gynecologic causes to the spectrum of CT-detected pathology in adolescent females. This observation emphasizes the need to maintain a broad differential diagnosis when evaluating abdominal pain in older female patients.

Non-specific abdominal findings constituted the largest diagnostic category on abdominopelvic CT (42.1%). When interpreted in conjunction with clinical data, these findings may suggest conditions such as enteritis, colitis, or obstruction. However, this high proportion also reflects the frequency of non-specific CT findings in pediatric patients presenting with abdominal complaints and

underscores the broad differential diagnosis encountered in routine clinical practice. Similar observations have been reported in previous pediatric imaging studies, in which non-specific or clinically indeterminate CT findings were frequently encountered during the evaluation of abdominal symptoms (15).

Although non-specific findings were common, appendicitis remains the most frequent condition requiring emergency abdominal surgery in children (16). In our cohort, CT was frequently used in diagnostically uncertain cases and identified a broad spectrum of abdominal pathologies. Similar observations regarding the diagnostic utility of CT in abdominal pathology have been reported previously (4,17).

Computed tomography demonstrated a high NPV and a relatively low PPV (30.0%), indicating that many CT-positive findings were ultimately managed without surgical intervention. Notably, the vast majority of CT-negative patients did not require surgery (95.8%), suggesting that negative CT findings were generally associated with non-operative management in this cohort. Computed tomography positivity was significantly associated with surgical intervention (OR=9.84). The overall surgical intervention rate was 28.4%. Consistent with these findings, CT imaging has been reported to result in a change in clinical management in approximately one-third (34.8%) of children presenting with abdominal pain who underwent scanning (13). This pattern suggests that the clinical value of CT in a tertiary pediatric surgical setting extends beyond the identification of surgically treatable pathology and may also support confidence in non-operative management when clinically appropriate.

Suspected appendicitis was the most common indication for abdominal CT in the present cohort, and appendiceal pathology was among the most frequently identified CT findings, occurring in 21.7% of patients. In addition to appendiceal pathology, trauma was a major indication for abdominal CT in pediatric patients. Trauma-related findings were identified in 18.7% of all abdominal CT examinations. Previous studies on pediatric blunt abdominal trauma have reported that more than 80% of CT scans are negative, with intra-abdominal injury rates of approximately 17% (18), closely aligning with the distribution observed in the present cohort.

Blunt trauma accounted for the majority of trauma cases in this cohort (90.7%), consistent with the distribution typically observed in pediatric trauma populations. Trauma subgroup analysis demonstrated that the spleen, liver, and kidneys were the most commonly affected organs, reflecting the characteristic pattern of solid-organ injury in pediatric blunt abdominal trauma. Computed tomography enabled characterization of organ-specific injuries and provided additional information for clinical assessment. The low rate of surgical intervention (5.3%) supports the predominance of non-operative management in hemodynamically stable pediatric patients, which is considered the standard of care (19). However, negative FAST findings cannot reliably exclude intra-abdominal injury, and further imaging may be required in clinically suspicious cases.

In contrast to trauma-related findings, urinary system pathologies (2.2%) and tumoral lesions (1.2%) were relatively uncommon. The low frequency of tumoral lesions in our cohort likely reflects the selective use of abdominal CT for acute clinical presentations in a pediatric surgical setting, where inflammatory and traumatic conditions predominate. Among these lesions, the low rate of malignancy is consistent with previous reports indicating that many pediatric abdominal tumors are benign or exhibit low malignant potential (20).

Mass lesions were infrequently identified and, when present, were distributed across multiple anatomical locations, predominantly involving the ovaries, liver, and retroperitoneal regions. While some lesions were evaluated based on clinical suspicion, others were detected incidentally, highlighting the broader diagnostic scope of CT beyond the primary indication for imaging. The variability in lesion characteristics, including size, morphology, and associated features such as necrosis or lymphadenopathy, emphasizes the contribution of CT to lesion characterization and clinical assessment in pediatric patients. Although uncommon, these lesions represented a diagnostically heterogeneous group, highlighting the importance of comprehensive image interpretation in pediatric abdominal CT examinations (21,22).

A substantial proportion of ICD-10 entries were symptom- or mechanism-based codes, which contributed to a marked discordance between preliminary clinical diagnoses and findings detected by CT. Although suspected appendicitis was the most frequently recorded ICD-10 diagnosis (48.8%), appendiceal pathology was identified in only 21.7% of patients. This discrepancy suggests that ICD-10 coding in pediatric emergency settings may favor sensitivity over specificity, potentially leading to overestimation of certain surgical diagnoses.

The marked discrepancy between referral diagnoses and CT findings highlights the challenges of establishing a definitive diagnosis based solely on initial clinical assessment and supports the use of structured imaging pathways in selected patients with equivocal presentations.

In this context, cross-sectional imaging may contribute to refinement of the differential diagnosis when clinical findings are non-specific or overlapping. Similar findings have been reported in pediatric appendicitis, where CT and magnetic resonance imaging demonstrate high diagnostic accuracy in resolving diagnostic uncertainty (23).

Among specific diagnoses, mesenteric lymphadenitis was rare in our series (0.7%) and was generally managed conservatively, consistent with previous reports describing its typically benign clinical course (24).

In our study, incidental or secondary findings were present in 28.9% of patients, highlighting the broader diagnostic scope of CT beyond the primary clinical indication. Although most of these findings were not directly related to the acute presentation, they may still have clinical relevance. Their relatively high frequency underscores the importance of systematic image review and suggests that CT may occasionally detect additional findings that could influence subsequent patient evaluation; however, their impact on clinical management could not be assessed in the present study.

The need for surgical intervention in pediatric consultations was concentrated in a limited number of diagnostic categories, with acute appendicitis and trauma accounting for the majority of cases. This distribution was consistent with the pattern of CT indications observed in our cohort, where suspected appendicitis and trauma were among the most common reasons for abdominal CT examinations. Similar consultation patterns have been reported in pediatric emergency practice (25).

The higher number of urological consultations relative to CT-confirmed cases suggests a cautious clinical approach to suspected conditions and indicates that these pathologies are generally uncommon and often managed conservatively. This discrepancy between consultation patterns and CT-confirmed pathology highlights the complexity of diagnostic decision-making in pediatric abdominal presentations (13).

Overall, our findings demonstrate that abdominal CT was frequently used in cases with diagnostic uncertainty and that it identified a broad spectrum of pathologies in a tertiary pediatric surgical population. The high proportion of pathological findings, together with the relatively low rate of surgical intervention, reflects the selective use of CT and the heterogeneous nature of pediatric abdominal presentations.

Unlike most pediatric CT studies that focus on a single disease entity, this study evaluated abdominal CT utilization across diverse pediatric surgical presentations within a tertiary referral setting. The integration of clinical indications, CT findings, consultation patterns, and surgical outcomes provides a pragmatic overview of how abdominal CT contributes to everyday decision-making in pediatric surgical practice.

These findings are consistent with current recommendations supporting selective CT use following initial ultrasonographic evaluation in pediatric patients (26).

Study Limitations

This study has several limitations. First, variability in clinical decision-making regarding CT indications—particularly for heterogeneous presentations that required individualized clinical judgment—together with incomplete laboratory data and the lack of consistently documented clinical scoring systems for all patients may have introduced residual confounding. Although consecutive inclusion of all eligible CT examinations reduced sampling bias, selection bias related to the decision to perform CT examinations could not be fully eliminated because imaging decisions were made as part of routine clinical care rather than according to a prospectively standardized study protocol. Second, the single-center, retrospective design may limit the generalizability of the findings. Pathologic confirmation was available only in surgically treated cases, representing an inherent limitation of retrospective analyses. Additionally, variability in imaging practices, including externally performed USG and heterogeneity in CT acquisition parameters, may have affected the consistency of imaging interpretation. Limited access to long-term follow-up data further limits the ability to correlate findings with clinical outcomes. Because the primary objective of the study was descriptive rather than predictive, multivariable predictive modeling was not performed. Accordingly, the findings should not be used to derive clinical decision thresholds. Associations between CT findings and surgical intervention were not adjusted for potential confounders such as age, sex, or clinical indication and should therefore be interpreted descriptively rather than as evidence of an independent effect of CT findings on surgical decision-making.

Despite these limitations, this study has several strengths, including a large pediatric cohort from a tertiary surgical center and a comprehensive analysis of the relationship between clinical indications and radiologic findings. The use of heatmaps, proportional distribution analyses, Pareto charts, and mosaic plots enabled a detailed characterization of diagnostic patterns, imaging utilization, and surgically relevant findings across a broad spectrum of clinical presentations. Additionally, the inclusion of patients with diverse clinical indications and the structured imaging approach contributed to the representativeness of the cohort and enhanced the clinical applicability of the findings.

Conclusion

Abdominal CT scans in a tertiary pediatric surgical center were most commonly performed for suspected appendicitis, trauma, and presentations related to pelvic or adnexal pathology. Despite a high CT positivity rate,

the relatively low rate of surgical intervention indicates that CT serves as a complementary, not definitive, tool in surgical management. The high NPV observed in this study suggests that negative CT findings were generally associated with nonoperative management of clinically equivocal cases.

Ethics

Ethics Committee Approval: The study protocol was approved by the University of Health Sciences Türkiye, Gaziantep City Hospital Non-Interventional Clinical Research Ethics Committee (approval no: 348/2025, date: 17.12.2025).

Informed Consent: This study was conducted retrospectively using hospital data. The requirement for informed consent was waived by the ethics committee due to the retrospective nature of the study.

Authorship Contributions

Surgical and Medical Practices: S.B.S., Concept: S.B.S., Design: S.B.S., Data Collection or Processing: S.B.S., R.B.P., M.U., Analysis or Interpretation: S.B.S., R.B.P., M.U., Literature Search: S.B.S., Writing: S.B.S.

Conflict of Interest: No conflicts of interest were declared by the authors.

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References

1. Buel KL, Wilcox J, Mingo PT. Acute abdominal pain in children: evaluation and management. Am Fam Physician. 2024;110:621-31.
2. Michelson KA, Reeves SD, Grubenhoff JA, et al. Clinical features and preventability of delayed diagnosis of pediatric appendicitis. JAMA Netw Open. 2021;4:e2122248.
3. Expert Panel on Pediatric Imaging:; Koberlein GC, Trout AT, Rigsby CK, et al. ACR appropriateness criteria® Suspected Appendicitis-Child. J Am Coll Radiol. 2019;16:S252-63.
4. Baykara AS. Acute appendicitis in children: evaluation of the diagnostic efficacy of ultrasonography and computed tomography. Cureus. 2023;15:e43860.
5. El-Nakeep S, Tafti D, Pozun A. Intestinal ultrasonography: technique, indications, and clinical applications. [Updated 2026 Jun 19]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2026 Jan-.
6. Li RT, Zhao Y, Zou XJ, et al. Overview of point-of-care ultrasound in diagnosing intestinal obstruction. World J Emerg Med. 2022;13:135-40.
7. Mohammad SA, Elsayed RA, Arafa NE, et al. Computed tomography of pediatric abdominal trauma: optimizing utilization and enhancing diagnostic interpretation. Pediatr Radiol. 2025;55:2018-36.
8. Blomerus S, Splinter TL, Gillis A, Buckley O, Turner H, McCabe A. Implementation of an acute abdominal pain diagnostic pathway in the emergency department. BMJ Open Qual. 2025;14:e003505.
9. Solomon DZ, Ayalew B, Dellie ST, Admasie D. Justification and optimization principles of ALARA in pediatric CT at a teaching hospital in Ethiopia. Ethiop J Health Sci. 2020;30:761-6.
10. Singer C, Saban M, Luxenburg O, et al. Computed tomography referral guidelines adherence in Europe: insights from a seven-country audit. Eur Radiol. 2025;35:1166-77.
11. Ahmad T, Khdair Ahmad F, Manson D. Diagnostic performance of a staged pathway for imaging acute appendicitis in children. Pediatr Emerg Care. 2021;37:e1197-201.
12. El-Gohary Y, Molina M, Chang J, et al. The use of computed tomography versus clinical acumen in diagnosing appendicitis in children: a two-institution international study. J Pediatr Surg. 2021;56:1356-61.
13. Khan HH, Subedi S, Kumar S, Lyons H. The pattern of CT scan use in the diagnosis of abdominal pain in children presenting to the emergency department of a tertiary community Hospital. Cureus. 2021;13:e19162.
14. Mobeen S, Apostol R. Ovarian Cyst. 2023 Jun 5. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2026.
15. Ugalde IT, Yen K, Tatro G, et al. Incidental findings on computed tomography in children with blunt abdominal trauma. Ann Emerg Med. 2025;85:405-10.
16. Waseem M, Wang CF. Pediatric Appendicitis. 2025 Jun 17. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2026.
17. Annu A, Garg UC, Sylonia SC. Evaluation of role of computed tomography in acute abdomen: a comprehensive clinical analysis. Int J Med All Body Health Res. 2025;6:128-33.
18. Otaibi BW, Khurshid MH, Hejazi O, et al. The abdomen does not lie, but the labs might: predictors of intra-abdominal injury on computed tomography imaging in pediatric blunt trauma patients. J Trauma Acute Care Surg. 2025;99:181-7.
19. Bašković M, Keretić D, Lacković M, Borić Krakar M, Pogorelić Z. The diagnosis and management of pediatric blunt abdominal trauma-a comprehensive review. Diagnostics (Basel). 2024;14:2257.
20. von Rohr R, Pachl M. Abdominal and pelvic tumours in children: diagnosis, management, and prognosis. Minim Invasive Pediatr Surg. 2025;43:510-9.
21. Jha SK, Brown C, Kang L, et al. Update on the role of imaging in staging of common pediatric abdominal tumors. Curr Probl Cancer. 2023;47:100969.

22. Gbadamosi H, Mensah YB, Appau AA, Renner LA. A spectrum of findings on computed tomography in paediatric abdominal and pelvic tumours in a Ghanaian teaching hospital. Ghana Med J. 2022;56:295-302.

23. Castro-Luna DI, Porras-Hernandez JD, Flores-Garcia JA, Dies-Suarez P, Servin-Martinez MF, Pierdant-Perez M. Contemporary ultrasound, computed tomography, or magnetic resonance imaging for acute appendicitis diagnosis in children and adolescents: systematic review and meta-analysis. Pediatr Radiol. 2025;55:1448-64.

24. Yukcu B, Yildirmak ZY, Ozel A, Genc DB. Clinical evaluation and outcomes of mesenteric lymphadenopathy in children: a cross-sectional analysis. Sisli Etfal Hastan Tip Bul. 2025;59:127-33.

25. Kalyoncu Aycenk A, Salci G. Appropriateness of pediatric surgical consultations from the emergency department: a 2-center study. Med Sci Monit. 2025;31:e951263.

26. American Academy of Pediatrics Committee on Pediatric Emergency Medicine, Section on Radiology; American College of Emergency Physicians Pediatric Emergency Medicine Committee; American College of Radiology; Marin JR, Lyons TW, Claudius I, et al. Optimizing advanced imaging of the pediatric patient in the emergency department: technical report. J Am Coll Radiol. 2024;21:e37-69.