

## Original paper

# Diagnostic Errors of Non-Traumatic Acute Abdomen

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## Abstract

**B**ackground: Acute abdomen is a relatively common issue that facing hospital casualties, which make it crucial for physicians to diagnose acute abdomen, as early as possible depending mainly on their clinical skills to avoid unnecessary delay or negative laparotomies. Every physician must be familiar with diagnosis of acute abdomen especially in situations where there is limited diagnostic facilities.

**Aim:** This study was conducted as a comparison between preliminary and final diagnosis for 500 cases of acute abdomen, and to find out the role of clinical skill and diagnostic tools in avoiding diagnostic errors.

**Method:** This study was performed from 1996-1998, and included 500 patients presented to casualty department with signs and symptoms of acute abdomen. Clinical skills were the major tools used for settling the diagnosis, due to shortage of the other diagnostic tools.

**Results:** Acute abdomen was common in the age group of 21-30 years, with male gender predominance (60.80%). Laparotomy was done for 462 out of 500 patients with acute abdomen, and it was similar to the pre-operative diagnosis in 421 patients, so the incorrect post-operative diagnosis rate was 41 patients (8.88%).

Also correct preliminary diagnosis was 454 out of 500 patient including the patients who underwent laparotomy, with false preliminary diagnosis rate (9.20%). Appendicitis was the major cause for acute abdomen (70.60%).

Limited laboratory and imaging studies were done for some patients, GUE showed the highest negative predicted value (99.42%) and the x-ray showed the highest sensitivity (95.24%). Most of incorrect post-operative diagnosis was related to physiological and pathological gynecological issues.

**Conclusion:** The diagnosis of acute abdomen should be based on the results of a good history and thorough physical examination aided by the secondary role of investigative tools. Diagnostic modalities could guide the physician in confirming the diagnosis. An accurate diagnosis of acute abdomen can minimize unnecessary operations and reduces the rate of negative laparotomies.

**Keywords:** Acute abdomen, Laparotomy, Diagnosis

## Introduction

The acute abdomen may be defined generally as an intra -abdominal process causing severe pain and often requiring surgical intervention, and it requires a fairly immediate judgment or decision about the management<sup>1</sup>

The term acute abdomen should not be equated with the invariable need for operation<sup>(2)</sup>

Abdominal pain is a common presentation to emergency department. It is vital that the physician has an understanding and be familiar with the presentations of common diseases that cause abdominal pain<sup>(3)</sup>.

While most of the etiologies of acute abdomen are not life threatening, rapid diagnosis and therapy may be life- saving in some cases. Preoperative accurate diagnosis prevents unnecessary

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laparotomies and results in reducing negative operations.

The presentation of an older patient with abdominal pain may be very different from that seen in a younger patient.<sup>(4)</sup>

Older patients tend to present later in the course of their illness and have more Pre-operative diagnosis of acute abdomen is crucial to minimize the morbidity and mortality especially where the diagnostic facilities are limited<sup>5</sup>

Improvement in the surgeons' power of decision making in confrontation with such patients is the basic pivot of disease diagnosis and therapy, particularly in developing countries with limited diagnostic facilities<sup>(5)</sup>.

## Materials and Method

This was an ante grade study for 500 cases of Non-Traumatic Acute Abdomen. With chief complaint of abdominal pain for 1-3 days. It was performed in the surgical emergency unit in Baghdad Teaching Hospital for a period of about 3 years from 1996-1998.

Both genders and almost all adult age groups were included in relation to their signs and symptoms as it is shown in table 1. Relevant points in the history including the patient's gender, site of pain, character of pain, fever, loss of appetite, change in bowel habit, vomiting, abdominal distension and urinary or genital symptoms. Factors in the clinical examination that were considered of significant contribution to the final diagnosis included temperature, tachycardia, abdominal tenderness and localized or generalized guarding. Few general urine examination (GUE), abdomen X-ray,

US and CBC tests were performed in some cases considering the clinical suspicion. Preliminary diagnosis was made by surgical residents based on clinical examination and investigations compared to the final diagnosis as it is shown in table 2.

Rate of incorrect final diagnosis and negative laparotomy, sensitivity, specificity, positive and negative predictive values considering leukocytosis (WBC count  $\geq 11,000/\text{ml}$  in peripheral blood s smear), GUE (considered positive if contained  $\geq 5$  WBC or  $\geq$  RBC), US and X-ray were all calculated

Aim: This study represents a comparison between preliminary and final diagnosis for 500 cases of acute abdomen, also it is an assessment for the sensitivity of clinical findings and other diagnostic tools with their direct effect on the final diagnostic and laparotomy outcome.

## Result

After careful and thorough analysis of all records, we have got these results

Our use for laboratory and imaging studies was limited, because of their shortage. Leukocyte count was done for 239 patients (47.80%) having peritonitis, 182 patients (79.6%), of them proved to be elevated.

GUE was done for 229 patients (45.80%) and its accuracy was 75.98%, 2 of them had appendicitis, so GUE had the highest NPV (negative predictive value).

Abdominal X-ray (erect position) was requested for only suspected bowel obstruction cases, only 50 patients(10%) and its accuracy was 90%, it had the highest sensitivity .

Ultrasound was done for 100 patients (20%) and its accuracy was 80%, and 93% of them had acute cholecystitis. As it is shown in table 3.

Laparotomy was done for 462 patients(92.4%) and it was positive in 421 patients(91.12%) , so incorrect post-operative diagnosis rate was 8.88%, While correct final diagnosis including the patients treated conservatively and those had undergone laparotomy was 454 out of 500, with incorrect diagnosis including the incorrect post-operative diagnosis rate(9.20%).as it is details are shown in table 4

**Table 1.** shows the preliminary diagnosis in relation to their ages and gender

Disease	Total NO	%	Age Peak	Male	Female
1-Acute Appendicitis	380	76%	21-30 years	212 (55.7%)	168 (44.2%)
2-Intest.Obstruction	41	8.2%	41-50 years	29 (70.7%)	12 (28.3%)
3-Biliary Disorders	36	7.2%	41-50 years	27 (75.0%)	9 (24.4%)
4-Perforated DU	21	4.2%	31-40 years	19 (90.4%)	2 (9.6%)
5-External Hernias	16	3.2%	41-50 years	12 (75.0%)	4 (25%)
6-GIt Bleeding	6	1.2%	31-40 years	5 (83.3%)	1 (16.6%)
<b>TOTAL</b>	<b>500</b>	<b>100%</b>			

**Table 2.** shows Symptoms and Signs of patients attended to the casualty with acute abdomen

<i>Symptoms</i>	<i>No. (%)</i>	<i>Signs</i>	<i>No. (%)</i>
Abdominal pain	500 (100%)	Abdominal tenderness	455 (91%)
Nature of pain		Rebound tenderness	415 (83%)
<i>a</i> -Continuous pain	436 (87.2%)	Localized guarding	426 (85.2%)
<i>b</i> -Colicky pain	64 (12.8%)	Generalized guarding	27 (5.4%)
Nausea	478 (95.6%)	Tachycardia(more than 100/min	388 (77.6%)
Vomiting	425 (85%)	Fever (more than 38.5 C <sup>0</sup> )	394 (78.8%)
Upper GI bleeding	4 (0.8%)	DER was not done	
Anorexia	466 (93.2%)		
Change bowel habit	133 (26.6%)		
Lower GI bleeding	2 (0.4%)		
Abdominal distention	59 (11.8)		

**Table 3.** shows the sensitivity and specificity of Laboratory and Imaging studies

	<b>Leukocytosis</b>	<b>GUE</b>	<b>X-ray</b>	<b>Ultrasound</b>
<b>Sensitivity(%)</b>	239 pt.(47.80%)	229 pt.(45.80%)	50 pt.(10%)	100 pt.(90%)
<b>Specificity(%)</b>	80.00	75.00	95.24	80.60
<b>PPV(%)</b>	46.67	76.00	62.50	78.79
<b>NPV(%)</b>	80.00	5.26	93.02	88.52
	46.67	99.42	71.43	66.67

### Discussion

Clinical evaluation of acute abdomen remains the gold standard for obtaining a correct diagnosis, while other diagnostic tools in term of Laboratory and imaging studies play secondary roles in minimizing the diagnostic errors.

Because that acute abdomen has a wide spectrum of diversity, so meticulous clinical evaluation is mandatory to reduce the negative laparotomy rate and to reduce missed catastrophic conditions which could be corrected by laparotomy.

This study had shown that peak age for acute abdomen was 21-30 years (76.00%) which was similar to many international studies as in this study which reported the prevalence of acute abdomen mostly in 20-29 years old patients<sup>5</sup>. In our study the male gender had dominated the cases

(60.80%). During the period under review, a total of 586 patients presented with non-traumatic acute abdomen; of which there were 412 (70.30%) males and 174 (29.69%) females, with a male to female ratio of 2.3:1.<sup>(6)</sup>

Socioeconomic factors and diet have mostly been incriminated to be responsible for the observed differences<sup>(7)</sup>.

Acute appendicitis was the greatest culprit in causing acute abdomen in our study 353 patients (70.60%), other studies, reported acute appendicitis to be the leading cause of acute abdomen in (55%) cases<sup>(5)</sup>. In our study CBC was the major laboratory test done for acute abdomen 239 patients (47.80%) Its sensitivity and specificity were (80.00%) and (46.67%) respectivel. Other studies reported the sensitivity of leukocytosis equal to (77-87%) and the specificity equal to (63-67%)<sup>(5)</sup>. The CBC

should never be used to make the sole diagnosis, because nearly 11% of normal

adults have an elevated WBC count and 13% have left shifts <sup>(8)</sup>.

**Table 4.** shows Preliminary,

Final diagnosis and accuracy rate.

Preliminary Dx	No. (%)	Final Dx	No. (%)	Accuracy %
Acute Appendicitis	380(76.%)	Acute Appendicitis	353(70.6%)	92.8%
Rupture follicle	Nil	Ruptured follicle	5 (1.0%)	0.0%
Twisted Ovarian Cyst	Nil	Twisted Ovarian Cyst	4 (0.8%)	0.0%
Salpingitis	Nil	Salpingitis	7 (1.4%)	0.0%
Ectopic Pregnancy	Nil	Ectopic Pregnancy	3 (0.6%)	0.0%
Acute Pancreatitis	Nil	Acute Pancreatitis	3 (0.6%)	0.0%
Intestinal Obstruction	41(8.2%)	Intestinal Obstruction	36 (7.2%)	87.8%
Paralytic Ileus	Nil	Paralytic Ileus	2 (0.4%)	0.0%
Ischemic Bowels	Nil	Ischemic Bowels	6 (1.2%)	0.0%
Perforated DU	21 (4.2%)	Perforated DU	15 (3.0%)	76.1%
Obst/Strang Ext Hernia	16 (3.2%)	Obst/Strang Ext Hernia	15 (3.0%)	93.7%
Bleeding Peptic Ulcer	4 (0.8%)	Bleeding Peptic Ulcer	2 (0.4%)	50%
Diverticulitis	2 (0.4%)	Diverticulitis	2 (0.4%)	100%
Acute Cholecystitis	35 (7.0%)	Acute Cholecystitis	30 (6.0%)	85.7%
Liver Abscess	Nil	Liver Abscess	2 (0.4%)	0.0%
CBD stone	1 (0.2%)	CBD stone	1 (0.2%)	100%
UTI	Nil	UTI	3 (0.6%)	0.0%
NSAP	NIL	NSAP	11 (2.2%)	0.0%
<b>Total</b>	<b>500</b>		<b>500</b>	

*NSAP:nonspecific abdominal pain*

GUE was performed for 229 patients (45.80%) of the total and its accuracy was (75.98%) with (75.00%) sensitivity and (76.00%) specificity and showed the highest Negative predicted value. In other study GUE test showed sensitivity and specificity (75%) and (84%) respectively<sup>5</sup> GUE is advised to be performed for all acute abdomen patients to exclude (UTI), diabetes, renal stones, ectopic pregnancy and normal pregnancy <sup>(9)</sup>.

Plain abdomen X-ray was done for 50 patients (10%) who presented with signs and symptoms of bowel obstruction, it had the highest sensitivity (95.24%) and specificity (62.5%). Other study reported sensitivity of 64.8% and specificity 88.8% for plain abdominal X-ray <sup>(5)</sup>.

Ultrasound imaging was done for 100 patients (20%) and it showed sensitivity and specificity of 80.60% and 78.79% respectively. And accuracy rate of 80.00%. Digital examination of rectum (DER) is useful to assess the rectum and pelvic organs. Pelvic tenderness and palpable deposits in the rectal pouch if present are

important clues to the clinical diagnosis. Statements such as ‘abdominal examination is not complete without performance of a rectal examination,<sup>(10)</sup> and ‘if you don’t put your finger in it you risk putting your foot in it’,<sup>(11)</sup> means it is essential part of clinical examination, especially abdominal examination and acute abdomen, but Although curtains are drawn if it is available, the examination usually takes place in the general ward and sometimes in a mixed emergency ward in the accident and emergency department. Patients have been noted to become quiet and avoid eye contact after such intimate examination.<sup>(1)</sup>

That is why we avoid it as it was strictly rejected especially by female gender.

## Conclusion

-Acute abdomen should be diagnosed primarily by meticulous and thorough history taking and by precise physical examination, aided by doing relevant

investigations, including laboratory tests and imaging studies.

-The investigative modalities are good guidance and helpful to confirm or to rule out the diagnosis. For example, when intestinal obstruction is a suspicion, one can perform abdominal X-ray which would be of a great help in the settlement of the diagnosis. Also using ultrasonic guidance for the diagnosis of cholecystitis, and to rule out any physiological or pathological gynecological issues.

-Pregnancy test is essential in confirming or excluding some issues, like ectopic pregnancy, at least from medico-legal point of view.

High levels of serum amylase may guide our suspicion toward pancreatitis. -

-Real attention must be paid for Non-specific abdominal pain, which could result in unnecessary or negative laparotomies.

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