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Focused Assessment with Sonography for Trauma (Fast) Versus Contrast Enhanced Computed Tomography in Blunt Abdominal Trauma: A Prospective Observational Study.

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ABSTRACT

Blunt abdominal trauma requires rapid diagnosis to reduce morbidity and mortality. This study evaluated diagnostic role of Focused Assessment with Sonography for Trauma (FAST) compared with contrast enhanced computed tomography (CECT). To evaluate the role of Focused Assessment with Sonography in Trauma (FAST) compared with contrast-enhanced computed tomography (CECT) in patients with blunt abdominal injury. A prospective observational study was conducted on 50 adult patients with blunt abdominal injury admitted to Government Mohan Kumaramangalam Medical College Hospital, Salem, between July 2024 and June 2025. All patients underwent clinical evaluation, FAST, and CECT, and findings were analyzed. Most patients were males (76%) aged 31–50 years (48%). FAST most frequently detected free fluid in the left hypochondrium (44%). CECT identified splenic injury as the commonest organ injury (32%), followed by liver (22%) and renal injuries (18%). Significant associations were observed between age, imaging findings, and injury pattern ($p<0.001$). FAST rapidly identified clinically significant intra-abdominal injury, while CECT provided superior characterization of organ injuries and associated lesions**.** FAST is an effective bedside screening tool for the initial assessment of blunt abdominal trauma, particularly in emergency settings. However, CECT remains the gold standard in hemodynamically stable patients because of its higher diagnostic accuracy and comprehensive evaluation. Combining FAST with selective CECT optimizes early diagnosis and patient management.

Keywords: CECT, FAST, sonography, injury.

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INTRODUCTION

Accidents are the leading cause of blunt abdominal trauma, a condition ranked high among the most common forms of injuries. The increasing number of motor vehicles has resulted in a rising incidence of blunt abdominal trauma worldwide. The cause of the majority of blunt abdominal injuries, 75–80%, is as a result of motor vehicle accidents. In addition, blunt injuries to the abdomen may be caused by falls from a great height, collisions with sharp objects, job accidents, sports injuries, bomb blasts, and bicycle impacts. Blunt abdominal injuries usually remain unreported. Hence, frequently overlooked until vigorously searched. Death occurs in the majority of cases because of delayed diagnosis and insufficient treatment for abdominal injuries [1].

Actually, blunt abdominal trauma happens as often as 12–15% of the cases, and car accidents cause around 80% of these [2].

The computed tomography scans with contrast enhancement are not invasive. It is the most accurate method of radiography to diagnose blunt abdominal injuries in patients currently. All patients, who are hemodynamically stable, have multiple extra-abdominal injuries, have neurological impairment or impaired sensorium from drug or alcohol use, or an injury mechanism that suggests a duodenal or pancreatic injury should undergo a CT scan. A CT scan is not warranted with someone with blunt abdominal injuries and who is hemodynamically unstable or displays signs of laparotomy [3].

The emergency room physicians and trauma surgeons use emergent sonography focused abdominal sonography for trauma, or FAST, to quickly, painlessly, and accurately evaluate acute abdominal injuries. FAST is a quick four-view ultrasound for the initial survey that seeks to look for the presence of hemoperitoneum, hemothorax, and hemopericardium [4].

Although there are few studies comparing contrast-enhanced computed CT with targeted abdominal sonography in trauma patients, this study compares targeted abdominal sonography with contrast-enhanced computed tomography for evaluating blunt abdominal injuries in trauma.

Aim

To compare the diagnostic performance of FAST and contrast enhanced computed tomography in patients with blunt abdominal trauma.

MATERIALS AND METHODS

Design Of The Study

A Prospective observational study was conducted

Study Group

The study involves 50 patients with the diagnosis of blunt abdominal injuries in the TAEI ward of Government Mohan Kumaramangalam Medical College and Hospital, Salem between July 2024 and June 2025

Inclusion Criteria:

1. All of the patients admitted with the diagnosis of blunt injury abdomen in TAEI ward of GMKMCH, Salem
2. Patients with age, more than 18 years old

Exclusion Criteria:

1. Patients with Stab injury
2. Penetrating Injury cases
3. Patients whose age, less than 18 years

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Methods And Collection Of Data:

1. The material of the study is taken from the patients admitted with findings of blunt abdominal injuries in the TAEI ward of GMKMCH
2. Data were gathered in accordance to age, demography, economic status, history including individual patients' complaints, duration. General examination and also systemic examination were performed. Patients were followed until their discharge and also thereafter

OBSERVATION AND RESULTS

Table 1: Blunt injury abdomen patients and age distribution (N=50)

Age	Frequency	Percentage
18 to 30 Years	9	18
31 to 50 Years	24	48
51to 70 Years	17	34
Total	50	100

Between the total of 50 patients, majority 48 % (n=24) of the patients were in the age group 31-50 years

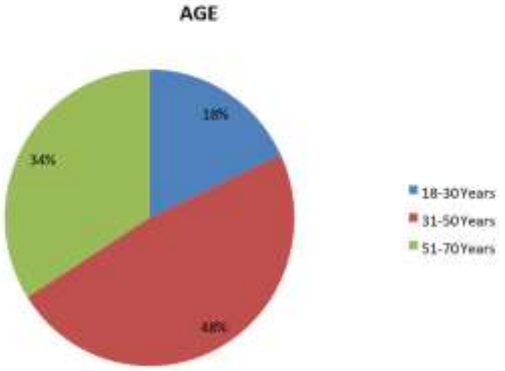

Table 2: Blunt injury abdomen and Mean age distribution (N=50)

Mean Age In Years	
Mean	45.76
Std. Deviation	13.092

The mean age of the patients was observed as 45.76±13.09 (years).

Table 3: Patients with blunt injury abdomen and Gender Distribution (N=50)

Gender	Frequency	Percentage
Male	38	76.0
Female	12	24.0
Total	50	100.0

Between the total of 50 patients, majority 38 (76%) were male patients.

Table 4: Patients Of blunt abdominal injuries and Distribution of FAST findings (N=50)

FAST findings	Frequency	Percentage
Xiphisternum	4	8.0
Right hypochondrium	19	38
Left hypochondrium	22	44.0
Pelvis	5	10.0
Total	50	100.0

In the majority of patients 22 (44%) had Left hypochondrium in FAST findings.

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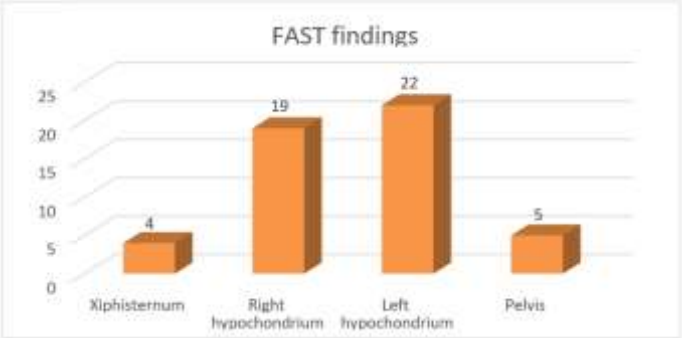

Table 5: Patients of blunt injury abdomen and Distribution of CT(Computed Tomography) findings (N=50)

CT(Computed tomography) scan findings	Frequency	Percentage
Splenic injury	16	32.0
Liver injury	11	22.0
Renal injury	9	18.0
Bladder injury	3	6.0
Hollow viscous perforation	4	8.0
Multiple organ injury	7	14.0
Total	50	100.0

Most of the patients, 16 (32%) had Splenic injury in CT scan findings .

Table 6: Comparison of FAST with Computed Tomography scan and it's distribution among patients of blunt abdominal injuries (N=50)

Comparison of fast and CT scan	Frequency	Percentage
Spleen	15	30.0
Liver	12	24.0
Kidney	8	16.0
Mesentery	5	10.0
Bladder	5	10.0
Intestine	3	6.0
Pancreas	2	4.0
Total	50	100.0

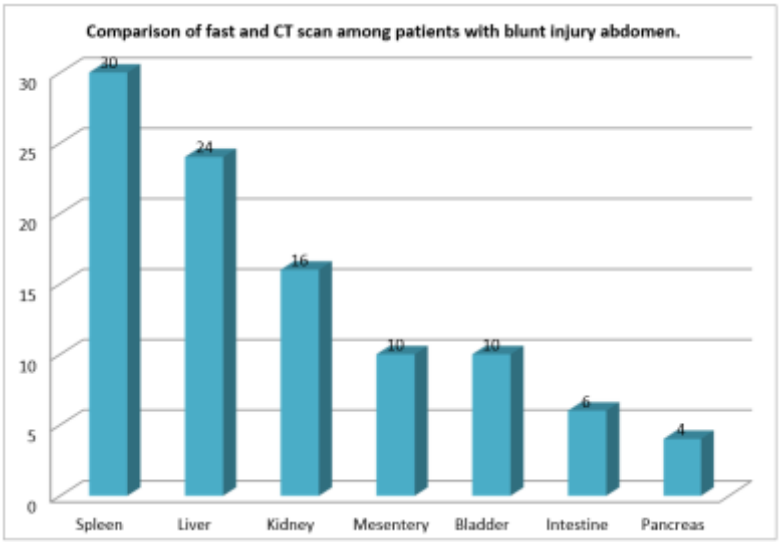

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Table 7: Correlation of Focused Assessment Sonography for Trauma findings with AGE among patients with the diagnosis of blunt injury abdomen. (N=50)

FAST findings with AGE				
		AGE		
		18-30 Years	31-50 Years	51-70 Years
FAST findings	Xiphisternum	4	0	0
		44.4%	0.0%	0.0%
	Right hypochondrium	5	14	0
		55.6%	58.4%	0.0%
	Left hypochondrium	0	10	12
		0.0%	41.6%	70.6%
	Pelvis	0	0	5
		0.0%	0.0%	29.4%
Total		9	24	17
		100.0%	100.0%	100.0%
Chi-square test		chi-square value = 66.228		p-value 0.001** HS

Statistically significant at p<0.001

Table 7: Chi-square test reveals a very high association between FAST results and age groups with a p-value of 0.001. Thus, it can be presumed that anatomical regions where blunt abdominal injuries occur have a good association with the age of patients who suffer such an injury. Xiphisternum and right hypochondrium injury is significantly more frequent in the younger groups, while left hypochondrium and pelvis injury is more frequent in the elderly groups.

Table: 8 Association of Computed tomography scan findings with AGE of patients with blunt abdominal injuries (N=50)

CT scan findings with AGE				
		AGE		
		18-30 Years	31-50 Years	51-70 Years
CT scan findings	Splenic injury	9	7	0
		100.0%	29.2%	0.0%
	Liver injury	0	11	0
		0.0%	45.8%	0.0%
	Renal injury	0	2	7
		0.0%	8.3%	41.2%
	Bladder injury	0	0	3
		0.0%	0.0%	17.6%
	Hollow viscus perforation	0	0	4
		0.0%	0.0%	23.5%
	Multiple organ injury	0	4	3
		0.0%	16.7%	17.6%
Total		9	24	17
		100.0%	100.0%	100.0%
Chi square test		Chi-square value = 53.493		p-value 0.001** HS

**Statistically significant at p<0.001

Chi square value on age groups with types of injuries had a higher significance at p < 0.001 because the p-value was 0.001. The chi-square value was 53.493.

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Table: 9 Association of Comparison of FAST and COMPUTED TOMOGRAPHY scan with AGE among patients in blunt injury abdomen. (N=50)

Comparison of fast and CT scan with AGE				
		AGE		
		18-30 Years	31-50 Years	51-70 Years
Comparison of fast and CT scan	Spleen	9	6	0
		100.0%	25.0%	0.0%
	Liver	0	12	0
		0.0%	50.0%	0.0%
	Kidney	0	6	2
		0.0%	25.0%	11.8%
	Mesentery	0	0	5
		0.0%	0.0%	29.4%
	Bladder	0	0	5
		0.0%	0.0%	29.4%
	Intestine	0	0	3
		0.0%	0.0%	17.6%
	Pancreas	0	0	2
		0.0%	0.0%	11.8%
Total		9	24	17
		100.0%	100.0%	100.0%
Chi square test		chi-square value = 64.963		p-value 0.001** HS

**Statistically significant at p<0.001

There is a high level of probability that the relationship between age and type of injury revealed by FAST and CT scans is highly significant. This is a result of the high chi-square value 64.963 with p = 0.001.

Table 10: Comparison of Focused Assessment Sonography for Trauma and Computed Tomography scan with Gender among patients of diagnosis with blunt injury abdomen. (N=50)

Comparison of fast and CT scan with GENDER				
		GENDER		Total
		Male	Female	
Comparison of fast and CT scan	Spleen	15	0	15
		39.5%	0.0%	30.0%
	Liver	12	0	12
		31.6%	0.0%	24.0%
	Kidney	8	0	8
		21.1%	0.0%	16.0%
	Mesentery	3	2	5
		7.9%	16.7%	10.0%
	Bladder	0	5	5
		0.0%	41.7%	10.0%
	Intestine	0	3	3
		0.0%	25.0%	6.0%
	Pancreas	0	2	2
		0.0%	16.7%	4.0%
Total		38	12	50
		100.0%	100.0%	100.0%
Chisquare test		chisquare value = 43.421		p-value = 0.001** HS

**Statistically significant at p<0.001

There is a high level of significance between gender and the type of injury, as they are highly significantly associated; the chi-square value is 43.421 with a p-value of 0.001.

DISCUSSION

This prospective observational study evaluated the diagnostic performance of Focused Assessment with Sonography for Trauma (FAST) compared with contrast-enhanced computed tomography (CECT) in 50 adult patients with blunt abdominal trauma. The majority of patients were males (76%), with the highest incidence occurring in the 31–50-year age group (48%). These findings are consistent with previous studies by Ahmed et al [12] and Reddy et al [13] who reported that blunt abdominal trauma predominantly affects economically active middle-aged males because of increased exposure to road traffic accidents, occupational injuries, and other high-energy mechanisms.

FAST proved to be an effective bedside screening investigation. Free intraperitoneal fluid was most frequently detected in the left hypochondrium (44%), followed by the right hypochondrium (38%). Richards and McGahan [1] emphasized that FAST is a rapid, non-invasive, and repeatable imaging modality during the primary trauma survey. Rippey and Royse [10] similarly highlighted its usefulness in rapidly detecting clinically significant hemoperitoneum, facilitating early surgical decision-making in hemodynamically unstable patients. However, FAST remains limited in detecting retroperitoneal injuries, hollow viscus injuries, diaphragmatic injuries, and small-volume intraperitoneal fluid.

In the present study, CECT identified splenic injury as the commonest abdominal organ injury (32%), followed by liver injury (22%), renal injury (18%), hollow viscus perforation (8%), bladder injury (6%), and multiple organ injuries (14%). These findings are comparable to those reported by Boutros et al [9] who demonstrated that splenic and hepatic injuries are the most frequent solid organ injuries after blunt abdominal trauma. CECT accurately characterized organ injuries, graded their severity, and identified associated vascular and retroperitoneal injuries, thereby guiding operative and non-operative management.

Comparison of FAST with CECT showed that although FAST successfully detected clinically significant hemoperitoneum, CECT demonstrated superior diagnostic accuracy in characterizing organ-specific injuries and identifying associated lesions missed or incompletely evaluated by ultrasound. Similar observations were reported by Radwan and Abu-Zidan [15] and by Reddy et al [13] who concluded that FAST is an excellent initial screening tool whereas CECT remains the definitive imaging modality for hemodynamically stable patients.

The statistically significant association observed between age, imaging findings, and injury pattern ($p<0.001$) suggests that demographic characteristics may influence injury distribution. Recent ATLS recommendations support FAST as the initial imaging investigation in unstable trauma patients, while WSES guidelines recommend contrast-enhanced CT as the investigation of choice in hemodynamically stable patients because of its superior diagnostic accuracy and ability to grade injuries [6-14].

Overall, the findings reinforce that FAST and CECT are complementary rather than competing investigations. FAST enables rapid bedside triage and early decision-making during initial resuscitation, whereas CECT provides comprehensive anatomical assessment for definitive management. Integrating FAST as the first-line screening tool followed by selective CECT in stable patients represents the most effective imaging strategy for blunt abdominal trauma and is consistent with current evidence and international trauma guidelines.

CONCLUSION

CECT remains gold standard for evaluating hemodynamically stable patients with blunt abdominal trauma because of its superior diagnostic accuracy and ability to characterize organ injuries. FAST serves as an excellent initial bedside screening modality, particularly in unstable patients. The combined use of FAST followed by selective CECT provides the most effective diagnostic strategy.

Therefore, CECT is still the first-line investigation modality for patients with blunt traumatic abdominal injuries who are hemodynamically stable.

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