

USG and CT correlation of non-traumatic acute abdomen.

Dr Hiral parekh¹ Dr krutik vasava²

¹ Professor and head of the department, department of radio diagnosis, shri MP shah medical college, Jamnagar Gujarat, India

² 3rd year resident, department of radio diagnosis, shri MP shah medical college, Jamnagar Gujarat, India

Abstract

Back ground:

Of all patients presenting to the Emergency Department(ED), approximately 10% have complaints of acute abdominal pain.

Non-traumatic acute abdominal pain is one of the most common symptoms in adults presenting to the emergency department. Clinical assessment is sufficient to decide on the level of urgency, but not on the specific cause of the acute abdominal pain. The causes of abdominal pain vary from life threatening to the self-limiting. Management decision on the basis of clinical and laboratory tests alone can result in unnecessary intervention or delayed management. Hence a diagnostic modality has to be formulated which aids in clinical diagnosis and prevents mortalities. CT scan and ultrasound now become principal investigation in non-traumatic acute abdomen.

This study aims to correlate the usefulness of USG abdomen and CT abdomen in patients presenting with acute abdominal pain in emergency department.

Materials and Methods:

- The present study of computed tomography and ultrasound evaluation of non-traumatic acute abdomen was a prospective study of 100 patients using ultra sound and CT scan modality. The present study is carried out at department of radiology, Guru Gobind Singh Hospital and M P Shah Medical College, Jamnagar. The study was carried out between 2017 to 2019.

- Results were checked by two radiologists (PI and CO-PI) and final comparative data was prepared from Computed Tomography (CT) and Ultrasound study.

Results:

- Out of 100 patients in this study, 65 % were male and 35% were female. Youngest patient was 11 month-old female baby and oldest patient was 100-year-old female, majority of the patients were adults with highest number of them in the age group of 30-40 years (20 %), among our patients 100 patients (29%) showed changes of pancreatitis (13 %) showed appendicitis and small bowel obstruction other common conditions encountered were cholecystitis (13 %) and renal ureteric calculi (8%), USG abdomen was abnormal in 55.17% of the pancreatitis and 76% of patients with appendicitis and small bowel obstruction and 81% in patients with cholecystitis and 87% in patients with renal or ureteric calculi.

Conclusion: In the present series of study conducted for correlation of CECT abdomen and USG abdomen in the evaluation of acute non-traumatic abdomen, CECT abdomen was more sensitive and accurate in diagnosing the causes of non-traumatic acute abdomen, although USG abdomen was proved to be valuable first hand tool in management of non-traumatic acute abdomen.

Key words: non-traumatic acute abdomen, ultra-sonography, contrast enhanced CT scan of abdomen.

Date of Submission: 20-05-2020

Date of Acceptance: 06-06-2020

I. Introduction

Of all patients presenting to the Emergency Department(ED), approximately 10% have complaints of acute abdominal pain.

Non-traumatic acute abdominal pain is one of the most common symptoms in adults presenting to the emergency department. Clinical assessment is sufficient to decide on the level of urgency, but not on the specific cause of the acute abdominal pain. The causes of abdominal pain vary from life threatening to the self-limiting. Management decision on the basis of clinical and laboratory tests alone can result in unnecessary intervention or delayed management. Hence a diagnostic modality has to be formulated which aids in clinical diagnosis and prevents mortalities. CT scan and ultrasound now become principal investigation in non-traumatic acute abdomen.

The American College of Radiology suggests an abdomen/pelvis CT with contrast medium in patients with acute abdominal pain. Others are in favor of ultrasound as the primary imaging technique mainly because ultrasound is easily accessible and does not expose patients to ionizing radiation. Ionizing radiation exposure at CT is associated with the risk of radiation induced cancer. This is a drawback of CT, especially as CT is increasingly being used in the diagnostic work-up of young patients. This may prompt the evaluation of alternative imaging strategies next to CT, such as ultrasound and MRI.

II. Materials and Methods

The present study was conducted at shri MP shah medical college during a period from September 2017 to September 2019 with written approval of ethical Committee and standard procedures. Results were checked by two radiologists (PI and CO-PI) and final comparative data was prepared from Computed Tomography (CT) and Ultrasound study.

Inclusion criteria:

- All the patients, suspected of having abdominal pain (non traumatic) were referred from surgical, medicine, paediatric and gynaecology departments for sonographic and CT evaluation on emergency basis.

Exclusion criteria:

- Patient with traumatic acute abdomen.

DESCRIPTION OF TOOL:

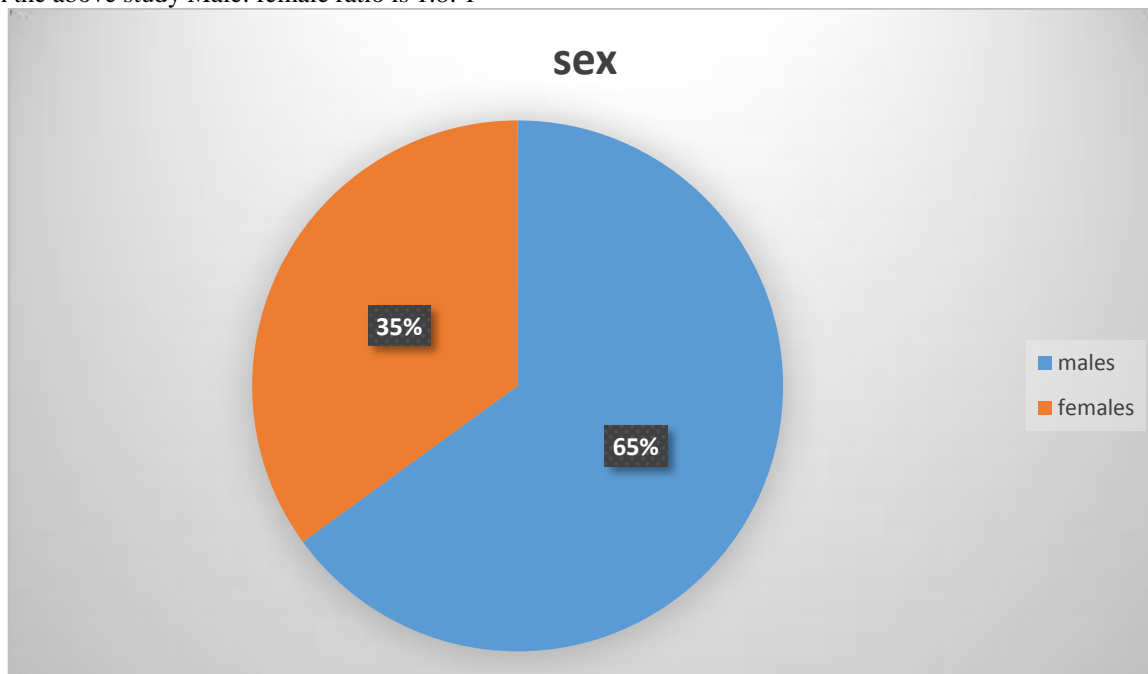
1. 16 SLICE COMPUTED TOMOGRAPHY (CT) MACHINE GE HEALTH.
2. ESAOTE MY LAB 60. (ULTRASOUND MACHINE)

Imaging technique:

All patients with acute abdomen after thorough clinical examinations were sent for radiological evaluation by department of surgery, medicine, gynaecology and paediatrics. ULTRASONOGRAPHY and Plain and Contrast CT abdomen was done as per requirements.

III. Results

In the above study Male: female ratio is 1.8: 1

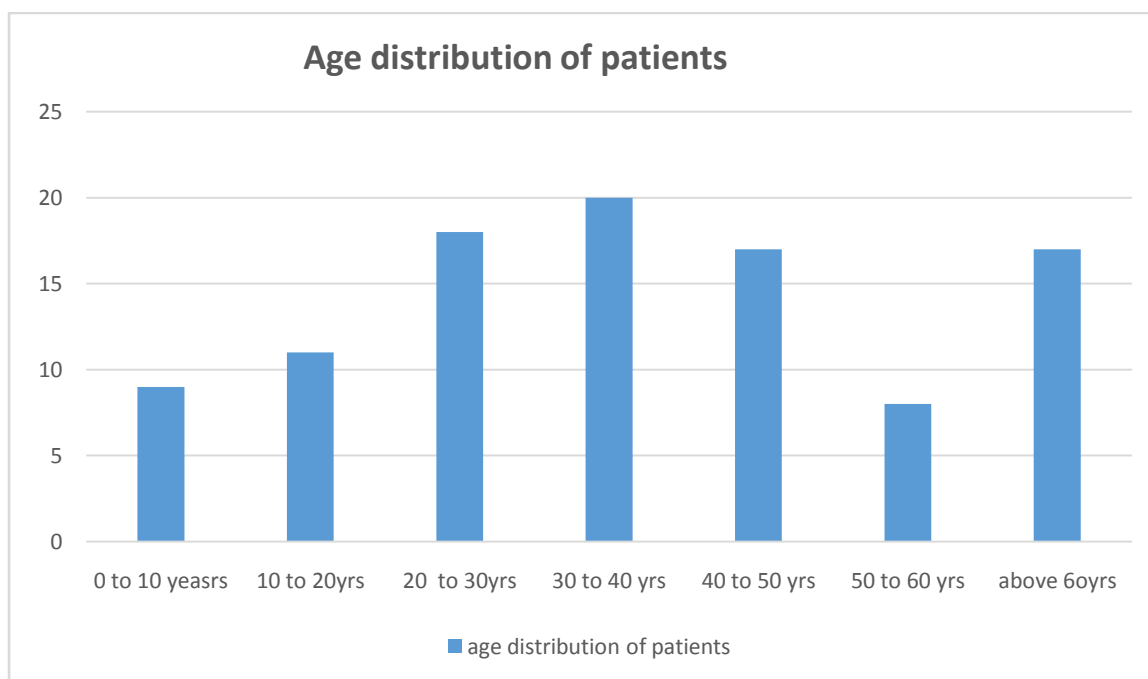


Age distribution of patients studied in present study

Age group in years	No of patients	(%)
0-10	9	9
10- 20	11	11
20 -30	18	18
30 -40	20	20
40 – 50	17	17

50 -60	8	8
Above 60	17	17

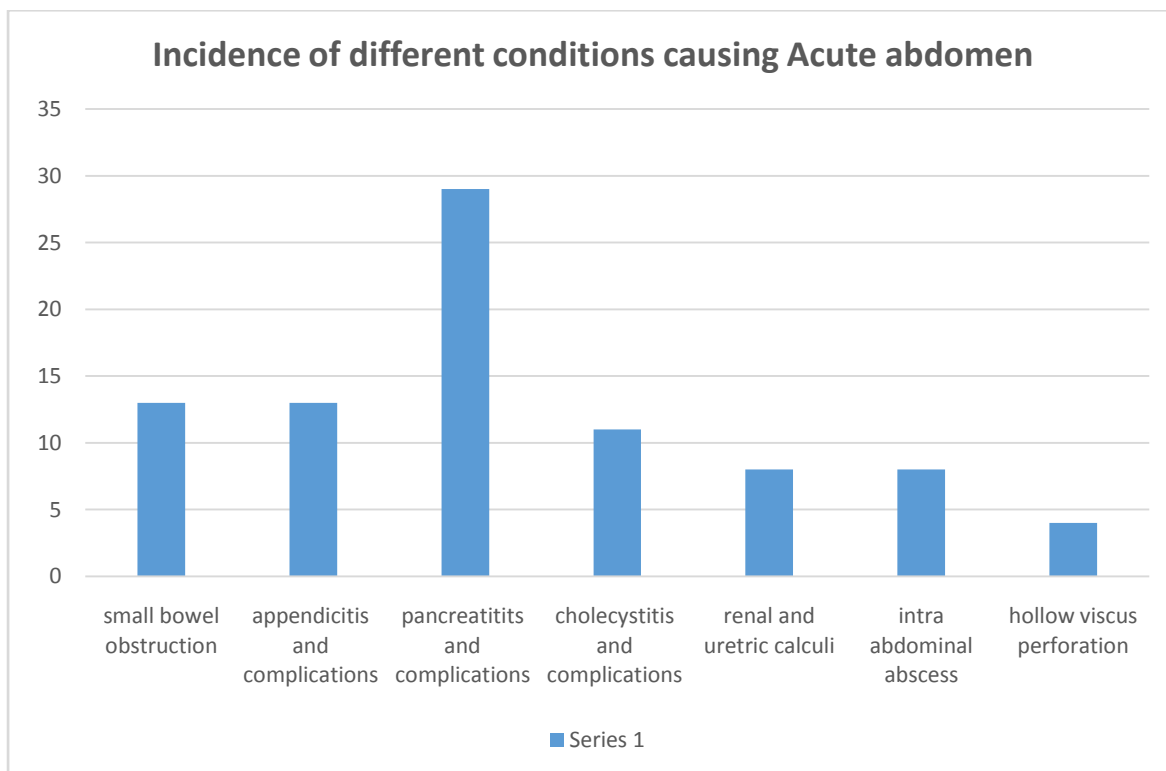
In the present study youngest patient was 11month old female baby and oldest patient was 100-year female, majority of the patient were between 30 to 40 years, and next common age group was 20 to 30 years.



Incidence of conditions causing acute abdomen

Condition	No of patients	(%)
Acute intestinal obstruction (Intussusceptions + Sigmoid volvulus +Pneumatosis of small bowel)	13	13
Hollow viscus perforation	4	4
Appendicitis and complications (Appendicular perforation + Mucocele of appendix+ Mucinous neoplasm of appendix)	13	13
Acute pancreatitis	29	29
Gall bladder calculi + Acute cholecystitis	11	11
Renal and ureteric calculi	8	8
Pyelonephritis	5	5
Intra-abdominal abscess	8	8
Ovarian cysts and torsion	4	4
Congenital	1	1
Superior mesenteric artery syndrome	1	1
Aortic dissection	1	1
Mesenteric panniculitis	1	1
Sarcoma of renal capsular origin	1	1

Above table tells us that acute pancreatitis was the major cause (29 %) of acute abdomen and Next most common was appendicular pathologies (13 %), small bowel obstruction (12 %) and gall bladder pathologies (11 %).



Incidence of various visceral conditions causing local visceral inflammation,

Condition	Present series,
Acute appendicitis.	11
Acute cholecystitis.	11
Acute pancreatitis.	29
Abscesses.	8
Pyelonephritis.	5

Age and sex incidence of various diseases causing acute abdomen.

Condition	0-10		11-20		21-30		31-40		41-50		>50	
	M	F	M	F	M	F	M	F	M	F	M	F
Congenital	1	-	-	-	-	-	-	-	-	-	-	-
Hollow viscus perforation	-	-	-	1	-	1	-	-	1	-	1	-
Acute appendicitis	-	-	-	-	1	1	-	-	2	-	-	-
Acute pancreatitis	-	-	2	2	4	2	5	3	4	1	4	2
Acute cholecystitis	-	-	1	-	-	1	-	-	-	-	3	2
Renal calculi	-	1	-	-	1	-	1	2	-	-	1	2
Small bowel obstruction	-	1	1	-	1	1	1	-	-	-	-	1
Intussusception	1	-	1	2	1	-	-	-	-	-	-	-

- Above table shows that acute pancreatitis is most common among middle aged (31 to 40) and young adults (21 to 30).
- Intussusceptions are most common among children and teenagers,

Correlation between CECT abdomen and USG abdomen in acute abdomen

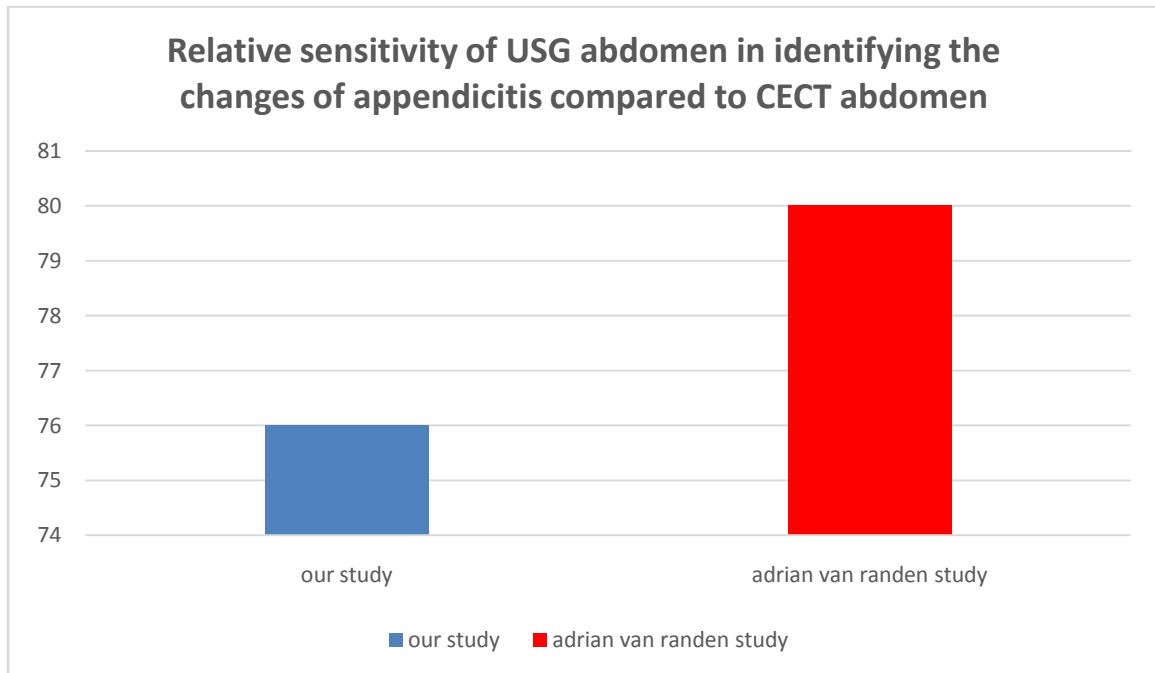
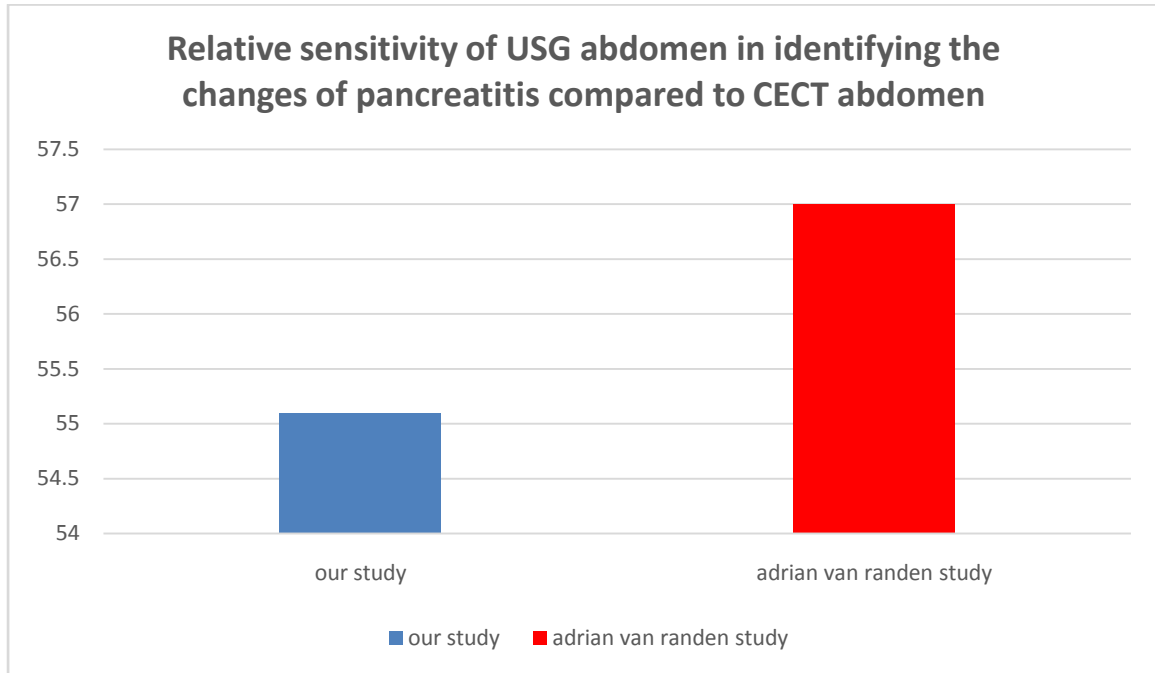
Diagnosis	Total number of cases positive on CT scan	Positive on USG	Negative on USG	Sensitivity of USG
Pancreatitis	29	16	13	55.17
Appendicitis	13	10	3	76.92
Cholecystitis	11	9	2	81.8
Hollow viscus perforation	4	1	3	25.0
Renal and ureteric calculi	8	7	1	87.5
Small bowel obstruction	13	10	3	76.92
Pyelonephritis and pyonephrosis	5	4	1	80.00
	8	7	1	87.5

Intra-abdominal abscess				
Gynecological emergencies	4	3	1	75.0
congenital	1	1	0	100.00
Superior mesenteric artery syndrome	1	0	1	0.00
Aortic dissection	1	0	1	0.00
Mesenteric panniculitis	1	0	1	0.00
Sarcoma of renal capsular origin	1	0	1	0.00

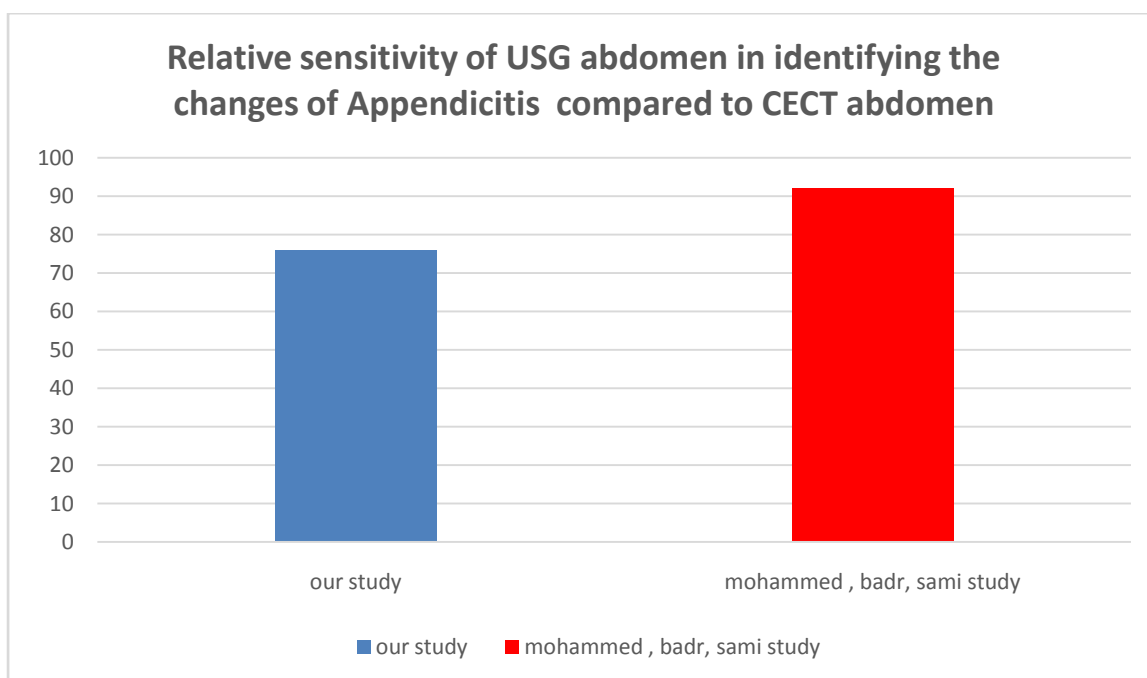
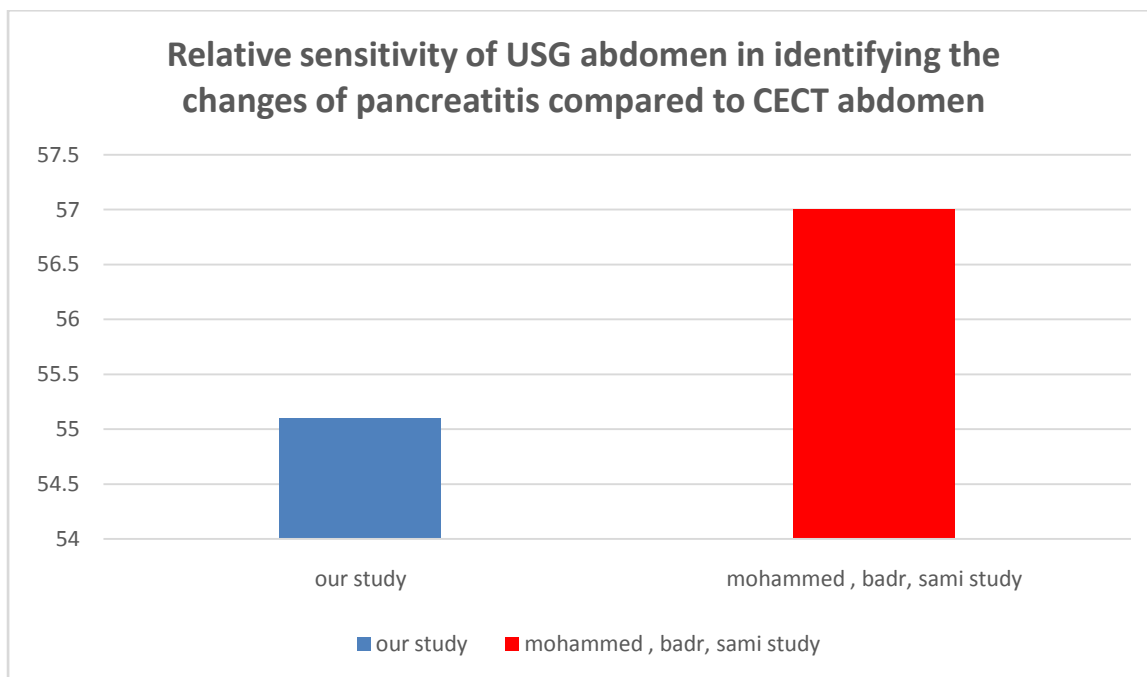
IV. Discussion

- A total of 100 patients referred from departments of surgery, gynecology and medicine were studied under this study and CECT abdomen and USG abdomen were performed and ability of the CECT abdomen and USG abdomen in identifying the changes of the common causes of acute abdomen were compared
- **Pancreatitis and its complications** were the most common cause among the patients who underwent CECT abdomen for acute abdomen, followed by **appendicular pathologies**.
- In the identification of the changes of **Acute pancreatitis, chronic pancreatitis and complications**, CECT abdomen is more sensitive than USG abdomen, USG abdomen was able to identify changes of pancreatitis and complications in **55.17 %** of the cases identified as pancreatitis on CECT abdomen.
 - Sensitivity of USG abdomen in identifying pancreatitis and its complications as a cause of acute abdomen depended mainly on patient characteristics and patient preparation,
 - USG abdomen was found to be relatively more sensitive in identifying the pseudo cyst as complication than vascular complications.
- In the identification of the changes of **Acute appendicitis and its complications** CECT abdomen is more sensitive than USG abdomen, USG abdomen was able to identify changes of appendicitis and complications in **76.92 %** of the cases identified as appendicitis on CECT abdomen.
- In the identification of the changes of **Acute cholecystitis and its complications** CECT abdomen is more sensitive than USG abdomen, USG abdomen was able to identify changes of appendicitis and complications in **81.8 %** of the cases identified as **cholecystitis** on CECT abdomen.
 - USG abdomen was sensitive in identifying the gall bladder stones.
 - USG abdomen was not sensitive in identifying the Gall bladder perforation as a complication of Acute cholecystitis
- In the identification of **Renal and ureteric calculi**, CECT abdomen is more sensitive than USG abdomen, USG abdomen was able to identify Renal and ureteric calculi in **87.5 %** of the cases identified as Renal and ureteric calculi on CECT abdomen.
 - USG abdomen was found be sensitive in identifying renal calculi, but not sensitive in identifying ureteric calculi.
- In the identification of **Small bowel obstruction** CECT abdomen is more sensitive than USG abdomen, USG abdomen was able to identify Small bowel obstruction in **76.92 %** of the cases identified as Small bowel obstruction on CECT abdomen.
 - USG abdomen was able to identify 100% of the cases when the cause for small bowel obstruction was intussusception.
 - USG abdomen was not sensitive in identifying changes sigmoid volvulus
- In the identification of changes associated hollow **viscus perforation** CECT abdomen is more sensitive than USG abdomen, USG abdomen was able to identify changes associated hollow **viscus perforation** in **25.00 %** of the cases identified as **hollow viscus perforation** on CECT abdomen
 - USG abdomen was not sensitive in identifying changes of hollow viscus perforation and site of perforation
- In the identification of changes associated with **pyelonephritis and its complications** CECT abdomen is more sensitive than USG abdomen, USG abdomen was able to identify changes associated with **pyelonephritis and its complications** in **80.00 %** of the cases identified as **pyelonephritis** on CECT abdomen
 - However, USG abdomen was not sensitive in identifying the changes of **uncomplicated pyelonephritis** but its complications like **pyonephrosis** and nephric and **per nephric abscess**.
- In the identification of intra-abdominal abscess CECT abdomen is more sensitive than USG abdomen, USG abdomen was able to identify Renal and ureteric calculi in **87.5 %** of the cases identified as Renal and ureteric calculion CECT abdomen.

- Adrienne van Randen, Wytze Laméris, H. Wouter van Es study **A comparison of the Accuracy of Ultrasound and Computed Tomography in common diagnoses causing acute abdominal pain** published in **springer European journal of radiology**¹ showed that USG showed relative sensitivity of **57 %** in identifying the changes of pancreatitis and its complications and **80%** in identifying appendicitis



- Mohamed E. Abd El Bagi, Badr M. Almutairi, , and Sami J. Alsolamy, study **Imaging of non-traumatic acute abdominal pain in adults presenting to the emergency department** , published in **Saudi medical journal**, showed that USG abdomen has relative sensitivity of **60 %** in identifying the changes of pancreatitis and **92 %** in identifying the changes of appendicitis



V. Conclusion

Acute abdomen is one of the most common cause for presentation at emergency room, and it has varied differential diagnoses, CECT abdomen and USG abdomen are most commonly performed investigation in acute abdomen, early diagnosis and management of the condition is important in reducing morbidity and mortality. The present study was aimed at correlating the findings in USG abdomen and CECT abdomen in patients with acute abdomen. In the present study we studied 100 patients referred from other departments for evaluation of acute abdomen, and CECT abdomen and USG abdomen were performed sequentially. USG abdomen was able to identify to 55.7% and 76.2% of cases identified as pancreatitis and appendicitis on CECT abdomen and 76.9% of bowel obstructions cases.

In the present series of study conducted for correlation of CECT abdomen and USG abdomen in the evaluation of acute non-traumatic abdomen, CECT abdomen was more sensitive and accurate in diagnosing the causes of non-traumatic acute abdomen, although USG abdomen was proved to be valuable first hand tool in management of non-traumatic acute abdomen.

References

- [1]. Van Randen, A. Laméris, W, van Es, H.W. et al. A comparison of the Accuracy of Ultrasound and Computed Tomography in common diagnoses causing acute abdominal pain. *Eur Radiol* 21, 1535–1545 (2011) doi:10.1007/s00330-011-2087-5
- [2]. Jaap Stoker, MD Adrienne van Randen, MD WytzeLame'ris, MSc Marja A. Boermeester, MD Imaging Patients with Acute Abdominal Pain <https://doi.org/10.1148/radiol.2531090302>
- [3]. Acute appendicitis: CT and US correlation in 100 patients. *E J Balthazar, B A Birnbaum, J Yee, A J Megibow, J Roshkow, C Gray*
- [4]. <https://doi.org/10.1148/radiology.190.1.8259423>
- [5]. Shah H, Parikh C, Raychaudhuri C. Role of Radiology in Evaluation of Non-Traumatic Acute Abdomen. *IAIM*, 2017; 4(3): 1-9.
- [6]. Venkanna M, Srinivas D, Sharada B. Clinical, Diagnostic, and Operative Correlation of Acute Abdomen. *Int J Sci Stud* 2018;6(2):138-143
- [7]. Randen, Adrienne &Laméris, Wytze&Es, H &Heesewijk, Hans &Ramshorst, Bert & Hove, Wim&Bouma, Willem &Leeuwen, Maarten &Keulen, Esteban &Bossuyt, Patrick & Stoker, Jaap&Boermeester, Marja. (2011). A comparison of the Accuracy of Ultrasound and Computed Tomography in common diagnoses causing acute abdominal pain. *European radiology*. 21. 1535-45. 10.1007/s00330-011-2087-5.
- [8]. Bhatt A, Tiparse A, Patel A, Gandhi B. USG and CT scan evaluation of patients of acute and chronic pancreatitis- a cross-sectional, comparative study. *Int J Res Med Sci* 2017;5: 3713- 6
- [9]. Prabhu R, Vijayakumar C, Balagurunathan K, Senthil VM, Kalaiarasi R, Swetha T. A study of correlation between clinical, radiological and pathological diagnosis of appendicitis: a retrospective analytic study. *IntSurg J* 2018;5:3011-6.
- [10]. Krishnappanasappa, ajitkumarreddy, siddappashirahatti A Comparative Evaluation of Various Imaging Findings with Per Operative Findings in Acute Abdomen
- [11]. H Prasad, G Rodrigues, R Shenoy. Role Of Ultrasonography In Non Traumatic Acute Abdomen. *The Internet Journal of Radiology*. 2006 Volume 5 Number 2
- [12]. Jastaniah, S ,Salih, A. ,Alsafi, K., Eltyib, H., Hagi, S. ,Khafaji, M. , Abbas, H. and Alshihri, M. (2015) CT Optimization for Diagnosis of Some Acute Abdomen Cases. *Advances in Computed Tomography*, 4, 19-26. doi: [10.4236/act.2015.42003](https://doi.org/10.4236/act.2015.42003).

Dr Hiral parekh, et. al. "USG and CT correlation of non-traumatic acute abdomen." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 19(6), 2020, pp. 55-62.