ACUTE ABDOMEN – STATUS OF DIAGNOSIS IN A RURAL BASED TEACHING HOSPITAL

Saurav Karmakar¹, Sandip Kumar Ghosh², Mrinalkanti Ghosh³

HOW TO CITE THIS ARTICLE:

Saurav Karmakar, Sandip Kumar Ghosh, Mrinalkanti Ghosh. "Acute Abdomen – Status of diagnosis in a rural based teaching hospital". Journal of Evolution of Medical and Dental Sciences 2013; Vol. 2, Issue 52, December 30; Page: 10107-10116.

ABSTRACT: The goal of the study was to evaluate the status of clinical diagnosis as well as diagnostic accuracy of easily available imaging techniques (X-ray, US, CT, etc.) in acute abdomen in a rural based teaching hospital. Here we present a prospectively conducted study including 118 patients presenting with features of acute abdomen irrespective of their age, sex, religions, marital and social status. After thorough history taking and clinical examinations, a straight x-ray abdomen, a chest x-ray, USG whole abdomen, CT scan of abdomen (if required), MRI (if required) were done. A provisional diagnosis was made on the basis of imaging findings. Then operative findings were noted if any surgery was required. Then a comparison was done to know that in what percentage of cases the diagnosis made by the available imaging techniques matched with the final diagnosis made on the basis of clinicopathological and operative findings. In our study among 45 cases of laparotomy other than appendectomy, 39 cases were accurately diagnosed by x-ray (86.66%), USG was diagnostic in 36 cases (80%) and if both were used the sensitivity was raised up to 91%. So it is evident that x-ray is the only and most useful investigating modality in a case of acute abdomen. The overall diagnostic accuracy of clinical examination in acute abdomen is 71% and if imaging techniques are combined with this, the sensitivity raises up to 94.3%.

INTRODUCTION: Acute abdomen can be defined as 'a syndrome induced by wide variety of pathological conditions that require emergent medical or more often surgical treatment.' ¹

Many diseases, some of which are not surgical or intra-abdominal, can produce acute abdominal pain and tenderness. Therefore this challenging clinical scenario requires a thorough and expeditious work-up to determine the need for operative intervention and to initiate appropriate therapy.

Approach to a patient with acute abdomen must be orderly and thorough. Clinical examination should suggest the probable cause and guide the choice of initial diagnostic tests. Supplementary laboratory and radiological investigations are indispensable for diagnosis of many surgical conditions, exclusion of medical causes and assistance for preoperative preparations. Now the availability and reliability of these diagnostic studies vary in different hospitals. Beside the wide clinic-pathological spectrum of acute abdomen, our study has focused over the aspect of diagnostic accuracy of available imaging techniques in this rural based teaching hospital.

The importance of good history and examination in the assessment of acute abdomen was demonstrated in the 1970s by Late Tim de Dombal from Leeds and Tony Gunn from Scotland. USG since its use by Puylaert et al in 1986 for diagnosing acute abdomen preoperatively has shown itself to be a discerning modality for diagnosing acute abdominal pathology. It is as good as laparoscopy in diagnosing acute abdominal conditions and unlike laparoscopy it has no contraindications such as previous laparotomy & the procedure does not involve general anesthesia. ¹ It is easily available, less

expensive, hazardless and noninvasive. CT since its advent has established its effectiveness as well as accuracy in diagnosing certain acute abdominal conditions. Wittenberg et al found that CT made a substantial contribution to diagnostic understandings in 42% of patients, change in therapeutic plans in 17% & improved precision of previously planned therapy in 10% patients. ² However CT has some drawbacks like the equipment is heavy, nonmobile, procedure is time consuming and also costly.

A study on USG in non-traumatic acute abdomen, published in The Internet Journal of Radiology, 2007 Volume 5 Number 2, was done by H. Prasad, G. Rodrigues & R. Shenoy of Kasturba Medical College. The study comprised of 148 patients presented with non-traumatic acute pain abdomen during the period June 2003 to October 2004 and underwent Ultrasonography. Definite diagnosis was made in 116 cases (78.4%). The sensitivity and specificity for ultrasound in diagnosing acute appendicitis, ureteric colic, acute pancreatitis and acute cholecystitis was around 66.6% and 100%, 84.6 % and 98.4%, 73.6% and 97.7%, 92.3% and 100% respectively. ³

A comparative study of plain x-ray abdomen and ultrasound in non-traumatic acute abdomen was published in The Journal of Gastrointestinal Radiology in 2005, volume 15, page 109-115. It was done by Dr. K. Gupta, Dr. R. K. Bhandari, Dr. R. Chander, Dept. of Radio diagnosis, Govt. Medical College, Amritsar during 2000-2001. Among 50 patients, ultrasound was highly accurate in diagnosing the exact cause with high overall predictive accuracy of 98.3% and sensitivity of 90%. Plain x-ray abdomen was 100% diagnostic in GIT perforation, GIT obstruction, psoas abscess (caries spine) and renal colic with overall predictive accuracy of 4.1% and sensitivity of 60%. ⁴

Mendelson et al. and Walsh et al. in their separate studies found ultrasonography to be 50% diagnostic in knowing the etiology of acute abdomen in children. ^[7, 8] Studies in adult population showed diagnostic accuracy of ultrasound to be between 25-34.7%. ^[1, 5, 6]

AIMS AND OBJECTIVES: The specific objectives of the study are -

1. To study clinic-pathological spectrum of different causes of acute abdomen including their incidences, presentations and outcomes in a rural based teaching hospital.
2. To determine the ability of available imaging techniques to diagnose various causes of acute abdomen in terms of sensitivity, specificity etc.
3. Comparative analysis of imaging findings with clinic-pathological and operative findings.

MATERIALS AND METHODS

1. Study area – Burdwan Medical College & Hospital
 2. Study population – Patients admitted in the emergency surgical ward of Burdwan Medical College & Hospital. Informed consent of the patients was taken.
 3. Study period – January 2011 to July 2012.
 4. Sample size – 118 patients
 5. Sample design – Randomly selected patients with
- Inclusion criteria –
- a) Patients were selected irrespective of their age, sex, religions, marital and social status.
 - b) Any patients presented with acute pain abdomen and / or abdominal distension.

Exclusion criteria –

- a) Patients not willing.
 - b) Patients presented in such a morbid condition that no time is left for imaging or other investigations and direct surgical intervention is done on clinical evaluation only.
6. Parameters to be studied –
- a) Thorough & sequential history taking.
 - b) Thorough clinical examinations.
 - c) Routine blood examinations.
 - d) Blood for serum amylase, lipase & others if required.
 - e) Straight x-ray abdomen in erect posture.
 - f) Chest x-ray postero-anterior view.
 - g) Ultrasonography of whole abdomen.
 - h) CT scan of whole abdomen (whenever needed).
 - i) Operative findings (if surgical interference needed).
 - j) Therapeutic response.
7. STUDY TOOLS –
- a) Patient's informed consent.
 - b) BHT for relevant history and clinical examinations and operative notes if any.
 - c) Routine blood and special blood examinations reports.
 - d) X-ray – Machine – Simadzu 800mA with IITV. 500mA, ME.
 - e) USG - Machine – Azilent Image Point Hx. 3.5 MHz, 7.5 MHz probe and 5-10 MHz transvaginal probe and HD7 of Philips with same probe configuration.
 - f) CT – Machine – Hitachi Pronto. Sub-second spiral.
 - g) 21 gauge single use disposable needle with 10cc plastic regular syringe.
 - h) Histopathology reports if any.
8. Study technique –
- Patients were randomly selected from the patients admitted in the surgical emergency ward with acute pain abdomen and / or abdominal distension irrespective of their age, sex, religion, marital and social status.
 - Patients' consent was taken.
 - History and clinical examinations were done as quickly as possible.
 - A straight x-ray abdomen, a chest x-ray, USG whole abdomen, transvaginal USG (if required), CT scan of abdomen (if required), were done through Radiology Dept. Of Burdwan Medical College & Hospital.
 - In the meantime routine & special (if required) blood examinations were done.
 - A provisional diagnosis was made on the basis of imaging findings.
 - Operative findings were noted if any surgery required.
 - A comparative study were done to know that in what percentage of cases the diagnosis made by the available imaging techniques match with the final diagnosis made on the basis of clinic-pathological and operative findings and response rates.

- The study was also focused on the clinic-pathological spectrum of various causes of acute abdomen including their incidences, presentations and outcomes.

10. Plan of analysis of data: Simple comparative analyses of gathered data were done following standard statistical protocol. Clinico-pathological spectrums of different causes of acute abdomen were analyzed in terms of their incidences, presentations, outcomes etc. Comparative analysis of imaging techniques with clinic-pathological and operative findings will be done in the form of sensitivity, specificity, positive and negative predictive value etc.

RESULTS: Among 5 age groups, most patients were in 31-45 yrs. (39%). Most common presentation was pain abdomen 70%. Accurate clinical diagnosis has been made in 84 patients with a positive predictive value of 71%. In 30% patients' clinical diagnosis has been changed after investigations. In 106 patients accurate diagnosis has been made after relevant investigations with a positive predictive value of 94.6%.

DISCUSSION:

Age groups: 46 patients are between 31-45yrs (39%), followed by 38 in 16-30 yrs. age group (32.2%) and 22 in 46-60 yrs. age group (18.6%). So 71% of patients are in between 16-45 yrs. of age and almost 90% of patients are in between 16-60 yrs. of age.

Sex: Among 118 patients 72 are male (61%) and 46 are female (39%). Among 31 to 45 yrs. age group, incidences of acute abdomen in male is quite high (39 male and 17 female patients). Among 6 patients >60 yrs. only 1 patient is female.

Main presenting features: Most common presentation is pain abdomen (70%) followed by abdominal distension and obstipation (16%).

Investigations done: In all patients chest x-ray, straight x-ray abdomen in erect posture and Ultrasonography were done. CT scan was done in 28 patients (23.72%) either to confirm or to support the diagnosis.

Clinical diagnosis: Accurate clinical diagnosis was made in 76 patients (68%) with a positive predictive value of 71%. In almost 30% patients, diagnosis changed after investigations. So it is clear that available imaging techniques has significant impact on diagnosis of acute abdomen.

Diagnosis by imaging: 104 patients (90%) have been diagnosed accurately by available imaging techniques (USG, x-ray and CT scan). Among these 35 (29.6%) patients have been diagnosed correctly only after investigations.

Diagnosis during operation: 85 patients (72%) required emergency operations, either in the form of laparotomy or appendicectomy. 14 patients (11.8%) were correctly diagnosed at OT. Among these 14 diagnoses in 4 patients were totally uncertain after all sorts of clinical examination and available investigations.

Case wise studies: Various causes of acute abdomen were classified broadly in following headings:

- Acute appendicitis
- Hollow viscous perforations
- Intestinal obstructions
- Acute pancreatitis

- Acute cholecystitis
- Trauma abdomen
- Gynecological cases
- Urological cases
- Others

Acute appendicitis: Total number of acute appendicitis was 32 (27%). The most common age group affected was 16-30 yrs. of age (75%).

28 cases were accurately diagnosed by clinical examination (sensitivity 87.5%). By combining clinical examination and available imaging techniques (mainly USG) sensitivity increased to 93.7%. Sensitivity of USG in diagnosing acute appendicitis was about 62.5%. Only in 2 patients acute appendicitis was discovered only at operation table. Both these two patients were presented with features of peritonitis and sub-acute intestinal obstruction and both of them had gangrenous appendix with collection. It is evident that, clinical diagnosis holds the key in diagnosing acute abdomen in a rural based teaching hospital where as USG can be used as an adjunct or supportive investigation.

One important thing had been found in this study that appendicectomy was over-diagnosed in 6 patients. In these patients appendix was found to be normal in histopathological examination. So the negative appendicectomy rate is 17.64%. Further investigations in these patients revealed that 3 patients had cystitis, 2 had pelvic inflammatory disease and 1 had small ureteric calculi which was not initially evident on x-ray or USG. So the positive predictive value of clinical examination in acute appendicitis is 82.5%. A study by Memisoglu Kemal et al, published in The World Journal of Emergency Surgery in February 2010 ⁹, depicted that the rate of negative appendicectomy is 17.3%. But their diagnosis of acute appendicitis was mainly based on leukocytosis and USG findings. In their study 34% of patients had negative USG findings for acute appendicitis which in our study is about 37.5%.

Hollow viscous perforation: There were 16 cases of hollow viscous perforations (13.5%) in our study population. The most common age group affected is 31-45 yrs. (50%). In this group 6 patients had peptic perforation.

Clinical diagnosis was accurately made in 8 patients with a sensitivity of 50% and positive predictive value of 80%.

Chest x-ray is 100% diagnostic in diagnosing hollow viscous perforation. So the sensitivity and positive predictive value of chest x-ray in diagnosing hollow viscous perforation are 100%. It is equally corroborative with the study done by K. Gupta et al in 2005 ⁴.

Among 16 cases of hollow viscous perforation, USG had supported the diagnosis or given the evidences of intra-abdominal collection in 14 cases (sensitivity 87.5%). In a study by Hariprasad et al in 2007, the diagnostic accuracy of USG in hollow viscous perforation was found to be 92.3%. ³

Intestinal obstruction: There were 18 cases of acute intestinal obstruction due to various causes. The most common age group affected was 46-60 yrs. (44.4%).

Accurate clinical diagnosis was made in 12 patients with a sensitivity of 66.66% and the positive predictive value of 75%.

Straight x-ray abdomen was diagnostic in 17 patients (sensitivity 94.4%). a study by K. Gupta et al in 2005 ⁴ depicted the 100% accuracy of x-ray in diagnosing acute intestinal obstruction, but they have taken only 2 cases of acute intestinal obstruction in their study.

USG supported the diagnosis of intestinal obstruction in 15 cases (sensitivity 83.3%). One important thing is that, sensitivity was not increased by combining x-ray and USG. So x-ray alone is an important investigation for suspected intestinal obstruction.

CT scan was done in 13 patients with suspected intestinal obstruction. It described the cause accurately in 11 patients.

Acute pancreatitis: In our study, acute pancreatitis was found in 10 patients (8.5%) and it arose as the next most common cause of acute abdomen. Hariprasad et al in 2007 found it to be 12.5%. ³

The most common age group found be 46-60 yrs. (60%) with all the patients were in between 30-60 yrs. Clinical diagnosis was made in 4 patients (sensitivity 40% and positive predictive value is 66.66%).

X-ray found to be having no value in diagnosing acute pancreatitis. Only in 1 case pleural effusion was found. USG was diagnostic in 5 cases (sensitivity 50%). Gall stone was found in 3 cases. CT scan seems to be 100% sensitive in diagnosing acute pancreatitis.

Acute cholecystitis: There were 9 cases of acute cholecystitis (7.6%). All were female and the most common age group affected was 31-45 yrs. (66.66%). 89% of cases were in between 31-60 yrs. The study by Hariprasad et al in 2007 depicted an almost same incidence (8%) among 148 patients. ³

The sensitivity of clinical examination was 55.55% with a positive predictive value of 71.4%. X-ray was of no value in any cases of acute cholecystitis but USG is 100% successful in diagnosing all the cases of acute cholecystitis demonstrating gall stone in 9 patients and gall bladder sludge in 2 patients (sensitivity 100%). This finding is quite compatible with the findings of the study done by K. Gupta et al in 2004. ⁴

Trauma abdomen: Only blunt trauma abdomen cases were included in our study and it was seem to be relatively common in our hospital (6.8%). Trauma cases were almost equally distributed through all ages though the most common age group was 46-60 yrs. (37.5%).

Accurate clinical diagnosis was made in 50% of cases and by combining it with imaging techniques the sensitivity raised to 75%. CT scan was done in 5 patients and in each of them it supported the diagnosis. In bladder injury and in mesenteric tear CT seems to be 100% diagnostic. Diagnosis of actual injury was done in 2 cases during operation.

Gynecological cases: 8 gynecological cases (6.8%) were diagnosed in our study who presented with the features of acute abdomen. Among them 2 had ruptured ectopic, 4 had ovarian cyst and 2 had PID. USG was 100% accurate in diagnosing all the cases of ectopic pregnancy and ovarian cyst.

Urological cases: There were 9 urological cases in our study (7.6%). Among them 3 had cystitis, 4 had renal calculi and 1 had Ureteric calculi. Clinical suspicions of urological cases were made in 5 cases (55.5%). Straight x-ray abdomen was accurate in diagnosing the Ureteric calculi and 3 cases of renal calculi. USG diagnosed 2 cases of renal calculi 1 case of Ureteric calculi and 1 case of cystitis. CT was done in 3 patients with suspected renal calculi and found to be 100% diagnostic.

ORIGINAL ARTICLE

Other cases: Among 8 miscellaneous cases in our study (6.8%), 3 were of amoebic liver abscess, 2 had acute gastritis and 1 case each of Iliopsoas abscess, inflamed meckel's diverticulum and dyselectrolytemia. USG is 100% accurate in diagnosing liver abscess and Iliopsoas abscess.

TABLES AND CHARTS:

Chart 1: Age distribution chart

Chart 2: Sex distribution chart

Chart 3: Symptom chart

ORIGINAL ARTICLE

Cause of acute abdomen	Number of patients	%
Acute appendicitis	32	27
Hollow viscous perforation	16	13.5
Intestinal obstruction	18	15.25
Trauma abdomen	8	6.8
Acute pancreatitis	10	8.5
Acute cholecystitis	9	7.6
Gynecological cases	8	6.8
Urological cases	9	7.6
Others	8	6.8

Table 1: percentage of cases

Chart 4: Bar chart of all cases

Cases	Total cases	Clinical diagnosis	%	Diagnosis only after investigation	Diagnosis confirmed before OT	%	Diagnosis is at O.T	%
Acute appendicitis	32	28	87.5	2	30	93.7	2	6
Hollow viscous perforation	16	8	50	8	16	100		
Intestinal obstruction	18	12	66.6	4	16	88.8	2	11
Acute pancreatitis	10	4	40	5	9	90	1	10
Trauma abdomen	8	4	50	2	6	75	2	25
Acute cholecystitis	9	5	55.5	4	9	100		

Table 2: Comparative study of all cases

Chart 5: Bar chart of comparative study of all cases

Causes	Total cases	x-ray	%	USG	%	CT
Acute appendicitis	32	0	0	20	62.5	ND
Hollow viscous perforation	16	16	100	14	87.5	Done in 1 patient, supports the diagnosis
Intestinal obstruction	18	17	94.4	15	83.3	Done in 13 patients, describes the cause accurately in 11 patients
Acute pancreatitis	10	0	0	6	60	Done in 8 patients, Diagnosed accurately.
Acute cholecystitis	9	0	0	9	100	ND
Trauma abdomen	8	3	37.5	3	37.5	Done in 3 patients, supports the diagnosis

Table 3: Accuracy of imaging techniques in each case

ND – not done

CONCLUSION: In our study we studied the incidences, age groups, main clinical features of various causes of acute abdomen as well as sensitivity, predictive accuracy of various imaging techniques in acute abdomen. Managing acute abdomen in emergency department means to correctly identify the cases that need urgent operative intervention. From our study it is evident that clinical examination is sufficient enough to diagnose acute appendicitis whereas combined clinical examination and imaging studies are very useful in diagnosing cases in which urgent laparotomy is required other than appendicectomy.

The overall diagnostic accuracy of clinical examination in acute abdomen is 71% and if imaging techniques are combined with this, the sensitivity raises up to 94.3%. This study is quite compatible with the finding of K. Gupta et al in 2005. In their study the diagnostic accuracy of USG in acute abdomen was 98.3%.^[4]

In our study among 45 cases of laparotomy other than appendicectomy, 39 cases were accurately diagnosed by x-ray (86.66%), 36 cases (80%) by USG and by combining the two

ORIGINAL ARTICLE

sensitivity rose up to 91%. So it is evident that x-ray has an important role in diagnosing acute abdomen.

REFERENCES:

1. Chana R S, Ahmed I. Role of ultrasonography in evaluation of children with acute abdomen. Journal of Indian Association of Paediatric Surgeons. 2005;10:41-43.
2. Wittenberg J, Feinberg HV, Black EB, et al. Clinical efficacy of computed body tomography. AJR. 1978;131:5-14.
3. H. Prasad, G. Rodrigues & R. Shenoy. Role of ultrasonography in non-traumatic acute abdomen. The Internet Journal of Radiology. 2007;5: no2.
4. Gupta K, Bhandari RK, Chander R. Comparative study of plain abdomen and ultrasound in non-traumatic acute abdomen. Indian J Radiol Imaging. 2005;15:109-15.
5. Verbanck JJ, Aelst FV, Rutgeerts L et al. The impact of routine admission abdominal sonography on patient care. J Clin Ultra. 1988;16:651-4.
6. Lerch MM, Riehl J, Buechsel R et al. Bedside ultrasound in decision making for emergency surgery: Its role in medical intensive care patients. Am J Emer Med. 1992;10:35-8.
7. Mendelson RM, Lindsell DRM. Ultrasound examination of paediatric "acute abdomen" preliminary findings. BJR. 1987;60:414-6.
8. Walsh PF, Crawford D, Crossling FT et al. The value of immediate ultrasound in acute abdominal conditions: A critical appraisal. ClinRadiol. 1990;42:47-9.
9. Memisoglu K, Karip B, Mestan M, Onur E. The value of preoperative diagnostic tests in acute appendicitis, retrospective analysis of 196 patients. The World Journal of Emergency Surgery. 2010;5:5.

AUTHORS:

1. SauravKarmakar
2. Sandip Kumar Ghosh
3. Mrinalkanti Ghosh

PARTICULARS OF CONTRIBUTORS:

1. Senior Resident, Department of General Surgery, ESIC Medical College & Hospital, Joka, Kolkata.
2. Assistant Professor, Department of General Surgery, Burdwan Medical College & Hospital.
3. Assistant Professor, Department of Radiodiagnosis, Burdwan Medical College & Hospital.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr.SauravKarmakar,
C/O. – AsitKarmakar,
Flat No. – 1B,
Trina Co-operative Housing Society Limited.,
BA-71, AA - 1,
Newtown, Kolkata – 700156,
West Bengal, India.
Email-sauravawesome@yahoo.co.in

Date of Submission: 26/11/2013.
Date of Peer Review: 27/11/2013.
Date of Acceptance: 12/12/2013.
Date of Publishing: 24/12/2013