



## STUDY OF ROLE OF ULTRASONOGRAPHY IN ACUTE TRAUMA SETTINGS

## Radiology

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## ABSTRACT

Trauma-related injuries are a significant cause of mortality, necessitating rapid and accurate diagnostic methods. Ultrasonography, particularly the Focused Assessment with Sonography for Trauma (FAST), offers a non-invasive, radiation-free, and swift means of assessing acute trauma cases. In seventy participants with acute trauma, ultrasonography findings were correlated with CT scans and intraoperative observations. Ultrasonography, particularly FAST, emerges as a valuable diagnostic tool for acute trauma. Its non-invasive, rapid, and reliable nature positions it as an essential asset in the initial assessment of trauma patients, facilitating timely decisions for surgical intervention or conservative treatment.

## KEYWORDS

## INTRODUCTION

Trauma-related injuries are a leading cause of mortality among individuals under 45 years old. Point-of-care ultrasound has transformed patient examination and treatment by offering accessibility, ease of use, and reproducibility. The Focused Assessment with Sonography in Trauma (FAST) ultrasound strategy was developed to detect hemoperitoneum and hemopericardium, consistently reporting specificities exceeding 98% and sensitivities ranging from 85% to 96%. Today, FAST has evolved into a comprehensive examination encompassing the abdomen, heart, chest, and inferior vena cava, with various technique variations, protocols, and interpretations available.

This prospective observational study was conducted over a period of six months.

## OBSERVATION AND RESULTS

In this study, the mean age of the participants was  $35.3 \pm 13.1$  years, with the majority falling in the age range of 18-50 years (75.7%). Of the 70 participants, 54 were male (77.1%), and 16 were female (22.9%).

Regarding complaints, the most common abdominal complaint was pain in the left upper quadrant (LUQ) (28.6%), while right lower quadrant (RLQ) pain followed (20%). Among chest complaints, right-sided chest pain was the most prevalent (10%).

**Table-1: Distribution Of Study Participants According To USG-abdomen And Chest Findings**

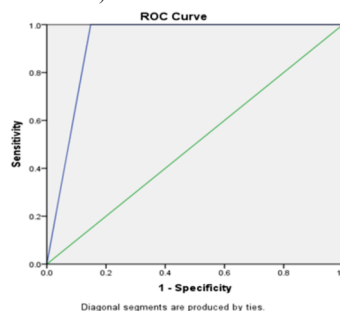
| USG-abdomen and Chest Findings | Frequency | Percent |
|--------------------------------|-----------|---------|
| <b>USG-abdomen (n=70)</b>      |           |         |
| Perihepatic fluid              | 19        | 27.1    |
| Perisplenic fluid              | 10        | 14.3    |
| Pelvis                         | 6         | 8.6     |
| Pericardial fluid              | 2         | 2.9     |
| Solid abdominal organ injury   | 10        | 14.3    |
| <b>Organ (n=10)</b>            |           |         |
| Liver                          | 5         | 50      |
| Spleen                         | 3         | 30      |
| Pancreas                       | 1         | 10      |
| Right kidney                   | 1         | 10      |
| Total                          | 10        | 100     |
| <b>USG-chest (n=70)</b>        |           |         |
| Right pleural fluid            | 3         | 4.3     |
| Left pleural fluid             | 3         | 4.3     |
| Right pneumothorax             | 1         | 1.4     |
| Left pneumothorax              | 1         | 1.4     |
| Fracture                       | 4         | 5.7     |

In this study, among the 70 participants, CT scans confirmed acute trauma in 27 patients, indicating positive findings. Additionally, FAST examinations yielded positive results for acute trauma in 23 out of the 70 participants. Moreover, during the intra-operative assessments, acute trauma diagnoses were established in 6 patients. Furthermore, post-treatment follow-up revealed that 23 patients had their acute trauma diagnoses confirmed.

**Table-2: Comparison Of Ultrasonography Findings With Final Diagnosis**

|               |     |                        | Final                  |          | Total  | p-value |
|---------------|-----|------------------------|------------------------|----------|--------|---------|
|               |     |                        | Positive               | Negative |        |         |
| FAST Positive | Yes | Count                  | 23                     | 0        | 23     | 0.001   |
|               |     | % within FAST Positive | 100.0%                 | 0.0%     | 100.0% |         |
|               |     | % within final         | 85.2%                  | 0.0%     | 32.9%  |         |
|               | No  | Count                  | 4                      | 43       | 47     |         |
|               |     | % within FAST Positive | 8.5%                   | 91.5%    | 100.0% |         |
| Total         |     |                        | Count                  | 27       | 43     | 70      |
|               |     |                        | % within FAST Positive | 38.6%    | 61.4%  | 100.0%  |
|               |     |                        | % within final         | 100.0%   | 100.0% | 100.0%  |

In this study, Ultrasonography was compared to the final diagnosis. Ultrasonography correctly diagnosed acute trauma in 23 out of 27 patients with a statistically significant difference (p-value 0.001). Regarding the diagnostic accuracy of Ultrasonography in acute trauma, the study found a sensitivity of 85.2%, specificity of 100%, positive predictive value (PPV) of 100%, and negative predictive value (NPV) of 91.5%. The accuracy (area under the curve) of Ultrasonography in diagnosing acute trauma was 0.926 with a 95% confidence interval (CI) of 0.845-1.000, which was statistically significant (p-value 0.001).



**Figure-1: ROC Curve For Diagnostic Accuracy Ultrasonography In Acute Trauma**

These results demonstrate that Ultrasonography is a valuable diagnostic tool in acute trauma, particularly in identifying free fluid and solid organ injuries.

## DISCUSSION

Focused Assessment with Sonography for Trauma (FAST) has become a pivotal tool for assessing trauma patients. Acute trauma primarily affects males in their early thirties.

The most prevalent USG findings in our study included perihepatic fluid (27.1%), perisplenic fluid, and solid abdominal organ injuries (both 14.3%). Liver injuries were the most common among solid organ injuries (50%). In terms of chest findings, pleural fluid was the most frequent (8.6%), followed by rib fractures (5.7%) and pneumothorax (2.9%).

To confirm the diagnosis of acute trauma, we utilized various methods, including CT scans, clinical assessments during follow-up visits, and laparotomy. Among the 27 patients with confirmed acute trauma, CT scans were positive in 23 cases, while clinical and CT assessments during follow-up visits confirmed 23 patients, with an additional six patients diagnosed during laparotomy.

## CONCLUSION

This study represents a notable contribution to the evaluation of Focused Assessment with Sonography for Trauma (FAST) accuracy within the Indian context. The results demonstrate that FAST achieves an impressive accuracy rate exceeding 92%. This finding holds significant promise, especially in scenarios where access to computed tomography (CT) may be limited, such as high-casualty combat situations.

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