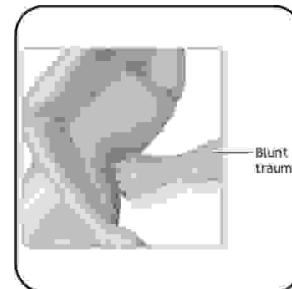


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## ROLE OF FAST AND DPL IN ASSESSMENT OF BLUNT ABDOMINAL TRAUMA



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**ABSTRACT...** [suhailamer@yahoo.com](mailto:suhailamer@yahoo.com) **Objectives:** To assess and compare the diagnostic accuracy of Diagnostic Peritoneal Lavage (DPL) and Focused Assessment Sonography for Trauma (FAST). **Design:** A comparative study. **Setting:** SU II Department of surgery Allied Hospital Faisalabad. **Period:** From Jan 2006 to Dec 2006 **Material and Methods:** A total of 50 patients irrespective of age and sex, presenting to casualty department with blunt trauma abdomen were included in the study. Patients with equivocal signs of peritonitis underwent abdominal ultrasonography followed by diagnostic peritoneal lavage. The operative findings were also recorded. **Results:** Out of total 50 patients, Sensitivity of FAST was 88.88%, Specificity 91.30%, Accuracy 90.00%, and Positive predictive value 92.30%, Negative predictive value 91.30%. In 3 patients ruled out on ultrasonography but confirmed on Diagnostic peritoneal lavage and exploratory laparotomy (false negative). Sensitivity of DPL was 96.66%, Specificity 85.00%. Accuracy 92.00%, Positive predictive value 90.62%, Negative predictive value 94.44%. Out of 50 patients 29 had positive DPL wrongly positive in 3 patients, true negative in 17 patients, false negative in 1 patient. 3 patients falsely negative on abdominal ultrasonography, 2 of them were having gut contents on DPL and 1 was having frank blood on DPL. **Conclusion:** Focused Assessment Sonography for Trauma (FAST) being non-invasive should be the first step in assessment of patients with blunt abdominal trauma, when complemented by DPL may help in defining the organ injury.

**Key words:** Blunt Abdominal Trauma, Diagnostic Peritoneal lavage, DPL. Focused Assessment Sonography for Trauma (FAST).

### INTRODUCTION

The care of the trauma patient is demanding and requires speed and efficiency. Blunt abdominal trauma has become very common globally; it needs prompt assessment, monitoring and management. Missed intra-abdominal injuries continue to cause preventable deaths. The history and thorough clinical examination along with specific diagnostic tools are needed. These diagnostic tools include X Rays, ultrasonography, Diagnostic

peritoneal lavage and CT Scan. Diagnostic tools that help the treating doctor in optimum management of blunt abdominal trauma include; Focused Assessment Sonography for Trauma (FAST), Diagnostic Peritoneal Lavage (DPL) and CT scan<sup>1</sup>. These investigations are sometimes mandatory for patients having equivocal signs of peritonitis. Indications in blunt trauma are as follows:

Patients with a spinal cord injury.

Those with multiple injuries and unexplained shock.  
Obtund patients with a possible abdominal injury.  
Intoxicated patients in whom abdominal injury is suggested.

Patients with potential intra-abdominal injury who will undergo prolonged anesthesia for another procedure.

Plain X Rays abdomen easily available but with limited diagnostic accuracy. CT Scan is an excellent but expensive and also is not available at all the times. Diagnostic peritoneal lavage along with focused assessment with sonography for trauma (FAST) can be used as a standard protocol for the assessment of blunt abdominal trauma. However operative treatment is not indicated in every patient with positive FAST scan results. Hemodynamically stable patients with positive FAST findings may require a CT scan to better define the nature and extent of their injuries.

Diagnostic peritoneal lavage is quick, safe and almost independent of the experience of the investigating person. The only absolute contraindication to DPL is the obvious need for laparotomy. Relative contraindications include morbid obesity, a history of multiple abdominal surgeries, and pregnancy.

Abdominal ultrasonography is less time consuming, economical, non invasive, easily repeatable and easily available. It can even be used in resuscitation area in unstable patients. It is especially helpful in diagnosis of solid organ injuries. Abdominal ultrasonography should be used as first line investigation and it should be complemented by subsequent diagnostic peritoneal lavage whenever suspicion. Bedside ultrasonography is a rapid, portable, noninvasive, and accurate examination that can be performed by emergency physicians and trauma surgeons to detect hemo-peritoneum.

Published work on the role of Diagnostic Peritoneal lavage and focused assessment with sonography for trauma is not encouraging locally. This is a humble effort to evaluate the role of Diagnostic Peritoneal lavage (DPL) and focused assessment with sonography for trauma in

blunt abdominal trauma in the local conditions.

A scanning method called FAST<sup>1</sup> was devised with a primary objective of developing a procedure that could detect intra peritoneal fluid and could be used easily, after training for brief periods, by surgeons and emergency medicine physicians with limited experience in ultrasonography. Hemodynamically stable patients with positive or indeterminate FAST results undergo CT scanning. Hemodynamically stable patients with negative FAST results are followed by clinical observation and repeated FAST to confirm the absence of injury because organ injuries are not necessarily accompanied by hemoperitoneum. In hemodynamically unstable patients, a positive FAST result leads to an emergency laparotomy, and an indeterminate FAST result leads to a DPL or a CT scan. (Few trauma centers currently perform DPL).

DPL Red blood cell counts greater than 10,000 cells/mm<sup>3</sup>, white blood cell counts greater than 500 cells/mm<sup>3</sup>, or the presence of bile, feces, or vegetable matter.

The sensitivity, specificity, and accuracy of FAST in detecting free fluid were hitherto reported to be 81% to 94%, 88% to 100%, and 86% to 98%, respectively<sup>1</sup>

Detection of free air is also possible in a certain percentage of cases. Searching for parenchymal abnormalities as well as free fluid improved the sensitivity of ultrasonography in some reports<sup>2</sup>, but, conversely, ultrasonography was limited mainly by its low sensitivity for identifying organ injuries in hemodynamically stable patients in other reports<sup>3</sup>

An unstable patient with clearly positive findings from ultrasonography or DPL should undergo laparotomy because of the high probability of major hepatic, splenic, or mesenteric bleeding<sup>4</sup>.

Critically ill patients who are too unstable for imaging may require bedside laparoscopy or diagnostic peritoneal lavage<sup>5</sup>

Bedside ultrasonography in the form of focused abdominal sonogram for trauma has been used in the evaluation of trauma patients in Europe for more than 10 years and is increasingly gaining acceptance in the United States. FAST's diagnostic accuracy generally is equal to that of diagnostic peritoneal lavage. Sensitivity and specificity of these studies range from 85-95%.

CT scanning may miss injuries to the diaphragm and perforations of the GI tract, especially when CT scanning is performed soon after the injury. Pancreatic injuries may not be identified on initial CT scans but generally are found on follow-up examinations performed on high-risk patients. For selected patients, endoscopic retrograde cholangiopancreatography (ERCP) may complement CT scanning to rule out a ductal injury.

The primary advantage of CT scanning is its high specificity and use for guiding non-operative management of solid organ injuries.

Drawbacks of CT scanning relate to the need to transport the patient from the trauma resuscitation area and the additional time required to perform CT scanning as compared to FAST or DPL. The best CT images require both oral and IV contrast.

The only absolute contraindication for a DPL is for the patient who requires emergent laparotomy regardless of the findings<sup>6</sup>.

It is an accurate and rapid investigation for blunt trauma, but the results should be interpreted with caution in penetrating injury<sup>7</sup>.

Injuries may be identified in the primary survey (breathing: diaphragmatic hernia, circulation: blood loss). Decisions for laparotomy may be based on history and clinical findings or via the primary survey adjuncts (DPL or FAST scan). DPL is performed as an open, closed and semi open techniques. In our study DPL was performed by semi open method. A positive lavage comprises;

1. Aspiration of >10mls of frank blood
2. A red cell count in the lavage fluid of >100

3. A white cell count of >5
4. Any bile or vegetable material in the lavage fluid.
5. Egress of lavage fluid via chest tube or urinary catheter.

DPL is steadily being replaced by ultrasound assessment, focused assessment by sonography for trauma. The FAST scan should take between 1-5minutes and has the advantage that it is repeatable and non-invasive. The FAST operator should document the findings in the notes. When a credentialed operator is present, this investigation has acceptable sensitivity to exclude haemoperitoneum or any intra peritoneal injury.

The history of abdominal pain, may be all that points to significant intra abdominal injury. Signs may include the 'seat belt' sign, abrasion or bruising, and/or abdominal tenderness and/or gross hematuria.

CT scan abdomen may identify occult injuries in stable patients. Patients with altered GCS or who are or will be intubated cannot be reliably assessed for these findings, or monitored for evolving peritonitis. Abdominal CT scan can be used to 'screen' these patients for occult injury.

Trauma surgeons who are newly trained in the use of FAST can achieve an overall accuracy rate of at least 90% from the outset of clinical experience with this modality<sup>8</sup>.

The evaluation of patients with blunt abdominal trauma has undergone significant evolution in the last twenty-five years. The standard in the past was the performance of diagnostic peritoneal lavage to determine if the patient had suffered injuries that required operative intervention. With the evolution of non-invasive techniques, abdominal ultrasound and computerized tomography have become the currently utilized methods to assess for intra abdominal injury<sup>9</sup>.

Focused assessment with sonography for trauma is an accurate and rapid investigation for blunt trauma, but the results should be interpreted with caution in penetrating injury<sup>10</sup>.

Handheld ultrasound using the Sonosite 180 system can be successfully used by appropriately trained doctors as the primary investigation in the acute evaluation of blunt abdominal trauma<sup>11</sup>.

FAST is a highly specific "rule in" technique and is useful in the initial assessment of trauma patients. Emergency physicians can perform FAST after a brief training period<sup>12</sup>.

USG will be used more frequently in the future for the evaluation of traumatized patients. Previously, the main focus of the sonographic examination was for the detection of free fluid<sup>13</sup>.

## MATERIAL & METHODS

Fifty patients presenting to casualty department of Allied Hospital Faisalabad with blunt trauma abdomen were included in this study. Among these 42 were male and 8 were female. Patients with equivocal signs of peritonitis after clinical evaluation will first undergo FAST followed by DPL.

## RESULTS

Modes of injury were;

Mode of injury	No of pts	%age
Road traffic accident	36	72%
Assaults	8	16%
Falls	4	8%
Crush injuries and others	2	4%
<b>The clinical presentations were:</b>		
Pain abdomen	50	100%
Absolute constipation	25	50%
Vomiting	36	72%

Bowel sounds were audible in 27 patients 54% and absent in 23 patients 46%.

Free intraperitoneal fluid was picked on sonography in 24 (true positive), wrongly diagnosed in 2 (false positive),

free fluid ruled out in 21 (true negative). In 3 patients ruled out on ultra sonography but confirmed on Diagnostic peritoneal lavage and exploratory laparotomy(false negative).

Sensitivity	88.88%
Specificity	91.30%
Accuracy	90%
Positive predictive value	92.30%
Negative predictive value	91.90%

Out of 50 patients 29 had positive DPL wrongly positive in 3 patients, true negative in 17 patients, false negative in 1 patient.

Sensitivity	96.66%
Specificity	85%
Accuracy	92%
Positive predictive value	90.62%
Negative predictive value	94.44%

Three (3) patients falsely negative on abdominal ultrasonography, 2 of them were having gut contents on DPL and 1 was having frank blood on DPL. This last patient later on under went exploratory laparotomy and was found to have mesenteric tear.

## DISCUSSION

The purpose of this study was to determine diagnostic utility of FAST and DPL as initial evaluation of blunt trauma abdomen in terms of sensitivity, specificity and accuracy.

The patients were divided into two groups; those with overt signs of peritonitis were excluded from study. Patients having no free fluid on ultrasonography and negative DPL but having clinical features like severe abdominal pain, absolute constipation and abdominal distention were monitored. Each of the patients included in the study underwent ultra sonography followed by DPL

and results were compared. On ultra sonography presence of free fluid i.e., anechoic strip constituted positive results.

Timely diagnosis of the nature of intra abdominal injury is essential to reduce the mortality and morbidity in such patients. Among the various diagnostic modalities currently used, in majority of the main public hospitals, ultrasonography proved to be very helpful in the correct diagnosis of the abdominal organ, injuries with diagnostic accuracy of 98%<sup>14</sup>.

Abdominal ultra sonography was found to be 88.88% sensitive, 91.30% specific and 90% accurate in detection of free intra peritoneal fluid. The positive predictive value and the negative predictive value were 92.30% and 91.90%. The figure is comparable with 100% sensitivity for intra peritoneal injury (95% confidence interval, 63.1%-100%) patients with views indicating intra peritoneal fluid but without pericardial effusion, again with no false-positive results, giving a specificity of 100%<sup>15</sup>.

## CONCLUSION

FAST being non invasive should be first step in the assessment of patients with blunt trauma abdomen. FAST complemented by DPL may helps in defining the organ injury. The results of both FAST and DPL can be used with fair sensitivity, sensitivity and accuracy in initial evaluation of blunt trauma abdomen.

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