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Original Research Article

THE CROSS-SECTIONAL OBSERVATIONAL STUDY ON EVALUATION OF PATIENTS OF ACUTE ABDOMEN PRESENTING TO THE EMERGENCY DEPARTMENT

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Abstract

Background: Acute abdominal pain (AAP) is one of the most common causes of referral to an emergency department (ED), but information about its impact is limited. The objective is to examine clinical aspects, causes, and management of acute abdominal pain in the Emergency Medicine Department and to assess the role of radiological investigations, and formulate a comprehensive management protocol for these patients. **Materials and Methods:** All patients admitted to the Emergency Department of Jehangir Hospital from December 2017 to April 2019 were included. General data were recorded for each patient. A total of 192 clinical variables were recorded for each patient with abdominal pain and relevant investigation with management was also provided. **Result:** A total of 380 patients were admitted through emergency during the data collection period. 380 (100%) of them were admitted with complaints of pain abdomen. The most common cause of acute abdomen was acute appendicitis. It was present in 14.5% of cases followed by pyloric perforation, cholecystitis, and ileal perforation in 11.6%, 8.2%, and 4.7% of cases respectively. **Conclusion:** AAP is a common cause of referral at EDs. USG is more effective for diagnosing abdominal conditions in Emergency Medicine compared to Plain Radiography (X-Ray) and CT scans.

INTRODUCTION

The term "acute abdominal pain" typically refers to sudden-onset, previously undiagnosed pain lasting for a duration of less than 7 days (usually less than 48 hours).[1] This pain can originate from a diverse array of intraperitoneal disorders, many of which require surgical intervention. Additionally, it can stem from various extra-peritoneal disorders, which typically do not necessitate surgical treatment.[2] Abdominal pain persisting for 6 hours or longer is generally associated with conditions of surgical significance.[3] In the management of patients experiencing acute abdominal pain, the primary objectives include 1) establishing a differential diagnosis and formulating a plan for confirming the diagnosis through appropriate imaging studies, 2) determining the necessity for operative intervention, and 3) preparing the patient for surgery in a manner that minimizes perioperative morbidity and mortality.

In numerous instances, these objectives are readily achieved. Nevertheless, the evaluation of patients presenting with acute abdominal pain can occasionally constitute one of the most formidable challenges in the field of Emergency Medicine. This scenario poses a diagnostic conundrum for emergency physicians due to the multifarious etiologies, encompassing both benign and life-threatening conditions. It is crucial to bear in mind that a substantial majority (at least two-thirds) of individuals presenting with acute abdominal pain exhibit ailments that do not necessitate surgical intervention.[2,4,5] Furthermore, most healthcare practitioners rely on the identification of specific patterns and sequences of symptoms and signs to assess the requirement for further diagnostic testing and to make decisions regarding the optimal timing for surgical intervention. However, it is noteworthy that at least one-third of patients manifest atypical characteristics that undermine the reliability of

pattern recognition.[2,5] Lastly, there exists uncertainty concerning whether individual clinicians consistently or even predominantly concur on the interpretation of presenting symptoms and physical signs.

Abdominal pain represents a prevalent symptom encountered within the Emergency Room (ER) department setting. It is imperative to discriminate between surgical, medical, and gynaecological origins of abdominal pain, as each scenario necessitates distinct management protocols. The presence of atypical clinical presentations can pose significant diagnostic challenges when determining the underlying cause of abdominal pain. In such instances, the utilization of various imaging modalities assumes a pivotal role in elucidating the etiology of abdominal discomfort.

This study aims to examine clinical aspects, causes, and management of acute abdominal pain in the Emergency Medicine Department. It intends to categorize causes into medical, surgical, and gynaecological for efficient triage, assess the role of radiological investigations, and formulate a comprehensive management protocol for these patients.

MATERIALS AND METHODS

A cross-sectional observational study was carried out after obtaining ethical committee approval in the Emergency department of Jehangir Hospital, from December 2017 to April 2019. The sample size was calculated based on the previous study [6]. A total of 68 participants were needed for the study. However, we decided to include more patients in this study duration. The purposive sampling method was used in the present study. Inclusion criteria were Patients with non-traumatic acute abdomen, patients aged 11 years or more, and patients willing to participate in the study. Exclusion criteria were Obstetric causes of penetrating /Blunt abdominal injury, age less than 11 years, and patient refusing to give consent.

The study involved a comprehensive medical evaluation process, starting with a thorough patient history assessment and a comprehensive general physical examination. Each patient underwent a detailed clinical examination, encompassing abdominal, cardiovascular, respiratory, central nervous system, and rectal assessments. Furthermore, standard blood and urine analyses were conducted. In accordance with the clinical necessity, abdominal sonography, and radiological investigations, including X-rays and, when necessary, CT scans deemed, were performed. Subsequently, patients received appropriate treatment, and their progress was meticulously observed. Follow-up appointments were scheduled based on individual response patterns. All evident causes of abdominal pain were meticulously documented, systematically organized and subjected to rigorous statistical analysis, utilizing appropriate statistical methodologies for meaningful interpretation.

Statistical Analysis

Categorical variables will be presented in terms of frequency (n) and percentage (% of cases), while continuous variables will be presented as Mean ± Standard deviation (SD). To assess the differences in the prevalence of various etiological factors among different groups of interest, such as age and sex groups, the Chi-Square test will be employed. The significance of differences in continuous variables among two or more groups will be evaluated using either the independent sample 't-test or analysis of variance (ANOVA). Prior to subjecting the study variables to t-tests or ANOVA, normality assumptions will be verified.

Statistical significance will be considered at p-values less than 05. All hypotheses will be formulated with two-tailed alternatives against each null hypothesis (hypothesis of no difference). The entire dataset will be subjected to statistical analysis using the Statistical Package for Social Sciences (SPSS version 21.0, IBM Corporation; NY, USA) for MS Windows.

RESULTS

In our study, 380 cases were studied as described in figure1. The mean ± SD of age in the group was 37.2 ± 16.7 years and the minimum – maximum age range was 11 – 80 years. Out of 380, 236 (62.1%) were male and 144 (37.9%) were female. The male-to-female sex ratio was 1.64: 1.00. The mean ± SD of time of onset in the group was 3.4 ± 1.9 days and the minimum–maximum range of time of onset was 1 – 10 days. All 380 (100.0%) patients directly approached the hospital after having an acute abdomen. Out of them, 10 (2.6%) had similar complaints, 8 (2.1%) had a history of operation and 362 (95.3%) had no significant past history. Addiction and family histories were described in [Table 1].

All patients presented with abdominal pain (100%) as presenting symptoms followed by vomiting (44.5%). The most frequent location of pain was generalized (49.2%) followed by the Right upper quadrant (14.5%). Other critical clinical parameters were described in [Table 2].

Blood investigations showed varying abnormalities, including raised white blood cell counts (43.9%), raised serum bilirubin (3.9%), raised serum creatinine (4.5%), raised blood urea (2.4%), raised amylase levels (4.2%), raised lipase levels (4.2%), and a lack of significant abnormal blood findings in 50.3% of cases (Table 3). X-ray findings revealed the presence of free gas under the diaphragm in 18.9% of cases, multiple air-fluid levels in 5.8%, and radio-opaque substances (calculi noted) in 2.1%, while 73.2% of cases had no significant X-ray findings (Table 3). Ultrasound (USG) findings displayed a variety of pathologies, with 35.3% of cases showing no significant findings. Notable findings included

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signs of perforation (18.9%), appendicitis (14.5%), cholecystitis (7.9%), obstruction (6.1%), renal calculi (2.6%), ureteric calculi (2.6%), liver abscess (2.1%), pyoperitoneum (1.8%), pancreatitis (1.3%), splenomegaly (0.5%), and other findings (2.6%) on USG. [Table 3]

The final diagnosis of cases was described in Table 4. The most frequent cases were appendicitis (14.5%) followed by pre-pyloric perforation (11.6) and cholecystitis (8.2%) [Table 4].

The distribution of final diagnosis according to various age groups in the group of cases studied is shown in [Table 5]. The distribution of final diagnosis differs significantly across various age groups in the study group (P-value<0.01). The most common diagnosis in the age group below 30 years was Nonspecific Abdominal Pain followed by appendicitis. The most common diagnosis in the age group below 31 - 50 years, 51 – 70 years, and above 70 years was Nonspecific Abdominal Pain followed by Prepyloric perforation.

The distribution of final diagnosis according to sex was shown in Table 6. The distribution of final diagnosis differed significantly across the group of males and the group of females. (P-value<0.001) [Table 6].

In our study, 187 cases with generalized location, the most common diagnosis was nonspecific abdominal pain which was found in 94 (50.3%) cases. Out of 55 cases with RUQ location, the most common diagnosis was cholecystitis which was found in 30 (54.5%) cases. Out of 29 cases with LUQ location, the most common diagnosis was non-specific abdominal pain which was found in 10 (34.5%) cases. Out of 22 cases with RLQ location, the most common diagnosis was appendicitis which was found in 14 (63.6%) cases. Out of 42 cases with RIF location, the most common diagnosis was appendicitis which was found in 40 (95.2%) cases. Out of 8 cases with flank location, the most common diagnosis was renal calculi which was found in 7 (87.5%) cases. Out of 22 cases with periumbilical location, the most common diagnosis was non-specific abdominal pain which was found in 7 (31.8%) cases. Out of 15 cases with epigastric location, the most common diagnosis was prepyloric perforation which was found in 8 (53.3%) cases [Table 7].

In our study, 75 cases with abdominal distension, the most common diagnosis was non-specific abdominal pain which was found in 17 (22.7%) cases. Out of169 cases with vomiting, the most common diagnosis was non-specific abdominal pain which was found in 52 (30.8%) cases. Out of 46 cases with constipation, the most common diagnosis was non-specific abdominal pain which was found in 24 (52.2%) cases. Out of 9 cases with jaundice, the most common diagnosis was non-specific abdominal pain which was found in 4 (44.4%) cases. Out of 146 cases with fever, the most common diagnosis was non-specific abdominal pain which was found in 55 (37.7%) cases. Out of 104 cases with anorexia, the most common diagnosis was non-specific abdominal pain which was found in 60 (57.7%) cases. Out of 92 cases with nausea, the most common diagnosis was appendicitis which was found in 44 (47.8%) cases. Out of 2 cases with burning micturition, the most common diagnosis was non-specific abdominal pain which was found in all i.e. 2 (100.0%) cases [Table 8].

In our study, 191 cases with non-significant blood investigation, the most common diagnosis was nonspecific abdominal pain which was found in 134 (70.2%) of cases, Out of 167 cases with raised white blood cell count, the most common diagnosis was Appendicitis which was found in 53 (31.7%) of cases. Out of 17 cases with raised serum creatinine level, the most common diagnosis was ileal perforation and cecal Perforation which was found in 5 (294%) each presentation. Out of 16 cases with raised amylase level, the most common diagnosis was pseudocyst of pancreas which was found in 10 (62.5%) cases. Out of 16 cases with raised lipase level, the most common diagnosis was pseudocyst of pancreas which was found in 10 (62.5%) cases. Out of 15 cases with raised Serum bilirubin level, the most common diagnosis was liver abscess which was found in 8 (53.3%) cases. Out of 9 cases with raised Blood urea level, the most common diagnosis was ileal perforation which was found in 4 (44.4%) cases [Table 9].

In our study, 236 male case studied, 71 (30.0%) were diagnosed on X-ray, 177 (75.0%) were diagnosed on USG and 24 (10.2%) were diagnosed on CT scan and 144 female case studied, 22 (15.3%) were diagnosed on X-ray, 94 (65.3%) were diagnosed on USG and 6 (4.2%) were diagnosed on CT scan [Table 10].

Table 1: Demographic data of study participants.

Parameters		**N=380**	**%**
Age Group (years)		**No. of cases**	**% of cases**
Age Group (years)	11.0 – 20	76	20
	21.0 – 30	85	22.4
	31.0 – 40	71	18.7
	41.0 – 50	66	17.4
	51.0 – 60	43	11.3
	61.0 – 70	28	7.4
	71.0 – 80	11	2.9
Gender	Male	236	62.1
	Female	144	37.9
Time of onset of acute	1 – 2	133	35.0
	3 – 4	145	38.2
	5 – 6	75	19.7

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abdomen (Days)	7 – 8	17	4.5
	>8	10	2.6
Presented to ED	Direct	380	100
	Referred	0	0
Past History	Similar complaint	10	2.6
	Operation	8	2.1
	Not significant	362	95.3
Family History	Significant	0	0
	Not significant	380	100
Addiction	Tobacco chewer	63	16.6
	Smoker	49	12.9
	Alcoholic	80	21.1
	Tobacco + Smoker + Alcoholic	18	4.7
	Not significant	170	44.7

Table 2: Distribution of characteristics of symptoms

Parameters	Characteristics	N	%
Symptoms	Abdominal Pain	380	100
	Vomiting	169	44.5
	Fever	146	38.4
	Anorexia	104	27.4
	Nausea	92	24.2
	Abdominal distension	75	19.7
	Constipation	46	12.1
	Jaundice	9	2.4
	Burning micturition	3	0.8
Location of Pain	Generalized	187	49.2
	Right Upper Quadrant	55	14.5
	Left Upper Quadrant	29	7.6
	Right Lower Quadrant	22	5.8
	Right Iliac Fossa	42	11.1
	Flanks	8	2.1
	Periumbilical	22	5.8
	Epigastric	15	3.9
Type of pain	Dull aching	233	61.3
	Colicky	116	30.5
	Burning	31	8.2
Progression of pain	Referred	78	20.5
	Shifting	9	2.4
	Not significant	293	77.1
Temperature	Normal	248	65.3
	Increased	132	34.7
	Decreased	0	0
Pulse Rate	Normal	110	28.9
	Increased	270	71.1
	Decreased	0	0
Respiratory Rate	Normal	174	45.5
	Increased	206	54.5
	Decreased	0	0
Clinical Examination	Bowel sound	357	93.9
	Tenderness	88	23.2
	Guarding	76	20
	Rigidity	12	3.2
	Abdominal distension	11	2.9

Table 3. Distribution of cases according to investigations

Parameters	Characteristics	N	%
Abnormal Blood Investigation	Not significant	191	50.3
	White blood cell count raised	167	43.9
	Serum creatinine raised	17	4.5
	Amylase level raised	16	4.2
	Lipase level raised	16	4.2
	Serum Bilirubin level raised	15	3.9
	Blood urea level raised	9	2.4
X-Ray Findings	Free gas under the diaphragm	72	18.9
	Multiple air-fluid levels	22	5.8
	Radio opaque substances (S/O calculi noted)	8	2.1
	Not significant	278	73.2
USG Findings	Not significant	134	35.3
	S/o Perforation	72	18.9
	S/o Appendicitis	55	14.5

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	S/o Cholecystitis	30	7.9
	S/o Obstruction	23	6.1
	S/o Renal Calculi	10	2.6
	Ureteric Calculi	10	2.6
	Pseudocyst of Pancreas	10	2.6
	S/o Liver abscess	8	2.1
	S/o pyoperitoneum	7	1.8
	Pancreatitis	5	1.3
	Ureteric Calculi	4	1.1
	Splenomegaly	2	0.5
	Other	10	2.6
Surgical intervention	Not required	177	46.6
	Cholecystectomy	31	8.2
	Exploratory Laparotomy	118	31.1
	Appendectomy	54	14.2

Table 4: Distribution of final diagnosis among the cases studied with acute abdomen

Diagnosis	No. of cases	% of cases
Nonspecific Abdominal Pain	134	35.3
Appendicitis	55	14.5
Prepyloric perforation	44	11.6
Cholecystitis	31	8.2
Ileal perforation	18	4.7
Small bowel obstruction	14	3.7
Renal calculi	10	2.6
Mesenteric Lymph nodes	10	2.6
Pseudocyst of pancreas	10	2.6
Cecal Perforation	9	2.4
Ectopic pregnancy	8	2.1
Liver Abscess	8	2.1
Duodenal perforation	6	1.6
Pancreatitis	5	1.3
Perforated Appendix	3	0.8
Ureteric Calculi	3	0.8
Splenomegaly	2	0.5
Other	10	2.6
Total	380	100

Table 5. Distribution of final diagnosis according to various age groups in the group of cases studied

Age Group (years)											
	≤30		31 – 50		51 – 70		>70		Total		
Diagnosis	n	%	n	%	n	%	n	%	n	%	P-value
Nonspecific Abdominal Pain	62	38.5	44	32.1	23	32.4	5	45.5	134	35.3	002**
Appendicitis	34	21.1	17	12.4	4	5.6	0	0	55	14.5	
Prepyloric perforation	11	6.8	18	13.1	13	18.3	2	18.2	44	11.6	
Cholecystitis	10	6.2	14	10.2	6	8.5	1	9.1	31	8.2	
Ileal perforation	10	6.2	4	2.9	3	4.2	1	9.1	18	4.7	
Small bowel obstruction	6	3.7	3	2.2	4	5.6	1	9.1	14	3.7	
Renal calculi	3	1.9	3	2.2	4	5.6	0	0	10	2.6	
Mesenteric Lymph nodes	10	6.2	0	0	0	0	0	0	10	2.6	
Pseudocyst of pancreas	4	2.5	6	4.4	0	0	0	0	10	2.6	
Cecal Perforation	1	0.6	5	3.6	3	4.2	0	0	9	2.4	
Ectopic pregnancy	3	1.9	5	3.6	0	0	0	0	8	2.1	
Liver Abscess	1	0.6	3	2.2	4	5.6	0	0	8	2.1	
Duodenal perforation	0	0	5	3.6	1	1.4	0	0	6	1.6	
Pancreatitis	2	1.2	3	2.2	0	0	0	0	5	1.3	
Perforated Appendix	0	0	2	1.5	1	1.4	0	0	3	0.8	
Ureteric Calculi	1	0.6	1	0.7	0	0	1	9.1	3	0.8	
Splenomegaly	0	0	1	0.7	1	1.4	0	0	2	0.5	
Other	3	1.9	3	2.2	4	5.6	0	0	10	2.6	
Total	161	100	137	100	71	100	11	100	380	100	
P-value by Chi-Square test. P-value<05 is statistically significant. **P-value<01.											

Table 6. Distribution of final diagnosis according to Gender in the group of cases studied

	Gender						
	Male		Female		Total		
Diagnosis	n	%	n	%	n	%	P-value

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Nonspecific Abdominal Pain	73	30.9	61	42.4	134	35.3	001***
Appendicitis	28	11.9	27	18.8	55	14.5	
Prepyloric perforation	41	17.4	3	2.1	44	11.6	
Cholecystitis	5	2.1	26	18.1	31	8.2	
Ileal perforation	17	7.2	1	0.7	18	4.7	
Small bowel obstruction	8	3.4	6	4.2	14	3.7	
Renal calculi	4	1.7	6	4.2	10	2.6	
Mesenteric Lymph nodes	9	3.8	1	0.7	10	2.6	
Pseudocyst of pancreas	10	4.2	0	0	10	2.6	
Cecal Perforation	9	3.8	0	0	9	2.4	
Ectopic pregnancy	4	1.7	4	2.8	8	2.1	
Liver Abscess	7	3.0	1	0.7	8	2.1	
Duodenal perforation	6	2.5	0	0	6	1.6	
Pancreatitis	4	1.7	1	0.7	5	1.3	
Perforated Appendix	2	0.8	1	0.7	3	0.8	
Ureteric Calculi	3	1.3	0	0	3	0.8	
Splenomegaly	0	0	2	1.4	2	0.5	
Other	6	2.5	4	2.8	10	2.6	
Total	236	100	144	100	380	100	
P-value by Chi-Square test. P-value<05 is statistically significant. ***P-value<001.							

Table 7: Distribution of final diagnosis according to location in the group of cases studied.

		Generalized	RUQ	LUQ	RLQ	RIF	Flanks	Periumbilical	Epigastric	Total
Non-specific abdominal pain	n	94	11	10	7	2	1	7	2	134
	%	50.3	20	34.5	31.8	4.8	12.5	31.8	13.3	35.3
Appendicitis	n	1	0	0	14	40	0	0	0	55
	%	0.5	0	0	63.6	95.2	0	0	0	14.5
Prepyloric perforation	n	25	2	9	0	0	0	0	8	44
	%	13.4	3.6	31.0	0	0	0	0	53.3	11.6
Cholecystitis	n	1	30	0	0	0	0	0	0	31
	%	.5	54.5	0	0	0	0	0	0	8.2
Ileal perforation	n	16	0	1	0	0	0	1	0	18
	%	8.6	0	3.4	0	0	0	4.5	0	4.7
Small bowel obstruction	n	13	0	0	0	0	0	1	0	14
	%	7.0	0	0	0	0	0	4.5	0	3.7
Renal calculi	n	0	0	3	0	0	7	0	0	10
	%	.0	.0	10.3	0	0	87.5	0	0	2.6
Mesenteric Lymph nodes	n	10	0	0	0	0	0	0	0	10
	%	5.3	0	0	0	0	0	0	0	2.6
Pseudocyst of pancreas	n	0	0	0	0	0	0	6	4	10
	%	0	0	0	0	0	0	27.3	26.7	2.6
Cecal Perforation	n	8	1	0	0	0	0	0	0	9
	%	4.3	1.8	0	0	0	0	0	0	2.4
Ectopic pregnancy	n	8	0	0	0	0	0	0	0	8
	%	4.3	0	0	0	0	0	0	0	2.1
Liver Abscess	n	0	8	0	0	0	0	0	0	8
	%	0	14.5	0	0	0	0	0	0	2.1
Duodenal perforation	n	4	1	0	0	0	0	1	0	6
	%	2.1	1.8	0	0	0	0	4.5	0	1.6
Pancreatitis	n	0	0	0	0	0	0	4	1	5
	%	0	0	0	0	0	0	18.2	6.7	1.3
Perforated Appendix	n	2	0	0	1	0	0	0	0	3
	%	1.1	0	0	4.5	0	0	0	0	.8
Ureteric Calculi	n	0	0	3	0	0	0	0	0	3
	%	0	0	10.3	0	0	0	0	0	.8
Splenomegaly	n	0	0	2	0	0	0	0	0	2
	%	0	0	6.9	0	0	0	0	0	.5
Other	n	5	2	1	0	0	0	2	0	10
	%	2.7	3.6	3.4	0	0	0	9.1	0	2.6
Total	n	187	55	29	22	42	8	22	15	380
	%	100	100	100	100	100	100	100	100	100

Table 8. Distribution of final diagnosis according to symptoms in the group of cases studied.

		Abdominal distension	Vomiting	Constipation	Jaundice	Fever	Anorexia	Nausea	Burning micturition	Total
Nonspecific abdominal pain	n	17	52	24	4	55	60	4	2	134
	%	22.7	30.8	52.2	44.4	37.7	57.7	4.3	100	35.3
Appendicitis	n	0	44	0	0	54	10	44	0	55
	%	0	26.0	0	0	37.0	9.6	47.8	0	14.5

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Prepyloric perforation	n	13	12	0	0	8	10	12	0	44
	%	17.3	7.1	0	0	5.5	9.6	13.0	0	11.6
Cholecystitis	n	0	3	0	0	4	1	4	0	31
	%	0	1.8	0	0	2.7	1.0	4.3	0	8.2
Ileal perforation	n	8	13	0	0	3	3	13	0	18
	%	10.7	7.7	0	0	2.1	2.9	14.1	0	4.7
Small bowel obstruction	n	13	12	14	0	1	6	2	0	14
	%	17.3	7.1	30.4	0	0.7	5.8	2.2	0	3.7
Renal calculi	n	0	9	0	0	0	0	0	0	10
	%	0	5.3	0	0	0	0	0	0	2.6
Mesenteric Lymph nodes	n	1	0	0	1	3	1	0	0	10
	%	1.3	0	0	11.1	2.1	1.0	0	0	2.6
Pseudocyst of pancreas	n	3	2	0	0	3	4	0	0	10
	%	4.0	1.2	0	0	2.1	3.8	0	0	2.6
Cecal Perforation	n	2	8	0	0	3	0	8	0	9
	%	2.7	4.7	0	0	2.1	0	8.7	0	2.4
Ectopic pregnancy	n	6	6	8	0	0	5	0	0	8
	%	8.0	3.6	17.4	0	0	4.8	0	0	2.1
Liver Abscess	n	6	0	0	2	4	0	0	0	8
	%	8.0	0	0	22.2	2.7	0	0	0	2.1
Duodenal perforation	n	1	2	0	0	0	1	2	0	6
	%	1.3	1.2	0	0	0	1.0	2.2	0	1.6
Pancreatitis	n	1	0	0	0	1	1	0	0	5
	%	1.3	0	0	0	0.7	1.0	0	0	1.3
Perforated Appendix	n	0	3	0	0	2	0	3	0	3
	%	0	1.8	0	0	1.4	0	3.3	0	0.8
Ureteric Calculi	n	0	2	0	0	0	0	0	0	3
	%	0	1.2	0	0	0	0	0	0	0.8
Splenomegaly	n	0	0	0	0	1	1	0	0	2
	%	0	0	0	0	7	1.0	0	0	0.5
Other	n	4	1	0	2	4	1	0	0	10
	%	5.3	0.6	0	22.2	2.7	1.0	0	0	2.6
Total	n	75	169	46	9	146	104	92	2	380
	%	100	100	100	100	100	100	100	100	100

Table 9: Distribution of final diagnosis according to abnormal blood investigation in the group of cases studied.

		Not significant	**Total count raised**	**S. creatinine raised**	**Amylase raised**	**Lipase raised**	**S. bilirubin raised**	**Blood urea raised**	**Total**
Nonspecific abdominal pain	n	134	0	0	0	0	0	0	134
	%	70.2	0.0	0.0	0.0	0.0	0.0	0.0	35.3
Appendicitis	n	2	53	0	0	0	0	0	55
	%	1.0	31.7	0.0	0.0	0.0	0.0	0.0	14.5
Prepyloric perforation	n	10	32	4	0	0	1	2	44
	%	5.2	19.2	23.5	0.0	0.0	6.7	22.2	11.6
Cholecystitis	n	3	28	0	1	1	0	0	31
	%	1.6	16.8	0.0	6.3	6.3	0.0	0.0	8.2
Ileal perforation	n	6	7	5	0	0	2	4	18
	%	3.1	4.2	29.4	0.0	0.0	13.3	44.4	4.7
Small bowel obstruction	n	7	7	0	0	0	0	0	14
	%	3.7	4.2	0.0	0.0	0.0	0.0	0.0	3.7
Renal calculi	n	10	0	0	0	0	0	0	10
	%	5.2	0.0	0.0	0.0	0.0	0.0	0.0	2.6
Mesenteric Lymph nodes	n	0	10	0	0	0	0	0	10
	%	0.0	6.0	0.0	0.0	0.0	0.0	0.0	2.6
Pseudocyst of pancreas	n	0	7	0	10	10	0	0	10
	%	0.0	4.2	0.0	62.5	62.5	0.0	0.0	2.6
Cecal Perforation	n	2	5	5	0	0	2	0	9
	%	1.0	3.0	29.4	0.0	0.0	13.3	0.0	2.4
Ectopic pregnancy	n	4	4	0	0	0	0	0	8
	%	2.1	2.4	0.0	0.0	0.0	0.0	0.0	2.1
Liver Abscess	n	0	0	0	0	0	8	0	8
	%	0.0	0.0	0.0	0.0	0.0	53.3	0.0	2.1
Duodenal perforation	n	1	5	2	0	0	1	2	6
	%	0.5	3.0	11.8	0.0	0.0	6.7	22.2	1.6
Pancreatitis	n	0	5	0	5	5	0	0	5
	%	0.0	3.0	0.0	31.3	31.3	0.0	0.0	1.3
Perforated Appendix	n	0	2	0	0	0	1	0	3
	%	0.0	1.2	0.0	0.0	0.0	6.7	0.0	0.8
Ureteric Calculi	n	3	0	0	0	0	0	0	3
	%	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.8
Splenomegaly	n	2	0	0	0	0	0	0	2
	%	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5

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Other	n	7	2	1	0	0	0	1	10
	%	3.7	1.2	5.9	0.0	0.0	0.0	11.1	2.6
Total	n	191	167	17	16	16	15	9	380
	%	100	100	100	100	100	100	100	100

Table 10: Distribution of disease diagnosis based on radiological investigation in the group of cases studied.

Radiological Investigation	Male (n=236)		Female (n=144)		Total (n=380)	
	n	%	n	%	n	%
X-Ray	71	30.0	22	15.3	93	24.5
USG	177	75.0	94	65.3	271	71.3
CT Abdomen	24	10.2	6	4.2	30	7.9

DISCUSSION

In the present study, 380 cases were studied. The largest number of patients include from age between 21.0 – 30.0 years (22.4%), followed by 11.0 – 20.0 years (20.0%). The study performed by Caterino S et al, noticed that the largest number of patients involved were in the age groups 60-70 years (16.6%) and 20-30 years (14.2%) respectively.[6] The study performed by Irvin TT et al,[7] noticed that the largest number of presentations occurred in the age groups 10-29 years (31%) and 60-79 (29%) respectively which is in concordance with our study.

In the present study, 236 (62.1%) were male and 144 (37.9%) were female. The male-to-female sex ratio in the entire study group was 1. 64: 1.00. The study performed by Miettinen P et al, noticed that the male-to-female ratio was 47:53 in the whole study population.[8] The study performed by Navarro Fernandez JA et al, noticed that 56.8% were women.[9]

The most common diagnosis in the present study was Nonspecific Abdominal Pain (35.3%), followed by Appendicitis 14.5%. The study performed by Irvin et al, also noticed that Nonspecific Abdominal Pain (35%) was the commonest diagnosis, followed by Acute Appendicitis (17%), and Intestinal Obstruction (15%).[7] The study performed by Miettinen P et al, noticed that nonspecific abdominal Pain (33%) was the commonest diagnosis, followed by acute appendicitis (23.3%), and acute biliary Disease (8.8%).[8] The study performed by Caterino S et al, noticed that Appendicitis (16.4%) was the most frequent diagnosis, nonspecific Abdominal Pain, was found in 15.5%, Cholelithiasis in 12.5%, Abdominal malignancy in 10.3% was another frequent condition.[6]. The study performed by El Bushra Ahmed Doumi et al, noticed that Acute Appendicitis was the commonest cause accounting for 63% of the patients, followed by acute intestinal obstruction 20.4% and abdominal trauma 11.6%.[10] The study performed by Navarro Fernandez et al, noticed that regarding the frequency of different acute abdomen diagnoses, appendicitis was the main cause (25%), followed by cholecystitis (10%).[9]

Amongst all nonspecific abdominal pain is commonest in both the sex, but more predominant in female (36%) than male (27%); Hollow viscus Perforation (22%), and Acute Pancreatitis were male predominating diagnoses, while Acute Appendicitis (22%), Acute Cholecystitis (18%) and Ureteral Colic (5%) were female predominating. Bowel obstruction (8%) is common in both the genders. The study performed by Raheja SK et al, noticed that Nonspecific Abdominal Pain was the most common in female patients under 30.[11] The study performed by E.H. Rang et al, suggests that unexplained abdominal pain causing admission to hospital showed that in females there was a high incidence in the younger age groups.[12] The study performed by Miettinen P et al, noticed that acute appendicitis, acute pancreatitis, and renal stone were most frequently found in men; while female predominance was noted in cases of nonspecific abdominal pain and biliary diseases.[8]

In this study, various abdominal pain locations were associated with specific diagnoses. Generalized pain was commonly linked to non-specific abdominal pain (50.3%), RUQ pain to cholecystitis (54.5%), LUQ pain to non-specific abdominal pain (34.5%), RLQ pain to appendicitis (63.6%), RIF pain to appendicitis (95.2%), Flanks pain to renal calculi (87.5%), Peri-umbilical pain to non-specific abdominal pain (31.8%), and Epigastric pain to pre-pyloric perforation (53.3%). Another study on right iliac or hypogastric pain found that laparoscopy diagnoses included appendicitis (30%) and Pelvic Inflammatory Disease (13.2%), while observation diagnoses included appendicitis (5.8%) and Pelvic Inflammatory Disease (15.6%).[13] Additionally, another study noted that right hypochondrium pain strongly indicated cholecystitis and was also significant for acute appendicitis (up to 74%).[9,14]

In this study, various symptoms and their associated diagnoses were examined. Abdominal distension (75 cases) most commonly led to a diagnosis of non-specific abdominal pain (22.7%), while vomiting (169 cases) also frequently resulted in a diagnosis of non-specific abdominal pain (30.8%). Constipation (46 cases) was most commonly associated with non-specific abdominal pain (52.2%), and jaundice (9 cases) led to non-specific abdominal pain diagnoses in 44.4% of cases. Among cases of fever (146 cases), non-specific abdominal pain was the most common diagnosis at 37.7%, whereas anorexia (104 cases) most commonly correlated with non-specific abdominal pain (57.7%). Nausea (92 cases) was most frequently linked to appendicitis (47.8%). In cases of burning micturition (2 cases), all were diagnosed with non-specific abdominal pain (100%). Additionally, the study conducted by Sarah L. Cartwright observed that certain symptoms like

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constipation and abdominal distension suggest bowel obstruction, while anorexia is of limited predictive value for appendicitis.[14] Navarro Fernandez JA's study identified a significant correlation between fever and visceral perforation,[9] whereas Cardall T's study found only minimal statistical association between a temperature exceeding 99 degrees Fahrenheit and the presence of appendicitis.[15]

In this study, different symptom progression patterns and their associated diagnoses were examined. Referred progression (78 cases) was most commonly linked to appendicitis (44.9%), shifting progression (9 cases) often indicated renal calculi (33.3%), and non-significant progression (293 cases) frequently resulted in nonspecific abdominal pain (45.1%). Tenderness (88 cases) was strongly associated with appendicitis (52.3%), while guarding (76 cases) predominantly indicated appendicitis (60.5%), and rigidity (12 cases) was often related to pancreatitis (25.0%). Additionally, Eskelinen M and colleagues' studies identified predictive factors for specific conditions. For males, these included tenderness, previous abdominal surgery, rebound, rigidity, pain location at diagnosis, guarding, and body temperature as independent predictors of acute appendicitis.[16] In patients over 50 years old, acute abdominal pain in the right lower quadrant with tenderness, rigidity, and increased body temperature was indicative of acute appendicitis.[17] Furthermore, significant predictors of acute renal colic included urine characteristics, tenderness, renal tenderness, duration of pain, and appetite.[18]

In this study, non-significant blood investigations (191 cases) were most commonly associated with a diagnosis of non-specific abdominal pain (70.2%). Raised white blood cell count (167 cases) often indicated appendicitis (31.7%). Raised serum creatinine (17 cases) was most commonly associated with Ileal perforation and Cecal Perforation (29.4% each). Elevated amylase levels (16 cases) predominantly suggested Psuedocyst of pancreas (62.5%), while elevated lipase levels (16 cases) were often linked to Psuedocyst of pancreas (62.5%). Elevated serum bilirubin levels (15 cases) frequently correlated with Liver Abscess (53.3%). Lastly, elevated blood urea levels (9 cases) were most commonly associated with Ileal perforation (44.4%). Furthermore, research by Dueholm S found that white blood cell count had the best sensitivity (83%) and negative predictive value for appendicitis.[19] Eskelinen M's study in males identified several predictive factors for acute appendicitis, including leukocytosis, previous abdominal surgery, location of pain, tenderness, rigidity, rebound, guarding, rectal digital tenderness, and body temperature.[18] Cardall T's study noted that an elevated total white blood cell count >10,000 cells/mm³, while associated with appendicitis, had limited clinical utility.[15] Additionally, Colombo GM observed that serum amylase levels were not always reliable for Acute Pancreatitis, and Hong YR's study highlighted hyperbilirubinemia as a significant diagnostic marker for acute appendicitis and the likelihood of perforation.[20]

The majority of patients (75%) received their diagnoses through ultrasound examinations of the abdomen, while X-ray abdomen proved useful in 30% of cases, and Computed Tomography (CT) Abdomen was used in 10.2% of cases. A study by Powers RD et al. revealed a marked increase in diagnosis specificity, with only 24.9% of cases diagnosed as undifferentiated abdominal pain (UDAP) or nonspecific abdominal pain in 1993.[21] Wade DS et al. observed that ultrasound-derived diagnoses of appendicitis had a sensitivity of 85.5%, specificity of 84.4%, positive predictive value of 88.3%, negative predictive value of 80.1%, and an overall accuracy of 85.0%, surpassing the accuracy of clinical impressions by surgeons.[22] Lee SL et al. found that migratory pain, physical examination, and initial leukocytosis remained reliable and accurate in diagnosing acute appendicitis, with neither CT nor ultrasound improving diagnostic accuracy or reducing negative appendectomy rates.[23] Tsushima Y et al. noted that contrast-enhanced CT frequently enhanced clinical diagnoses and initial treatment plans in patients with abdominal pain.[24] Rosen MP et al. reported that CT reduced hospital admission rates in 28% of patients with suspected appendicitis and changed surgical management in 40% of patients.[25] Hustey FM et al. found that CT results were diagnostic in 57% of cases, with higher percentages for patients requiring medical or surgical intervention.[26] Stromberg C et al. emphasized the superior diagnostic precision of contrast-enhanced CT scanning in patients with acute abdominal pain, supporting its early inclusion in the diagnostic process.[14] Sarah L. Cartwright et al. recommended ultrasonography for assessing right upper quadrant pain and CT for evaluating right and left lower quadrant pain, considering special populations and atypical symptoms.[27] Testa A et al. highlighted the role of clinical bedside ultrasonography as a first-line imaging method in patients with acute epigastric pain, reducing wait times for diagnosis and decreasing the overuse of more invasive radiological techniques.[28] Adrienne Van Randen et al. noted that plain radiographs led to correct diagnoses in 50% of patients,[29] and Gans SL et al. concluded that plain abdominal radiography has no place in the workup of adult patients with acute abdominal pain in the current emergency department practice.[30]

This study indicates that Ultrasonography (USG) is more effective for diagnosing abdominal conditions in Emergency Medicine compared to Plain Radiography (X-Ray) and CT scans. While not all patients underwent CT scans, both USG and X-ray were performed for all patients. In cases where all three radiological studies were conducted, USG results aligned closely with CT findings. Consequently, USG is considered a valuable, non-invasive, readily available, and cost-effective tool for diagnosing abdominal pain-related conditions in the Emergency Room.

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CONCLUSION

The management of acute abdominal pain poses a formidable diagnostic challenge for emergency department (ED) physicians. Beyond considering intra-abdominal pathologies, it is imperative to also contemplate extra-abdominal and metabolic factors. Consequently, a multidisciplinary approach assumes paramount significance. To enhance patient care and pre-empt diagnostic inaccuracies, the utilization of diagnostic algorithms and structured patient evaluation forms is advocated. These tools function as a mechanism for comprehending intricate clinical scenarios, such as the acute abdomen, through a clear, logically organized, and systematic perspective. This approach facilitates the maintenance of a problem-oriented and priority-based strategy. While diagnostic algorithms are formulated to deliver optimal care for the majority of cases, they are not intended to supplant the clinical expertise and judgment of the physician. In the evaluation of acute abdominal pain, numerous potential pitfalls must be circumvented with care and vigilance. It is essential to recognize that these diagnostic algorithms serve as valuable guides but do not replace the crucial role of a physician's experience and discernment in patient assessment and management.

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