

Original Research Article

Accuracy of Surgeon performed ultrasound in diagnosis of Acute AbdomenK Ashok¹, Sushma Bose Reddy²¹Director and General Surgeon, Rajiv Gandhi Institute of Medical Sciences (RIMS) Adilabad, Telangana²Department of Obstetrics and Gynecology, Rajiv Gandhi Institute of Medical Sciences (RIMS) Adilabad, Telangana***Corresponding author**

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Abstract: General surgeons are many times faced with emergency situations where they may need to diagnose the conditions with ultrasound instead of referring the patient to radiology Department which may lead to inadvertent delays. Therefore surgeon's ultrasound skills can remarkably help in fast diagnosis as well as treatment. This study was done to evaluate the accuracy of diagnosis of various acute abdomen cases when diagnosed by ultrasound and surgery. This study was conducted in Department of General Surgery in RIMS Adilabad; Institutional Ethical committee permission was obtained. About 1000 cases of acute abdomen were included in this study. The same surgeon performed ultrasound and surgery in all the cases and the diagnosis by ultrasound and surgical diagnosis was recorded other parameters like duration of post-operative pain were noted. Out of the 1000 cases 600 (60%) were male and 400 (40%) were female patients. Most common cause of acute abdomen was nephrolithiasis 460 (46%) followed by appendicitis 155 (15.5 %) and Peritonitis 154 (15.4%). The accuracy of diagnosis by ultrasound compared with surgical diagnosis was 100% in nephrolithiasis and Ectopic pregnancy followed by Appendicitis 96.77% and ovarian cysts 90.91%. Surgeons are generally involved in diagnosis and management of conditions such as acute abdomen. Surgeon's skills of diagnosis by ultrasound will lead to better and early management of acute and painful conditions without waiting for diagnosis by radiology department especially in cases of emergencies. The accuracy of surgeon performed ultrasound diagnosis is comparable to that of diagnosis by radiology department provided they receive adequate training. Therefore it is recommended that all the general surgeons should get themselves trained in ultrasound diagnosis which will eventually lead to better patient care and over all treatment outcomes.

Keywords: Ultrasound, Surgeon, Diagnosis, Acute Abdomen

INTRODUCTION

Acute abdominal pain is defined as the sudden onset of abdominal pain symptoms within 24 hours presenting as single episode. Although pain is the most common complaint it is not the only symptom of acute abdomen. It is the most common cause of seeking medical care in emergency departments all over the world [1, 2]. The routine of management includes taking patients history, clinical examination, Laboratory tests and abdominal ultrasound [3]. In most of the countries of the world ultrasound examinations are performed in radiology departments by specialized radiologists. However the resources of radiology departments are often limited especially in developing countries due to shortage of Radiologists leading to long waiting times in emergency departments. Bedside ultrasonography has shown to reduce the length of time

of stay in emergency as well as arrival at definitive diagnosis and patient care [4, 5]. Ultrasonography has proven as well established tool for surgeons in emergency situations like acute abdomen ultrasound is said to be the new stethoscope of millennium [6-9]. Although Ultrasonography [US] was initiated by cardiologists and obstetricians extensively in clinical practice, its use by surgeons has evolved recently. Ultrasonography [US] was first used by surgeons in 1946, but surgeons became interested in performing ultrasonography in emergency in last two decades [10] it was in 1976 Dr Thomas Tiling begin to study the potential uses of ultrasound in treating surgical diseases. Tiling's work on traumatic hemoperitoneum influenced others who completed prospective evaluation of surgeon-performed ultrasound in trauma patients [11]. They demonstrated that with required hands on training

and proctored experience surgeons and surgical residents could acquire the necessary skills to obtain and interpret ultrasound images accurately [12]. With the ultrasound surgeons can receive instant information to augment physical examination and narrow differential diagnosis and to initiate intervention. Use of bed side ultrasound is well established in countries such as USA, Australia, Japan and European countries but rare in countries like India [13-16]. Several studies have confirmed the benefits of an early ultrasonography examination in the trauma situations [17-19]. Studies have shown the benefits of surgeon performed ultrasonography for abdominal pain in emergency departments and has helped in earlier decision regarding surgery. [3, 10, 20-22]. This study was conducted with an aim to evaluate the accuracy of ultrasound in various acute abdomen cases.

MATERIALS AND METHODS

This study was conducted in Rajiv Gandhi Institute of Medical Sciences (RIMS) Adilabad. Ethical Permission for the study was obtained from institutional ethical committee. Patients and their guardians were informed about the study and written consent was obtained. The First Author being a General Surgeon has received formal training in Ultrasonography [US] for a period of one month and continuously updates his knowledge by attending workshops and hands on

training in Ultrasonography. Inclusion criteria were all patients above age of 15 years or older admitted to emergency department for abdominal pains were considered eligible to participate in the study. The exclusion criteria were, previously diagnosed abdominal conditions, previous abdominal surgical procedures, and acute conditions needing immediate care, patients with history of malignancy, trauma, drugs and alcohol addiction and patients not willing to participate in the study. In this study a bed side ultrasonography was performed after detailed history taking, clinical examination and laboratory tests. The ultrasonographic diagnosis was recorded and surgical diagnosis was confirmed during the relevant operations. The accuracy of the ultrasonographic diagnosis was then matched with surgical diagnosis. All the data was analyzed by SPSS version 17 on windows 8 format.

RESULTS

The table 1 shows the demographic profile of the patients included in the study. A total of 1000 cases were studied and among them 600 (60%) were male and 400 (40%) were female. The most common age group presenting with acute abdomen was 31-40 years, 28.2% followed by 21-30 years of age contributing 21.2% of the patients. The age groups of 41-50 years and 15-20 years contributed 18.2% and 15.1% patients each.

Table 1: Age and sex wise distribution of the patients

Age Group	Male	Female	Total	Percentage
15 – 20	90	61	151	15.1
21 – 30	131	81	212	21.2
31 – 40	182	100	282	28.2
41 – 50	112	70	182	18.2
51 – 60	35	41	76	7.6
> 61	50	47	97	9.7
Total	600	400	1000	100

The commonest presentation of the patients with acute abdomen was abdominal pain and after detailed history and clinical examination no abdominal related comorbidity was seen in any case but comorbidities related to Cardiovascular disease and Diabetes Mellitus was seen in 175 male (17.5%) and 35 female (3.5%) patients. Total of 750 male and 100

female were referred from other centers for admission as the Rajiv Gandhi Institute of Medical Sciences (RIMS) Adilabad happens to be the tertiary care center. Most common complaint was abdominal pain with duration of 8-12 hours and few patients also had rigidity and palpable mass on clinical examination given in table 2

Table 2: General condition of the patient and related comorbidities

	Male	Female	Total/ percentage
Abdominal related comorbidity	Nil	Nil	-
Comorbidity related to CV or DM	175	35	210 (21%)
Referral for admission	750	100	850 (85%)
Duration of pain			
0–8 h	100	150	250 (25%)
8–12 h	400	200	600 (60%)
>12 h	100	50	100 (10%)
Affected General conditions			
Tenderness	287	253	540 (54%)
Rigidity	167	72	239 (23.9 %)
Palpable mass	Nil	33	33 (3.3%)

Most common cause of acute abdomen was nephrolithiasis 460 (46%) followed by appendicitis 155 (15.5 %) and Peritonitis 154 (15.4%). The other

involved conditions were cholecystitis 10.2% pancreatitis 4.5% , ovarian cysts, ectopic pregnancy PID were 3.3, 2.1 and 3.0% see table 3.

Table 3: Diagnosis of the patients with Acute Abdomen

Diagnosis	Male	Female	Total	Percentage
Appendicitis	100	55	155	15.5
Cholecystitis	50	52	102	10.2
Peritonitis	107	47	154	15.4
Pancreatitis	43	2	45	4.5
Nephrolithiasis	300	160	460	46.0
Ovarian cysts	-	33	33	3.3
Ectopic pregnancy	-	21	21	2.1
PID	-	30	30	3.0
Total	600	400	1000	100

Accuracy of diagnosis of various abdominal related conditions and their final results with surgical diagnosis was compared with the pre-operative ultrasonographic diagnosis and surgical diagnosis the accuracy was 100% in cases of Nephrolithiasis and

ectopic pregnancy. In cases of appendicitis the accuracy was 96.77%, peritonitis the accuracy was 90.9% and ovarian cysts the accuracy was 90.91%. Accuracy was 50% in the diagnosis of PID see table 4.

Table 3: Accuracy of Diagnosis based on Ultrasound and Surgical exploration

Condition	Ultrasound Diagnosis	Surgical Diagnosis	Accuracy %
Appendicitis	150	155	96.77
Cholecystitis	80	102	78.43
Peritonitis	140	154	90.90
Pancreatitis	40	45	88.89
Nephrolithiasis	460	460	100
Ovarian cysts	30	33	90.91
Ectopic pregnancy	21	21	100
PID	15	30	50.0

DISCUSSION

Ultrasound performed by surgeons and physicians are increasing worldwide in emergency departments however the method is debated. In

countries like India where there is generally paucity of Radiologists, in such cases it becomes very useful for a surgeon or emergency physician to get formal training in ultrasonography which can lead to better patient

management. We in the present tried to study the accuracy of the surgeon performed ultrasound. In a study performed by Anna Lindelius *et al.*; on 800 patients evaluating the level of patient satisfaction in cases of abdominal pain where ultrasonography was performed by surgeon in emergency department found that patients with acute abdominal pain bedside ultrasound was related to higher satisfaction and decreased short term health care consumption [23]. Another study by S. Sridhara *et al.*; giving ultrasound training to surgery residents for a period of two months and 238 patients of abdominal pain were then evaluated by the trained residents found that the ultrasound scan be performed by surgery residents with similar results as that of radiology residents. They recommended that training of the surgery residents is possible with satisfactory results [24]. In one study by a Lindelius *et al.*; on 800 patients with abdominal pain seen with surgeon received 4 weeks of ultrasound training and comparing the results of diagnosis with and without using the ultrasound found that the diagnostic accuracy was significantly higher in the patients examined with ultrasonography as additional tool. Ultrasound hence proved to be helpful in making or arriving at correct diagnosis in 24.1% of cases [22].

In our study also the surgeon has received 4 weeks of formal training in ultrasonography and the accuracy of diagnosis was more or less similar if it would have been performed by radiologists therefore our study agrees with such findings. In one study by L. Gustafsson *et al.*; for finding accuracy of surgeon performed ultrasound in detecting gall stones and surgeons having undergone 4 weeks training in ultrasonography. The ultrasonography findings of surgeons were then compared to radiologists finding that the trained surgeons were able to accurately diagnose the gall stones with high level of agreement with radiologists [25]. One study evaluating the effects of surgeon performed ultrasonography on acute abdomen in specific patients and subgroups regarding diagnostic accuracy found increased diagnostic accuracy in patients with BMI > 25 and upper abdominal pain. Among the patients with peritonitis requiring surgery 61% in ultrasound group were admitted to surgery directly. They concluded that surgeon performed ultrasound is helpful in majority of patients admitted to emergency departments for abdominal pain [26]. It is now clear that acute care surgeons have successfully performed interpreted and taught bedside ultrasound examinations of critical or injured patients. The real time imaging by ultrasound allows the surgeon to receive accurate information of the condition coupled with clinical examination can

help to expedite the management of patients which becomes important where time is a critical factor.

CONCLUSION

Surgeons are generally involved in diagnosis and management of conditions such as acute abdomen. Surgeon's skills of diagnosis by ultrasound will lead to better and early management of acute and painful conditions without waiting for diagnosis by radiology department especially in cases of emergencies. The accuracy of surgeon performed ultrasound diagnosis is comparable to that of diagnosis by radiology department provided they receive adequate training. Therefore it is recommended that all the general surgeons should get themselves trained in ultrasound diagnosis which will eventually lead to better patient care and over all treatment outcomes.

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