



Comparative Evaluation of Non Traumatic Acute Abdomen by USG And MDCT

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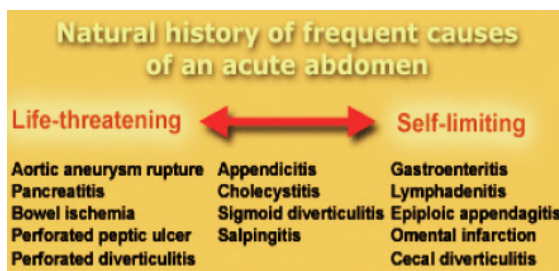
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KEYWORDS :

INTRODUCTION

- Acute abdomen refers to severe abdominal pain developing suddenly or over a period of several hours .
- The term encompasses long list of differential diagnosis which may vary from self limiting to life threatening diseases.
- Indicated management may vary from emergency surgery to reassurance of the patient.



Role of imaging

- The C/P is often nonspecific which may be normal in patients who need emergency surgery & abnormal in patients without a surgical disease.
- Laboratory findings (CBC,ESR &CRP)are mostly equivocal.
- Thus, imaging plays a vital role in establishing the diagnosis and planning of management

AIMS AND OBJECTIVE

- To evaluate the role of USG(Ultrasonography) in diagnosis of acute abdomen.
- To evaluate the role of MDCT in diagnosis of acute abdomen.
- Compare the results of USG with MDCT in these patients.

To find out relevant statistical data related to the above study.

Materials and methods

- **Study type:** Prospective study.
- **Study duration:** 1st august 2011– 31st march 2013.
- **Study size:** 200
- **Study group:** Cases of non-traumatic acute abdomen of all ages and sex.
- **Inclusion criteria:**
 - pts. of all ages and sex presenting with non-traumatic abdominal pain of >2 hrs & <5 days duration
- **Exclusion criteria:**
 - Abdominal trauma
 - Pregnant women
 - Patient with compromised vital signs.
- USG was done on WIPRO P3 and GE voluson 730 pro with multi-frequency convex probe of 3.5 MHZ and linear probe of 11 MHZ .
- Sonography was preferably done in fasting and with full bladder.
- However, in critical emergencies it was proceeded without preparation.
- CT scan abdomen was done on Siemens Somatom Emotion 16.
- Both oral & intravenous contrast medium were used unless contraindications were present.
- After acquisition of axial images, multiplanar reconstruction was done for higher quality visualization of the entire abdomen.

Parameter

• Contrast agent

Oral 750–1,000 mL 3% diatrizoate meglumine*
 Intravenous administration 110–120 mL nonionic contrast material. ,

- **Rate**
- **Acquisition**
- **Scan delay**
- **Scan area**
- **Section thickness**

Suggested Protocol

2 mL/sec
Single phase
 70–90 sec (portal venous phase)
 Diaphragm to symphysis pubis
 5 mm

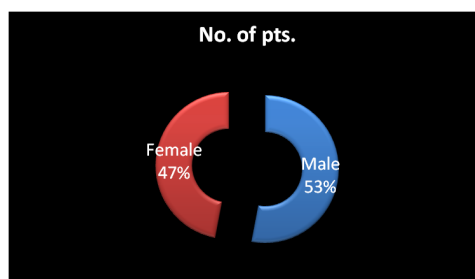
Observations & Results

TABLE 1 (AGE distribution OF PATIENTS IN ACUTE ABDOMEN)

AGE GROUP(YEARS)	NUMBER OF PATIENTS	PERCENTAGE(%)
0-10	9	4.5%
11-20	31	15.5%
21-30	51	25.5%
31-40	56	28%
41-50	38	19%
51-60	9	4.5%
>60	6	3%
TOTAL NUMBER OF PATIENTS	200	100

TABLE 2 (SEX DISTRIBUTION)

GENDER OF THE PATIENT	NUMBER OF PATIENTS	PERCENTAGE
MALE	106	53%
FEMALE	94	47%
TOTAL NUMBER	200	100%



Sex distribution

TABLE 3 (PRESENTING COMPLAINTS IN PATIENTS OF ACUTE ABDOMEN)

COMPLAINTS	NUMBER OF PATIENTS	PERCENTAGE(%)
ABDOMINAL PAIN-	200	100
NAUSEA/ VOMITING-	90	45
FEVER	46	23
ABDOMINAL DISTENTION	20	10
CONSTIPATION OR OBSTIBATION-	15	7.5
DYSURIA /HAEMATURIA	35	17.5
GYNAECOLOGICAL COMPLAINTS IN FEMALES IF PRESENT	4	2%

TABLE 4 (DISTRIBUTION OF PAIN IN PATIENTS WITH ACUTE ABDOMEN)

REGION	NUMBER OF PATIENTS	PERCENTAGE(%)
WHOLE ABDOMEN	38	19
EPIGASTRIUM	39	19.5
RIGHT HYPOCHONDRIUM	15	7.5
LEFT HYPOCHONDRIUM	4	2
HYPOGASTRIUM	15	7.5
LUMBAR REGIONS	46	23
UMBILICAL	9	4.5
RIGHT ILIAC FOSSA	29	14.5
LEFT ILIAC FOSSA	3	1.5
TOTAL NUMBER	200	100

TABLE 5 (CAUSES OF ACUTE ABDOMEN)

Causes of Acute abdomen	No. of patients
Urinary tract pathology	43
Gastrointestinal pathology	41
Hepatobiliary pathology	30
Pancreatitis	14
Gynaecological	20
Miscellaneous	14
Non specific pain	38
Total	200

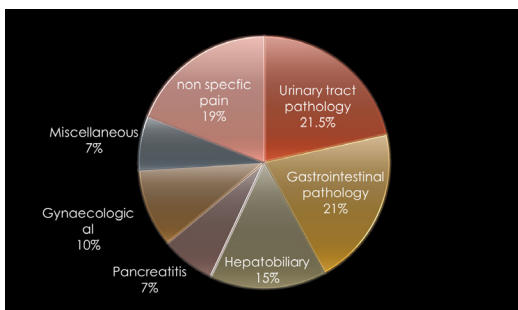


TABLE 5A (Age distribution)

Age	Urinary tract pathology	Gasetroint-estinal pathology	Hepatobilia-ry	Panc-re-atic	Gynaecological	Others	Non-specific abdominal pain
0-10	0	2	0	0	0	5	2
11-20	4	14	0	0	5	4	6

21-30	19	10	2	2	12	2	8
31-40	14	7	11	6	5	3	12
41-50	5	1	15	3	0	0	10
51-60	2	2	2	1	1	0	0
>60	1	3	0	0	1	0	0

**SECTION 6 URINARY TRACT PATHOLOGY
TABLE 6A (URINARY CAUSES OF ACUTE ABDOMEN)**

PATHOLOGY	NO. OF PATIENTS
I. UROLITHIASIS	44
a. URETERIC CALCULUS	23
b. RENAL CALCULUS	18
II. EMPHYSEMATOUS PYELONEPHRITIS	1
III. RENAL ABSCESS	1
IV. PYONEPHROSIS	1
TOTAL	43

TABLE 6B(AGE & SEX DISTRIBUTION)

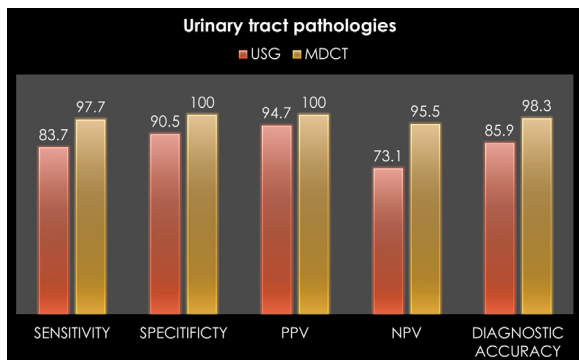
AGE	NO.OF PATIENTS	SEX		PERCENTAGE(%)
		MALE	FEMALE	
0-10	0	0	0	0
11-20	0	0	0	0
21-30	10	5	5	23
31-40	19	10	9	44
41-50	10	8	2	23
51-60	2	2	0	5
>60	2	2	0	5
TOTAL	43	27	16	100%

TABLE 6C (USG & MDCT FINDINGS IN RENAL CALCULI ON BASIS OF SIZE)

SIZE OF CALCULUS	NO. OF CALCULUS	LOCATION		NO.OF CALCULUS DETECTED BY USG	NO.OF CALCULUS DETECTED BY MDCT
		CALYX	PELVIS		
<5mm	4	4	0	2	4
>=5mm	14	10	4	14	14
TOTAL	18	14	4	16	18

TABLE 6D

	USG	MDCT
SENSITIVITY	83.7 %	97.7 %
SPECIFICITY	90.5 %	100 %
PPV	94.7 %	100 %
NPV	73.1 %	95.5 %
DA	85.9 %	98.3 %



SECTION 7 GASTROINTESTINAL CAUSES

TABLE 7A (GASTROINTESTINAL CAUSES OF ACUTE ABDOMEN)

GASTROINTESTINAL CAUSES	NO. OF PATIENTS
ACUTE APPENDICITIS	26
INTESTINAL OBSTRUCTION	13
PERFORATION	2
TOTAL	41

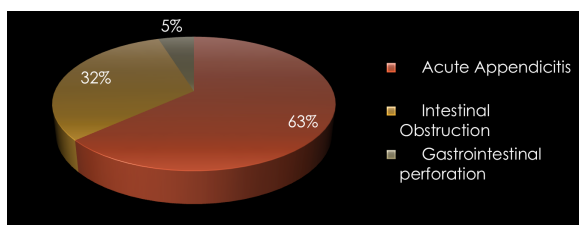


TABLE 7 B (AGE & SEX DISTRIBUTION IN APPENDICITIS, INTESTINAL OBS. & PERFORATION)

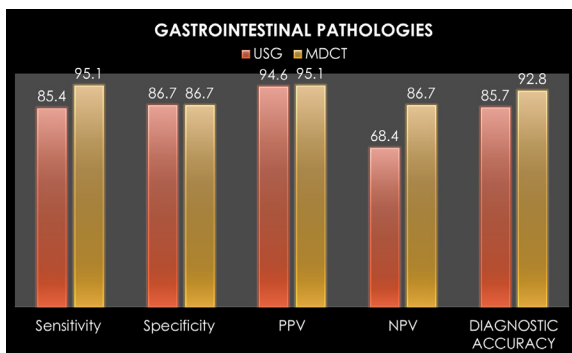
AGE	NO. OF PATIENTS OF APPENDICITIS		NO. OF PTS. OF INTESTINAL OBS.		PERFORATION
	MALE	FEMALE	MALE	FEMALE	MALE
0-10	0	0	2	0	
11-20	9	4	1	0	
21-30	7	5	2	1	
31-40	0	1	3	1	1
41-50	0	0	1	1	
51-60	0	0	0	0	
>60	0	0	1	0	1
	16	10	10	3	2

TABLE 7 C (USG & MDCT FINDINGS IN BOWEL OBSTRUCTION AND PERFORATION)

FINDINGS	USG DETECTED	MDCT DETECTED
DILATED BOWEL LOOPS		
SMALL BOWEL	9	10
LARGE BOWEL	2	2
THICKENED WALL	7	8
ISCHAEMIA OF BOWEL WALL	2	3
PERFORATION	0	2

	USG	MDCT

SENSITIVITY	85.4 %	95.1 %
SPECIFICITY	86.7 %	86.7 %
PPV	94.6 %	95.1 %
NPV	68.4 %	86.7 %
DA	85.7 %	92.9 %



SECTION 8 HEPATOBILIARY CAUSES

TABLE 8A (HEPATOBILIARY CAUSES OF ACUTE ABDOMEN)

Hepatobiliary causes	No. of patients
ACUTE CHOLECYSTITIS	18
OBSTRUCTIVE BILIOPATHY	5
HEPATIC ABSCESS	7
TOTAL	30

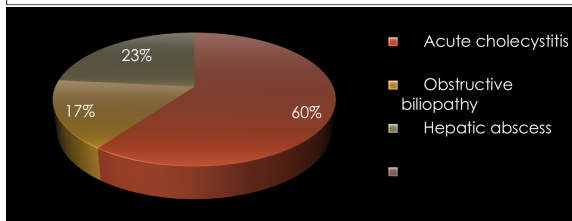


TABLE 8B (AGE & SEX DISTRIBUTION IN HEPATOBILIARY CAUSES)

AGE	NO. OF PTS. OF CHOLECYSTITIS		NO. OF PTS. OF CHOLEDOCHOLIT.		NO. OF PTS. OF LIVER ABSCESS	
	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
0-10	-	-	-	-	-	-
11-20	-	-	-	-	-	-
21-30	-	2	-	-	2	-
31-40	2	2	-	-	4	-
41-50	4	4	1	1	1	-
51-60	1	2	1	1	-	-
>60	1	0	-	-	-	-
TOTAL	8	10	2	2	7	-

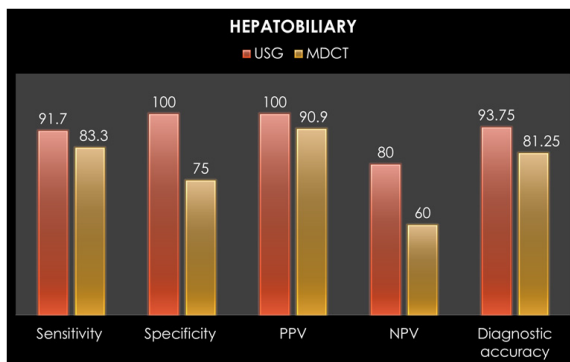
TABLE 8C (USG & MDCT FINDINGS IN CHOLECYSTITIS)

FINDINGS	NO. OF PTS. DETECTED BY USG	NO. OF PTS. DETECTED BY MDCT
THICKENED/OEDEMATOUS GB WALL	17	15
DISTENDED GB LUMEN	12	12
GALL STONES	18	10
PERI GB FLUID	8	8
PROBE TENDERNESS	12	NA

TABLE 8 D (USG & MDCT FINDINGS IN CHOLEDOCHOLITHIASIS)

FINDINGS	NO. OF PTS. DETECTED BY USG	NO. OF PTS. DETECTED BY MDCT
DILATED CBD	5	5
CALCULUS IN CBD	5	3
DILATED IHBR	5	5

	USG	MDCT
SENSITIVITY	93.3 %	83.3 %
SPECIFICITY	100 %	66.7 %
PPV	100 %	44.5 %
NPV	75 %	80.55 %



SECTION 9 PANCREATITIS

TABLE 9 A (PANCREATIC CAUSES OF ACUTE ABDOMEN)

TYPE	NO. PATIENTS
ACUTE PANCREATITIS	9
ACUTE ON CHRONIC PANCREATITIS WITH PSEUDOCYST	5
TOTAL	14

TABLE 9B (USG & MDCT FINDINGS IN PANCREATITIS)

FINDINGS	NO. PTS. DETECTED BY USG	NO. PTS. DETECTED BY MDCT
BULKY PANCREAS (DIFFUSE/ FOCAL)	10	13
ALTERED ECHOTEXTURE/ ATTENUATION	10	13
PERIPANCREATIC ECHOGENIC FAT/STRANDING	6	10
INTRA/EXTRAPANCREATIC FLUID	6	8
PSEUDOCYST	5	5
DILATED PANCREATIC DUCT	5	5
EXTRAPANCREATIC COMPLICATIONS	6	6
DIAGNOSIS	10	13

TABLE 9C (CT SEVERITY INDEX GRADING)

CT GRADE	SCORE	NO. OF PATIENTS	NECROSIS	SCORE	NO. OF PATIENTS
A	0	1	NONE	0	6
B	1	3	<30%	2	4
C	2	1	30-50%	4	3
D	3	6	>50%	6	1
E	4	3			
TOTAL		14			14

PANCREATITIS

SECTION 10 GYNAECOLOGICAL CAUSES
Gynaecological causes

Gynaecological causes	No. of patients
PID	5
OVARIAN CYST (SIMPLE&HAEMORHAGIC)	9
TUBO- OVARIAN ABSCESS	2
ENDOMETRIOSIS	2
HAEMATOMETRA/PYOMETRA	2

TABLE 10B (AGE DISTRIBUTION OF GYNAECOLOGICAL CAUSES OF ACUTE ABDOMEN)

AGE DISTRIBUTION	NO. OF PATIENTS
0-10	0
11-20	5
21-30	11
31-40	2
41-50	1
51-60	0
>60	1
TOTAL	20

TABLE 10C (USG & MDCT IN DETECTION OF GYNAECOLOGICAL CAUSES)

GYNAECOLOGICAL CAUSES	NO. OF CASES DETECTED BY USG	NO. OF CASES DETECTED BY MDCT
OVARIAN CYST (SIMPLE&HAEMORHAGIC)	9	9
PID	5	3
TUBO- OVARIAN ABSCESS	2	2
ENDOMETRIOSIS	2	2
HAEMATOMETRA/PYOMETRA	2	2
TOTAL	20	18

SECTION 11 MISCELLANEOUS CAUSES

TABLE 11A (MISCELLANEOUS CAUSES OF ACUTE ABDOMEN)

MISCELLANEOUS CAUSES	NO. OF PATIENTS
PSOAS ABSCESS	3
MESENTERIC LYMPHADENITIS	10
EPIPLOIC APPENDAGITIS	1

TABLE 11B (USG & MDCT IN DETECTION OF MISCELLANEOUS CAUSES)

MISCELLANEOUS CAUSES	NO. OF CASES DETECTED BY USG	NO. OF CASES DETECTED BY MDCT
PSOAS ABSCESS	3	3
MESENTERIC LYMPHADENITIS	10	10
EPIPLOIC APPENDAGITIS	1	1
TOTAL	14	14

figure 1:USG left UVJ calculus

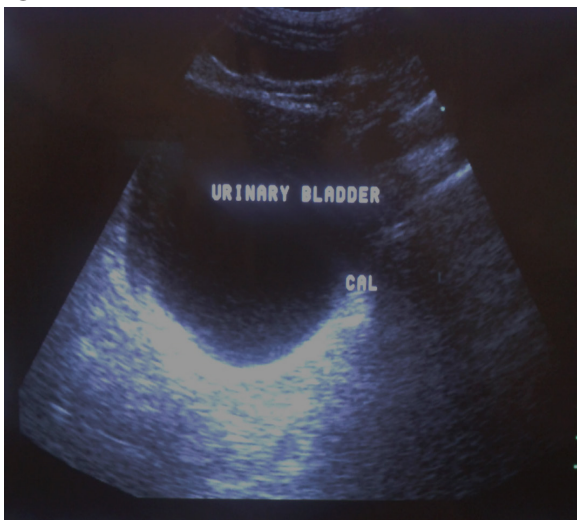


figure 2: MDCT left UVJ calculus

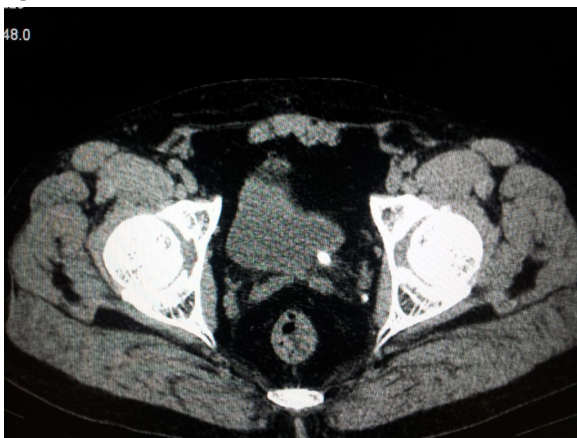


figure 3: USG left upper ureteric calculus with hydroneureter

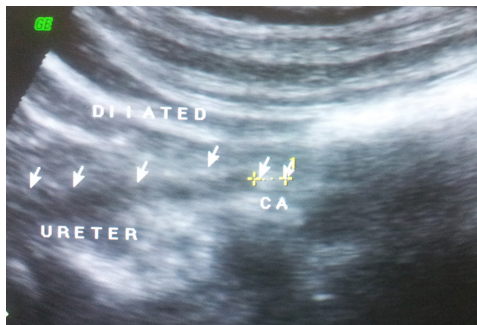


figure 4: MDCT coronal view left upper ureteric calculus with proximal hydroneureteronephrosis



figure 5: MDC coronal view shows right lower ureteric calculus at iliac bifurcation with hydronephrosis seen in right kidney. The calculus was not visible on usg but showed hydronephrosis.

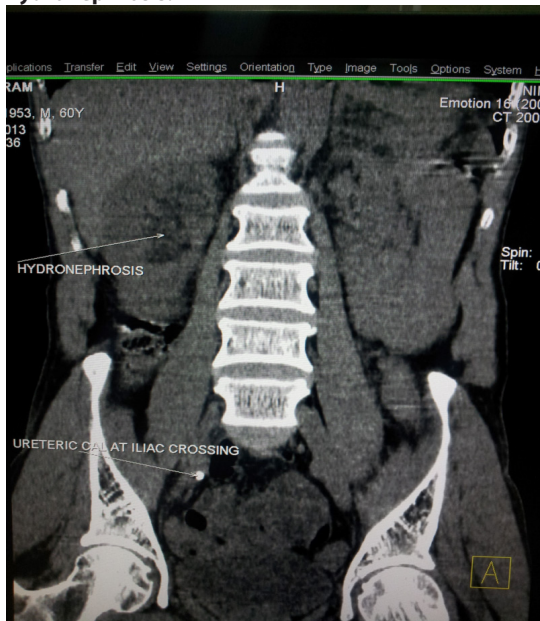


figure 6: USG shows right hydronephrosis but did not reveal distal calculus in lower ureter

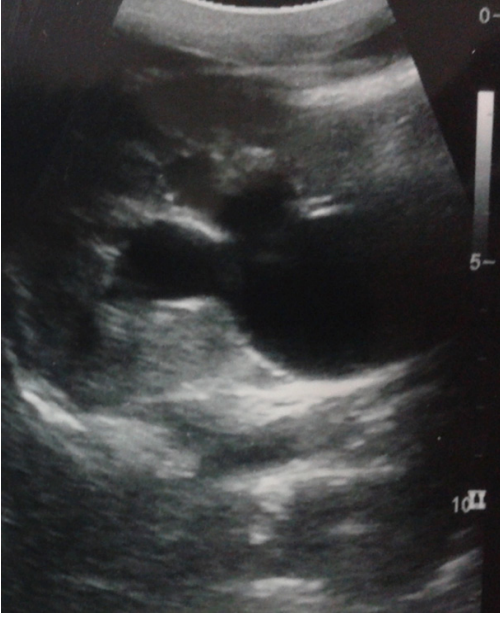


figure 7: USG shows thickened blind ended tubular aperistaltic structure in RIF suggestive of appendicitis

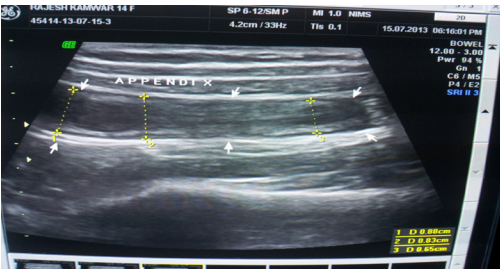


figure 8: inflamed appendix noted arising from base of caecum suggestive of appendicitis.



figure 9: USG reveals target lesion in RIF suggestive of intussusception.

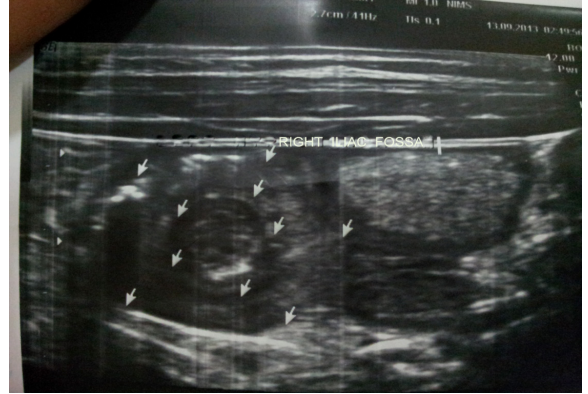


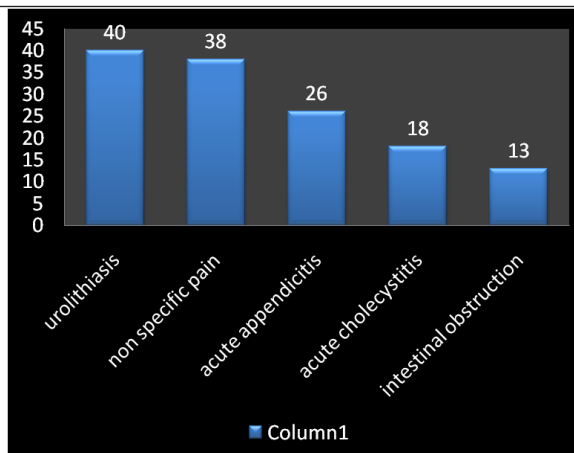
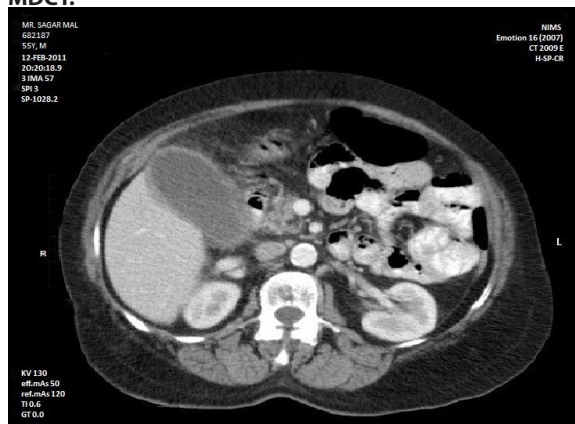
figure 10: MDCT axial view shows similar target lesion involving distal ileum and caecum suggestive of ileocolic intussusception.



figure 11: Distended GB with thickened wall and multiple calculus with distal acoustic shadowing suggestive of calculi cholecystitis .



figure 12: MDCT axial view shows distended GB with thickened GB wall. There is no evidence of calculus on MDCT.



Our study

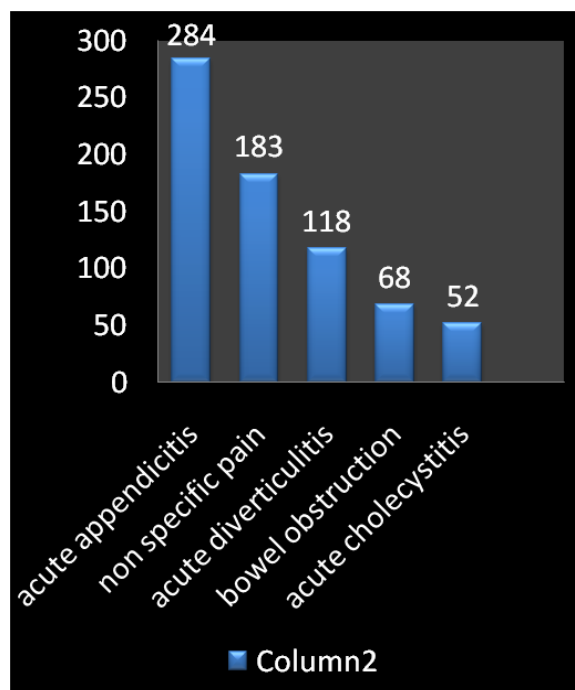
Conclusion:

- Thus, with this our study concluded that USG has a good sensitivity, specificity & DA for most of the causes of acute abdomen.
- It proved to be a better modality for diagnosing hepatobiliary & gynaecological causes of acute abdomen.
- Moreover, its inherent advantages of lack of radiation & contrast, low on expenses and portability further strengthen its importance in imaging of acute abdomen.
- Whereas, MDCT proved to be a superior modality in terms of sensitivity, specificity & DA for all patients of acute abdomen except in cases of hepatobiliary & gynaecological conditions.

MDCT is also superior in terms of lack of operator dependency, ability to diagnose broad spectrum of diseases & helping the physician and surgeon by assessing the severity and grading of the disease, and giving exquisite and comprehensive anatomical details

1. Thus, we recommend USG as the modality of choice for hepatobiliary and gynaecological causes of acute abdomen.
2. We also suggest "first pass" use of USG, especially in children & young patients.
3. Lastly, we acknowledge the overall superiority of MDCT over USG in diagnosing acute abdomen and thus recommend its use whenever USG is equivocal or gives limited details to the physician or operating surgeon

	Lameris W et al	Our study
Study type	Multicentric Prospective study	Monocentric Prospective study
Location	Netherlands	NIMS hospital Jaipur
No. of patients	1021	200
Objective	To identify an optimal imaging strategy.	To statistically determine the role of USG & MDCT. To compare the 2 modalities .
Reference	Lameris W, van Randen A, van Es HW, et al. Imaging strategies for detection of urgent conditions in patients with acute abdominal pain: diagnostic accuracy study. BMJ 2009	



Lameris et al study