

**A PROSPECTIVE STUDY TO ASSESS THE ACCURACY OF
DIAGNOSTIC FOCUSED ABDOMINAL SONOGRAPHY FOR
TRAUMA (FAST) IN BLUNT ABDOMINAL TRAUMA AMONG THE
PATIENTS PRESENTING TO GOVT RAJAJI HOSPITAL
MADURAI.**

Dissertation submitted to

The TamilNadu Dr. M.G.R. Medical University, Chennai.

With fulfillment of the regulations for the award of the degree of

MASTER OF SURGERY (GENERAL SURGERY) Branch -I



DEPARTMENT OF GENERAL SURGERY

MADURAI MEDICAL COLLEGE

MADURAI - 625 020

APRIL-2015

**CERTIFICATE BY THE GUIDE AND THE HEAD OF THE
DEPARTMENT**

This is to certify that the dissertation entitled " A PROSPECTIVE STUDY TO ASSESS THE ACCURACY OF DIAGNOSTIC FOCUSED ABDOMINAL SONOGRAPHY FOR TRAUMA (FAST) IN BLUNT ABDOMINAL TRAUMA AMONG THE PATIENTS PRESENTING TO GOVT RAJAJI HOSPITAL MADURAI" submitted by Dr.P.VANITHA to the Tamil Nadu Dr M.G.R. Medical University, Chennai in partial fulfillment of the requirement or the award of M.S Degree Branch - I (General Surgery) is a bonafide research work was carried out by her under direct supervision and guidance from September 2013 to August 2014 in the Department of General Surgery, Madurai Medical College.

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DECLARATION

I, **Dr.P.VANITHA**, declare that, I carried out this work on, A PROSPECTIVE STUDY TO ASSESS THE ACCURACY OF DIAGNOSTIC FOCUSED ABDOMINAL SONOGRAPHY FOR TRAUMA (FAST) IN BLUNT ABDOMINAL TRAUMA AMONG THE PATIENTS PRESENTING TO GOVT RAJAJI HOSPITAL MADURAI at the Department of General Surgery, Madurai Medical College during the period of September 2013 to August 2014. I also declare that this bonafide work or a part of this work was not submitted by me or any others for any award,degree, diploma to any other University, Board either in India or abroad. This is submitted to The Tamilnadu Dr. M.G.R. Medical University, Chennai in partial fulfillment of the rules and regulations for the M.S. degree examination in General Surgery.

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ACKNOWLEDGEMENT

I wish to express my sincere gratitude and thanks to my chief and guide **Prof. Dr.D.Maruthupandian.M.S.**, for his guidance and encouragement during the course of this study.

I thank sincerely **Prof.Dr. Sankaramahalingam.M.S.**, Professor and Head of the Department of General Surgery for his valuable advice and cooperation in completing this study.

I thank sincerely **Prof.Dr.S.SUMATHY. M.D.R.D., D.G.O.**, Professor and Head of the Department of RADIO-DIAGNOSIS for her valuable advice and cooperation in completing this study.

I wish to express my whole hearted thanks to our Assistant Professors **Dr.K.Karunakaran.M.S., Dr.D.Latha, M.S., D.A., and Dr.C.Saravanan, M.S., D.Ortho.**, for their constant encouragement and excellent guidance.

I am grateful to **Prof.Dr.Shanthakumar.,**Dean Madurai medical college , for his valuable advice, suggestions and his constant support throughout my dissertation.

I also thank my parents and family members, who were helpful in each and every situation in doing this study.

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ABSTRACT

Background&Objective:

In view of increasing number of road traffic accidents and blunt abdominal injury and its lethal & fatal complications ,FAST is an essential and necessary component of trauma management.Hence this study is undertaken. The ObjectivesOf Our Study Were To Asses The Diagnostic Acuracy Of Focussed assessment with sono graphy in detecting intra abdominal free fluid after blunt abdominal injuries..

Methods:

Govt.Rajaji hospital ,Madurai, admits all the victims of Blunt Abdominal Trauma in Trauma ward. 50 consecutive patients with history of blunt abdominal trauma attendingor taken to our hospital 01/01/2014 to 31/12/2014 were included

in the study. Inclusion and exclusion criteria were defined, and applied to all patients. All the 50 patients underwent FAST protocol examination for evidence of intra-abdominal free fluid. Patients were grouped into 2 categories based on presence of free fluid (FAST +ve) and absence of free fluid (FAST -ve). FAST findings were compared with gold standards like laparotomy findings and in conservatively treated patients, with CT scan findings. Statistical analysis was done by Sensitivity and Specificity.

Results:

50 patients with history of blunt abdominal trauma were included in the study, out of which 36 were males and 14 were females. Most of the patients in the age group of 20-50 years. RTA was the most common mechanism of trauma seen in 35 patients. 30 patients presented with hypotension. FAST findings were

positive in 38 patients and negative in 12 patients.34 patients were underwent laparotomy and 16 patients were treated conservatively.

Specificity of FAST was 100% in comparison with laparotomy findings and 60% when compared to CT findings.The sensitivity was 84% comparison with laparotomy findings and 72% when compared to CT findings. FAST has +ve predictive value of 100% and 80% in comparison with laparotomy and CT Scan findings respectively.The negative predictive value of FAST found to be 16% and 50% in comparison with laparotomy and CT Scan findings respectively.

Interpretation & Conclusion:

In our study we noted that the most common cause or mechanism of trauma causing blunt abdominal trauma was Road traffic accidents. Males were most commonly affected. The average time taken for FAST examination was 10 minutes . Most of the patients presented with pain abdomen and hypotension Splenic and Liver laceration were the most common organ injury.

FAST has the 84% diagnostic accuracy in detecting the organ injury in blunt abdominal trauma. We conclude that the advantage of FAST protocol is harmless ,non-invasive quick,portable,accurate, repeattable and can be done during resuscitation.It does not interfere with other investigations especially in hemodynamically unfit patients.

Key words:

Blunt abdominal injury, focussed abdominal sonography,ultrasonography.

INTRODUCTION

FAST (Focused Abdominal Sonography for Trauma) or focused assessment with sonography in trauma is an emergency Ultra sound investigation, done by the radiologist, emergency physician, and trauma surgeon for the patients with Blunt Abdominal Trauma.

The need of diagnostic ultra sonography to assess the blunt injury patients for abdominal trauma has been realised. But only after late 90's that surgeons doing abdominal scan for a trauma as an emergency tool was first executed. After that, many prospective studies have illustrated the usage and merits of using abdominal scan in the earlier work-up of the blunt injury patient. After that, increasing interest in this scanning has developed among trauma care surgeons, emergency physician, and nurses.

Many results on abdominal Ultra sonography in injury has insisted its use in earlier investigating tool, a screening modality, or an additive study adjunct to CT scan or diagnostic peritoneal lavage (DPL). A few surgeons with good knowledge

in the utility of Ultra sonography in trauma using it almost indulgely as a diagnostic modality for assessing the injury.

It may be that as trauma care surgeons attain good knowledge in their own sono graphic skills, they purely rely on admission and first scan as the best diagnostic tool for the acute abdomen due to trauma.

Focussed abdominal sono graphy for trauma patients (FAST) depends on the identification of free fluid either haemoperitoneum or gastro-intestinal contents to detect patients with trauma. Blunt abdominal injury patients with intra abdominal insult those not having haemo peritoneum, or those having haemo peritoneum unidentifiable on admission, may be a missed injury or a delayed diagnosis.

The objectivs of our study is to assess the diagnostic accuracy of Focussed Abdominal sono graphy for Trauma in indentifying the intra-abdominal fluid following blunt abdominal trauma. and to define the usage of FAST in the Imaging and utility protocols of the blunt injury victims.

Focussed abdominal son ography in Trauma (FAST) is the useful investigation of choice in many trauma care centers for blunt abdominal trauma . Since from 1995,there are many reports that justify the many merits and the well known fit falls of D P L (Diagnostic peritoneal lavage and C-T Scan , have led to a increasing interest in FAST Examination in many trauma care centers in western countries. After their novel contribution in evaluating Fast many trauma centers in America and Canada Has done prospective studies in FAST.

Their study concluded that FAST in trauma centers is an accurate in assessing intra abdominal organ injury. Further, their reports have analysed and gave a suggestion that FAST is an extra ordinary screening tool that could be easily learnt and reliably be performed by non radiologists like trauma physicians , surgeons ,etc,. Even though these studies favour the usage of FAST is accurate still it needs some training programmes in non radiologist¹.

Emergency trauma care physician and trauma surgeons, can perform this ultra sound as it is a focussed, and limited easy technique to give answer for one simple and important question , That is the presence of free fluid in the abdomen or not. The

Key tool in this study is simply the evidence of free fluid in abdominal cavity not merely answering the grade of organ injury or type of injury and the specific organ injury.

But USG is not much useful in early identification of perforation in hollow visceral injury, or laceration in solid organs. Also the mere absence of collection of fluid won't exclude the serious intra-abdominal injury.

Ultra sonogram has the merits of Being

1. non-invasive,
2. can be rapidly performed,
3. readily repeatable,
4. Cheap

Further medical or surgical management is decided according to the clinical condition of the patient whether stable or unstable. Now there is an increasing interest among the trauma care providers regarding Ultra sonogram (FAST) training, acquiring the skills, and are utilising US in their routine investigatory tools for blunt trauma abdominal assessment

The identification of abdominal injury after polytrauma still remains a major diagnostic challenge. The FAST has been accepted as a useful and reliable screening test in many trauma centers in North America. The FAST has been found to be a quick, costless, portable, and an accurate test.

But still many countries diagnostic peritoneal lavage (DPL) and computed tomography (CT) remains the gold standards in assessing the blunt abdominal injuries. DPL (Diagnostic peritoneal lavage) is an invasive procedure with its own recognized contraindications and complications and still it is occasionally more sensitive than FAST in certain conditions.

In addition, C-T Scan exposing the person for radiation that is contraindicated in pregnant patients. Also the need of costly and nephrotoxic radiographic contrast, is time-consuming and expensive, and is limited only to stable patients. Because of the perceived merits of FAST and the demerits of DPL and C-T have led to an increasing interest in FAST in many trauma care centers².

Trauma causes an estimated 10% of the worldwide deaths and is the 3rd commonest cause of death in first four decades of life (1-44 yrs) and potentially the leading cause of loss of life years. FAST (Focussed assessment with the sonographic examination of the trauma patient) protocol examination reviewing abdo

minal quadrants for collection free fluid is an reliable tool in the initial evaluation of the acute abdomen patients³.

In view of increasing number of vehicular accidents and blunt abdominal injury and its lethal & fatal complications, FAST is an essential and necessary component of trauma management. Hence this study is undertaken.

To date,” many studies of abdominal Ultra sonogram have been inconclusive for several reasons, including the frequent lack of a gold standard test, the inclusion of both penetrating and blunt injuries, the use of small sample sizes, and the study of patients with a low severity of injury”.

Hence a more precise evaluation of FAST was required and forms basis for this study. The purpose of this prospective study was to compare FAST, aimed at the identification of free intra peritoneal fluid, to the other gold standards, i.e., Laparotomy findings in operated patients and CT scan findings in conservatively treated patients of blunt abdominal trauma.

AIMS & OBJECTIVE

Patients with history of blunt abdominal trauma present with variable clinical manifestations and will have diagnostic dilemma in detecting significant intra-abdominal injury and in decision making for the requirement of urgent surgical intervention so, a standard and cost effective investigation or screening test is to be identified, its accuracy has to be defined and later implemented on the trauma victims. This background has formed the aim of this study.

Purpose of this study is to assess the accuracy of FAST (Focussed Abdominal Sonography in Trauma) protocol examination for the identification of fluid in the abdominal cavity. (haemoperitoneum / intestinal contents) following blunt trauma to abdomen.

REVIEW OF LITERATURE

Since the introduction and implementation of FAST in 1990, over thousands of studies are undertaken. Some studies favour the use of focused abdominal sonography in trauma as the initial investigation of choice, and some are against it and advocate its potential limitations and its pitfalls.

FAST has become an accepted screening modality for intra-abdominal injuries in the traumatized patients. The primary focus of this limited study is to detect free intra-peritoneal fluid with ultra sound in the trauma room. If fluid is detected in this setting, it strongly suggests significant intra-abdominal injury requiring urgent laparotomy⁴.

Sonography has become the primary mode for the initial evaluation of abdominal injury in many trauma centers. The assessing the of abdominal injuries in trauma patients, still a diagnostic problem. All modalities of Investigations can not be applied to to the trauma patient at short period as they are either time consuming, necessitate the stable patient to be transferred to the dept of radiology , (eg.for CT Scan) or carry a risk of harm (DPL).

Evidence reports from United States of America and Europe that a focussed assessment with abdominal sonography can be used for the identification of free fluid in the peritoneal cavity. In the presence of trauma this fluid assumed to be a frank blood.

The harmlessness, rapidity, repeatability, the low cost are the novel advantage of real time ultrasonogram and that can be applied in the hemodynamically unstable patients, can be done in casualty itself without need for shifting the patient to radiology department. One more feature is that it can be done by the trauma surgeons during resuscitation itself.

The advantages of ultrasound are that it is harmless, rapid, repeatable and can be performed in the haemodynamically unstable patients, in casualty by the surgeons during resuscitation. Focussed abdominal sonography in trauma (FAST) has now been accepted as accurate as other investigations.

J. Brenchley et al. Conducted a study in 2006 at UK, with an objective to evaluate the introduction of FAST Scan in the initial assessment of injured patient in United Kingdom. Totally 153 patients were entered into the study²³. Patients had

a FAST Scan performed are included in the survey and final results were compared with the results of other investigation like C-T scan, laparotomy, observations, and post-mortem examinations. The sensitivity of FAST Scan was 78% and Specificity was 99%⁶.

In a study conducted in Canada with an objective to evaluate the accuracy of FAST in identifying the abdominal organ injury that necessitates the inpatient management in a case of blunt abdominal injury. Excluding the indeterminate cases, FAST had 95% sensitivity, 99% specificity, 76% +ve predictive value, 100% -ve predictive value and 96% accuracy⁷.

In one more study conducted it was reported that FAST was a quicker, useful and more reliable investigating tool when used as an initial investigatory tool in surgical triage in trauma care centers. The underdiagnosed or overdiagnosed intra-abdominal bleeding usually occurring in trauma centers are the background of their study. The goal/purpose of this prospective study was comparing the diagnostic accuracy of physical abdominal examination and pre-hospital FAST to detect abdominal bleeding⁸.

It was observed in a study conducted in University of California, Sandigo, with the objective to assess the diagnostic accuracy of abdominal sono graphy in patients with blunt abdominal injury. They had concluded that abdominal ultrasound is a reliable test in screening for organ injury in patients with blunt trauma of abdomen and their use promotes a remarkable change in major Institutional practice⁹.

In a study conducted in Barnsley in U .K, it was concluded that emergency trauma care physicians after undergoing a training in USG can utilise FAST in the initial assessment of trauma patients with good and sufficient specificity. The results of this study are sensitivity of 78%, specificity of 99% and confidence interval of 95%⁴.

In an article published by the Internet Journal of /emergency Medicine, the study carried out with the objective to assess the accuracy of FAST exams for the detection of BAT in selected patients, the results showed that the overall sensitivity for the detection of free fluid was 87.6%, specificity of 98.5% confidence interval of 95%. It was concluded that residents can accurately perform FAST scans for the detection of haemoperitoneum¹⁰.

John. P. Mc Gahan et.al from California University have conducted Meta-Analysis, with the abjective to report the state of the art of ultra sono graphy in assessing the patient with blunt injury,. They have concluded that the use of ultra sono graphy in assessing the patient with blunt trauma has increasingly used in the past decade. Who-are using sono graphy in thispatients should be aware of its many uses, but also its potential pitfalls.

The sensitivity of FAST Scan has ranged from 65 to 100%. In almost all of the studies Specificities remained high, in the range of 95% or greater. Pitfalls included that the FAST Scan can miss important organ injuries, that may require surgery and without a full bladder, free fluid in Pelvis is often missed¹¹.

The challenge in the imaging of abdominal trauma is to accurately identify injuries that require early exploration and at the same time avoid unnecessary operative intervention in cases that can be managed conservatively.

In recent years CT and USG have to a great extent replaced all other modalities of investigation¹². But both have their limitations. In spite of diagnostic

superiority, availability of CT is still limited and it also requires stable patients. On the other hand, inability to consistently detect pancreatic, bowel and mesenteric injuries and inability to functionally assess the kidneys and frequent interference by gaseous distension and associated bone or soft tissue injuries are major limitations of US¹³.

“Throughout the world there seems to be enthusiasm for emergent abdominal sonography in trauma victims, but the role of this diagnostic modality has yet to be determined¹⁴”.

This prospective study was assigned to compare the emergent abdominal ultra sonograophy (USG) with the other gold standards, DPL and C-T Scan , in the evaluation of the abdomen after blunt trauma. In 220 patients withpoly trauma, US performed in the Trauma room was an accurate test (accuracy 95%) for free intra peritoneal fluid, as compared with DPL and CT¹⁵.

Furthermore, the average USG examination required <5 minutes and was easily performed during the early assessment. Therefore, the authors conclude that emergent abdominal ultra sonography provides an accurate and timely method of abdominal assessment and that the utilization of emergent sonography at North

American trauma centers may improve the quality of patient care. The authors agree with the sentiments of H. D. Roott . that this is a very reliable tool that we used to have overlook too long¹⁶.

Although ultra sonography has been used to identify solid organ injury, hemo thoraces, and pericardial fluid, most studies are concentrating on the ability of USG to identify intra peritoneal fluid¹⁷.

The focused USG examinations performed in this study were exclusively aimed at the identification of free fluid in Morisson's pouch, and Pouch of Douglas, and the spleno renal recess. Although USG may be an accurate test for organ injury and pericardial /pleural fluid, this ongoing study attempts to answer only one question: Is this emergent abdominal ultra sonography, in our hands, an accurate test for intra peritoneal fluid in adults with multisystem injuries.

In one more Systematic review and meta-analysis of emergency ultra sonograohy for blunt abdominal trauma conducted by Stengel et.a1 from the Department of Trauma Surgery, Ernst-Moritz-Arndt University, Greifswald, Germany,

with the background as how precise and reliable is ultra sonography as a primary tool for injury assessment in blunt abdominal trauma.

They have concluded the even though they are having high specificity, and has an unexpectedly low sensitivity for the identification of both free fluid and organ lesions, In a clinically suspected abdominal injury, one more assessment (e.g. helical computed tomography) must be done regardless of the initial ultra sonographic findings¹⁸.

TECHNIQUE OF FAST

”The primary objective of focused abdominal sonography in trauma (FAST) is to detect the presence of haemoperitoneum in a patient with suspected intra-abdominal injury¹⁹.

The indications of FAST are haemodynamically unstable patients with suspected abdominal injury and those with significant extra-abdominal injuries (orthopedic, spinal, chest) requiring a non-abdominal emergency surgery²⁰.”

We advocate that FAST should be done in all patients with blunt abdominal injury and injuries to the trunk below the level of nipples with hemodynamic instability²¹.

Who should do FAST? FAST is performed by the surgeon attending the injured patient at the emergency department / casualty, or in the intensive care unit (ICU) as a bedside procedure while the resuscitation is in progress²².

The need to shift the patient to the radiology department for FAST defeats the very purpose of this diagnostic tool. FAST is recommended to be performed using a 3.5 or 10 MHz ultrasound sector transducer probe and gray scale 'B mode' ultrasound scanning²³.

The scan starts with the sub-xiphoid region in the sagittal plane in order to set the gain levels in the machine. The probe is then moved to the right to assess the Morrison's (hepato-renal) pouch in the sagittal plane. Then the probe is moved to the left to scan the spleno-renal recess in the sagittal plane.

At this point, the bladder is recommended to be filled with 250-300 ml of sterile normal solution through the urinary catheter and the catheter clamped. This provides an excellent sonological window for visualization of the pelvis in the transverse plane. In patients who have a suspected bladder injury precluding filling of the bladder, a saline filled bag is placed over the hypogastrium, which provides an acoustic window for the pelvis. The total time taken for such a scan would be around 5-8 minutes²⁴.

Interpretation:

Free fluid (blood, intestinal contents) in the peritoneal cavity appears anechoic (black) compared with the echogenicity of the surrounding structures. The pericardial and pleural cavities are assessed for presence of fluid in the sub-xiphoid view of FAST²⁵.

The scanning of the most dependent areas of the peritoneal cavity provides an opportunity to pick up presence of anechoic fluid against the contrast provided by the liver and spleen. No assessment with regard to the outline and echogenicity of the liver, spleen and kidneys is made in this scan²⁶.

The pelvic window provides information about free fluid in the pelvis and provides assessment of the bladder. The presence of free intraperitoneal fluid is considered as a positive FAST.

Limitations of FAST include poor sonological window in obese patients and in those who have extensive subcutaneous emphysema over the abdomen²⁷. Interpretation of FAST requires training and basic knowledge of

interpreting of ultrasound images. Small amounts of haemoperitoneum and solid organ injuries especially in patients who arrive very early after injury to the emergency department may be missed.

Significant retroperitoneal injuries including those to major vessels and kidneys may be missed by FAST because of interference by overlying bowel gas precious time should not be wasted in the performance of FAST in the patient with obvious abdominal injuries who require urgent operative intervention ²⁸.

Anatomy of the peritoneum relevant to FAST

The whole abdomen is divided into four areas of interest that covers almost all the possible organ injury in a case of blunt injury abdomen. Usually the abdominal areas are divided into nine areas or quadrants in view of surface anatomy. These four areas are the focus of interest in view of Fast examination as this will cover almost the entire abdomen and all possible areas of collection of free fluid in intra abdominal injuries.

The first one is the intra- thoracic portion of the abdomen which is the caudal most portion lies beneath the diaphragm (or) Rib cage. The intra abdominal organs situated here are the liver , the spleen , the stomach and the diaphragm. As these organs are lying behind the ribs they are in-accessible for clinical palpation and very difficult to assess the severity of injury even after thorough examination. Here is the place where the most common organs of injury are situated like liver and the spleen..The grades of liver and splenic injury can be assessed by Fast .

The second area of interest is the Pelvic abdomen which lies within the pelvic bony cage.(true Pelvis).The organs situated here are Sigmoid , Rectum ,Urinary bladder , membranous urethra , prostate , and small intestinal loops. In addition females have the uterus , fallopian tubes , and the ovaries on either side.

The common organ getting injured in this area is the membranous part of urethra and the urinary bladder. They get injured in accidental fall, or RTA when the bladder full. Bladder injury may be intra peritoneal or extra peritoneal resulting in the extra vasation of urine. Fast recognizes the collection urine that can be confirmed by collapsed bladder and straw colour on diagnostic aspiration.

The third one is the hidden portion of the abdomen, that is the retroperitoneal area which is occupied by pancreas, kidneys, ureters, abdominal aorta, and inferior vena cava. Renal injury is more common in RTA .grade 1,grade 2,renal injuries of are treated conservatively if diagnosed by Fast Examination.

Repeated fast and C-T scan can be done to assess the prognosis in conservatively treated patients. Grade 3 and Grade 4 renal injuries are

taken up for emergency laparotomy and may proceed with nephrectomy. Uretric injuries are treated accordingly.

The fourth one is the abdominal cavity proper occupied by small and large intestine, mesentry, the uterus ,if gravid only) and the urinary bladder ,if full.Small and large bowel laceration and mesenteric tear is more common in blunt injury abdomen.Mesentric tear may sometime be presented with massive heamoperitoneum.bowel laceration and mesenteric tear are the most common pathology in bowel injury.

On physical examination abdomen is divided in to nine areas.They are Epigastrium ,Rt & LT Hypochondrium,Rt &Lt Lumbar , Umbilical Region , Rt & Lt Iliac fossa , And Hypogastrium . (Figure .1.)

RH&LH – Hypochondrium (left and right upper quadrants)

ER – Epigastrium

RL&LL – Loin / Lumber (left and right)

UR – Umbilical

RIF &LIF– Iliac Fossa (left and right)

HR - Hypogastrum

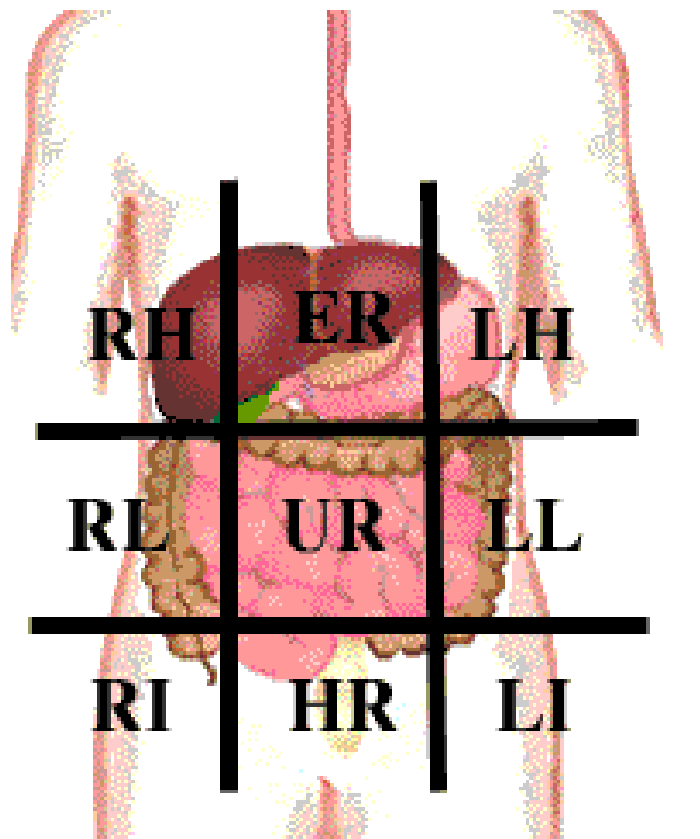


Figure.1. Surface areas (nine) of the abdomen

Sonological anatomy and technique used in FAST

The only novel thing of FAST is to identify the presence of intra peritoneal free fluid. Detection of organ injury, localization of injury and type of injury severity are suitable to normal ultrasound scanning or CT²⁹. The FAST examinations³ are windows of ultra sound and they correspond to descriptions of anatomical planes like sagittal or coronal.

1. Peri-hepatic – organs in the Rt upper quadrant (R-U-Q) are visualized
Rt lobe of the liver, Rt sided kidney and hepato –renal space.
2. Peri-splenic – organs in the Lt upper quadrant(L-U-Q) are visualized –
Ltkidney, spleen, and peri-splenic area.
3. Pelvic organs in the pelvic cul- de sac are visualized – pouch of Douglas is
the potential space between urinary bladder and uterus in females ,or recto
vesical pouch in males.

4. Peri-cardial ; sub coastal xiphisternal echo cardio graphic view of the heart, liver and pericardium. This will pick up any pericardial fluid collection, sub diaphragmatic air and fluid collection .

Plain X-Ray of abdomen erect films are quite useful in an acute injury and are part of trauma care protocol to rule out any bowel perforation . But these normal films are useful in some way to demonstrate the intra abdominal organ relationship and observe the close proximity of the liver and Rt kidney, and spleen and the Lt kidney .

FAST examination requires basic knowledge about the physics of ultrasonogram. Good knowledge about the machine proper and the types of probes used for various organ visualization, depth assessment , and proper usage of probe. Every Trauma care surgeons, physicians should have the sound knowledge in ultra sound machine before applying in live patients.

It is recommended that surgeons are able to describe and eliminates artifact and anatomic pitfall, and to operate the machine fully and optimises ultra sound image

It's also recommended that an ultra sound machine with live 2--D mode (Rapid B – mode) and transducer frequencies between 3--6MegaHZ being used. Optimally used depth settings depend on the patient's body habitus -- a setting of 7 to 15cm will be sufficient for most patient.³⁵.

A curve-linear abdominal probe is the ideal probe using the low depth settings that allow for good field of views,that will give the best available image resolution has to be attained. Adjust gain setting so, that vascular structure are dark or black and the surrounding tissues were not bright.

It is important to use an adequate amounts of aqua gel to eliminate air gap between the skin and the transducers which 'll degrading the image quality³⁶.

Fig.2 Plain X – ray Abdomen.

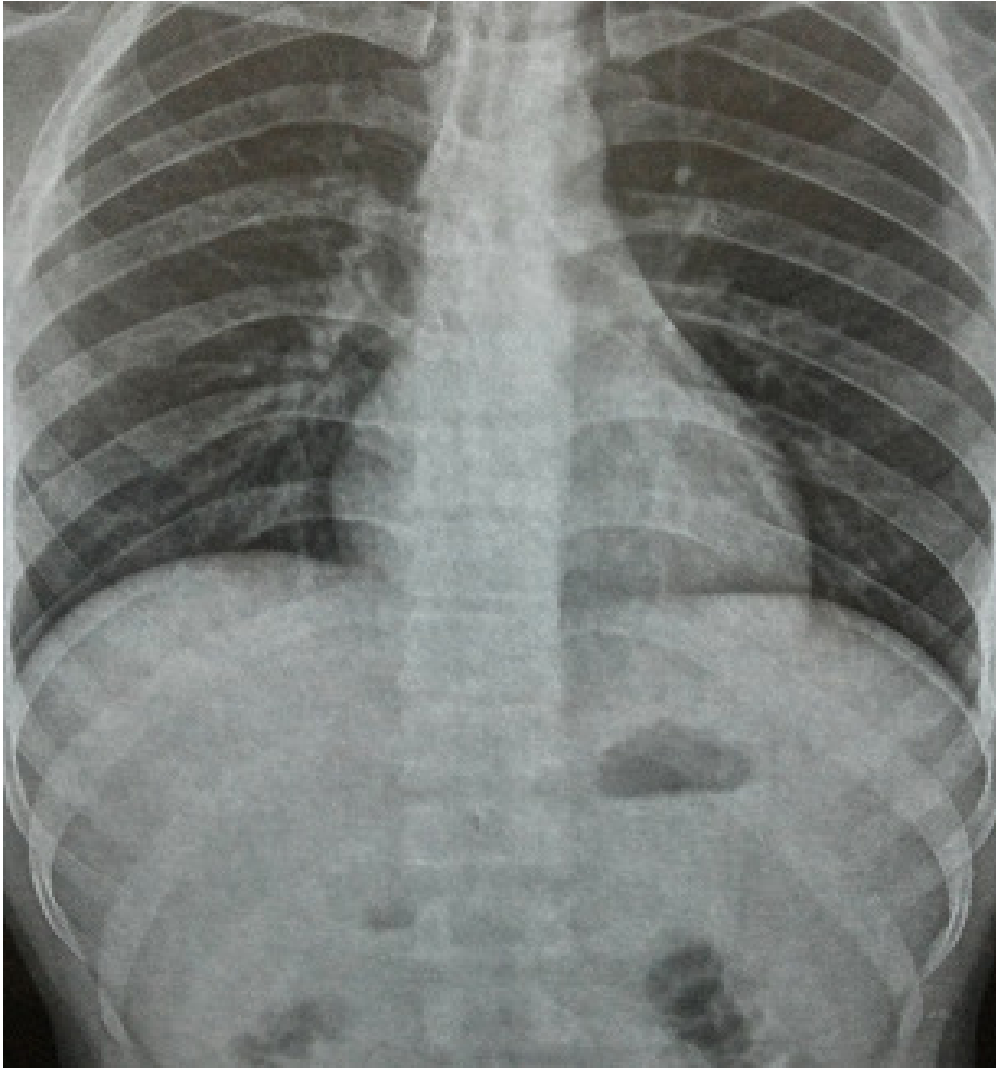
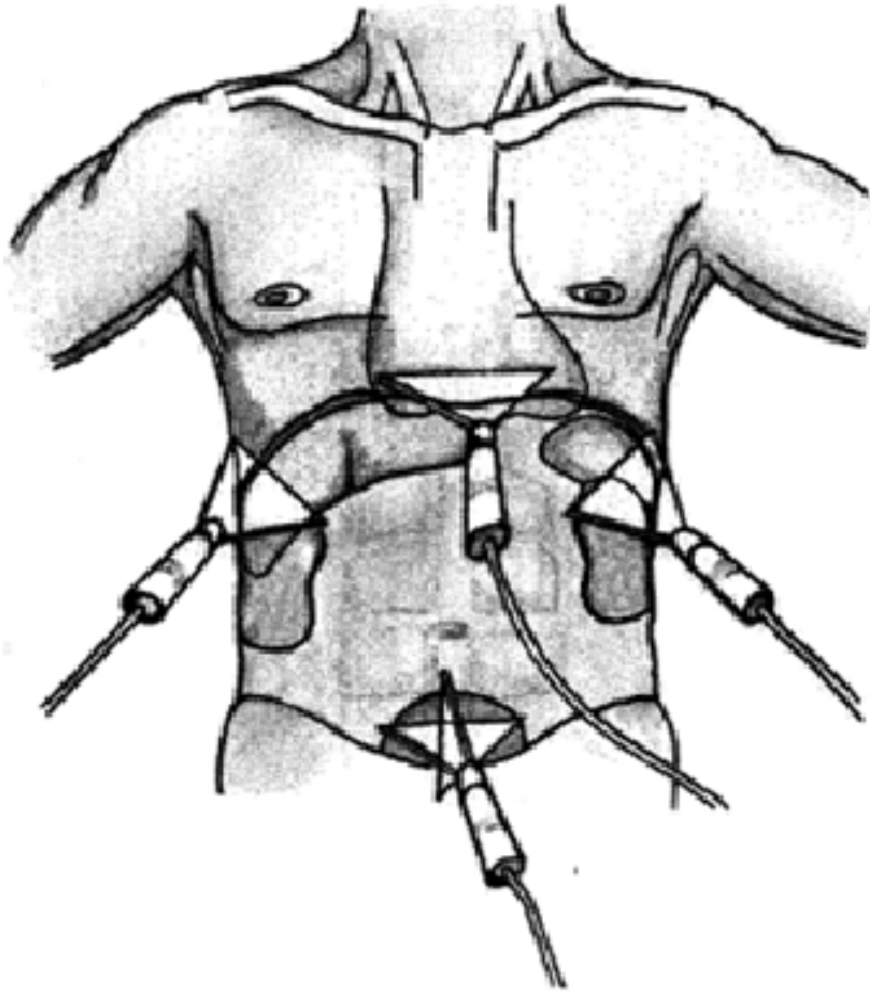


Fig: 3 The four scanning windows / probe positions for the FAST examination

- 1) Peri- cardial
- 2) Peri -hepatic
- 3) Peri-splenic
- 4) Pelvic



1. Peri-hepatic

Fig 4. A Position for peri-hepatic FAST



The patient's supine position (as for all type of scanning position

The scan operator must stand to the Rt side of the patient. The ultrasound machine should be at the level of eye (or) tilt the screen to minimize the reflection.

The probe should be put in the Rt mid to post.auxillary line at the level of the 11th and 12th rib. Turn around the probe till the hepato-renal space (Rutherford-Morrison's pouch) is seen. In a normal patients, the liver and the kidney were closely align with no evidence of fluid.

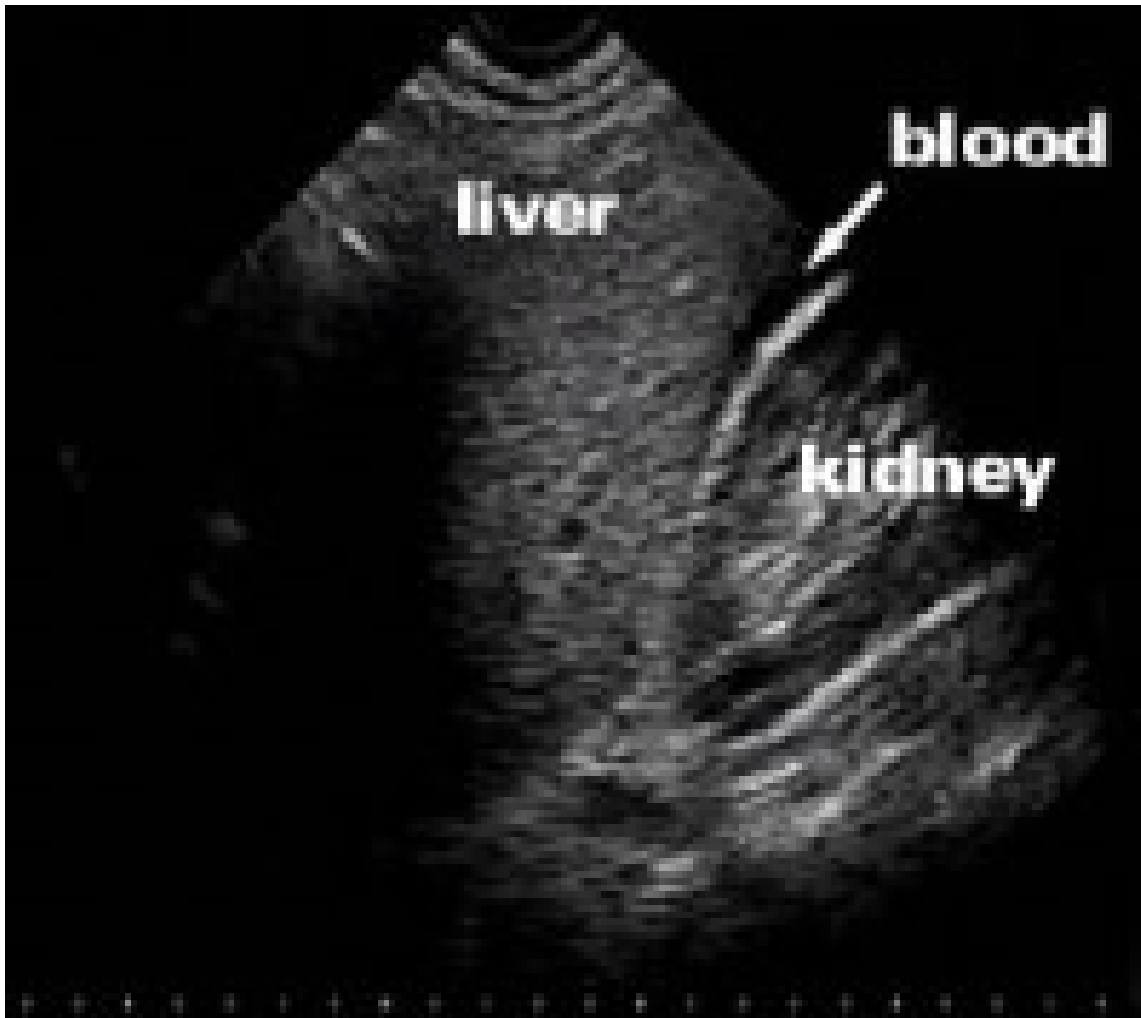
Because this pouch is the most dependant area of theUpper abdomen, intra peritoneal fluid should get collected here first. Free Fluid is usually hypoechoic and is seen as a dark or black stripe between the liver capsule and the fatty Gerotta's fascia of the little kidney. As little as 70ml of fluid that may be visualized as a +ve scan in this area³⁷.

Figure. 5. A Normal peri-hepatic FAST



Note the space between liver and right kidney, where there is no any evidence of free fluid in hepato – renal pouch.

Fig 6. Abnormal or positive hepatorenal FAST



Note the black strip of free fluid between the liver and right kidney that is in the Morrison's pouch (Hepato – renal pouch).

Figure 7. Fluid positive hepato-renal FAST



The dark band around the kidney indicates the presence of intra-abdominal fluid, which is usually by trauma means only blood, urine, or intestinal contents. Considering the fluid intra-abdominally that ascites has the similar finding and it should be remembered in the patient with chronic hepatic disease and right cardiac failure.

2. Perisplenic



Fig 8. Note the patient's position in peri-splenic FAST with patient in supine, the transducer to be kept on the Lt post. axillary line (between 10th and 11th ribs), angle to be maintained to obtain a good view of the spleen and left kidney interface³⁸.

Figure. 9. Normal perisplenic FAST



Note that there is no free fluid in between Spleen and diaphragm.

Figure 10. Fluid Positive peri-splenic FAST



Note in this figure, free fluid in the posterior aspect of spleen is seen. Also Note the displacement of left kidney inferiorly.

3. Pelvic

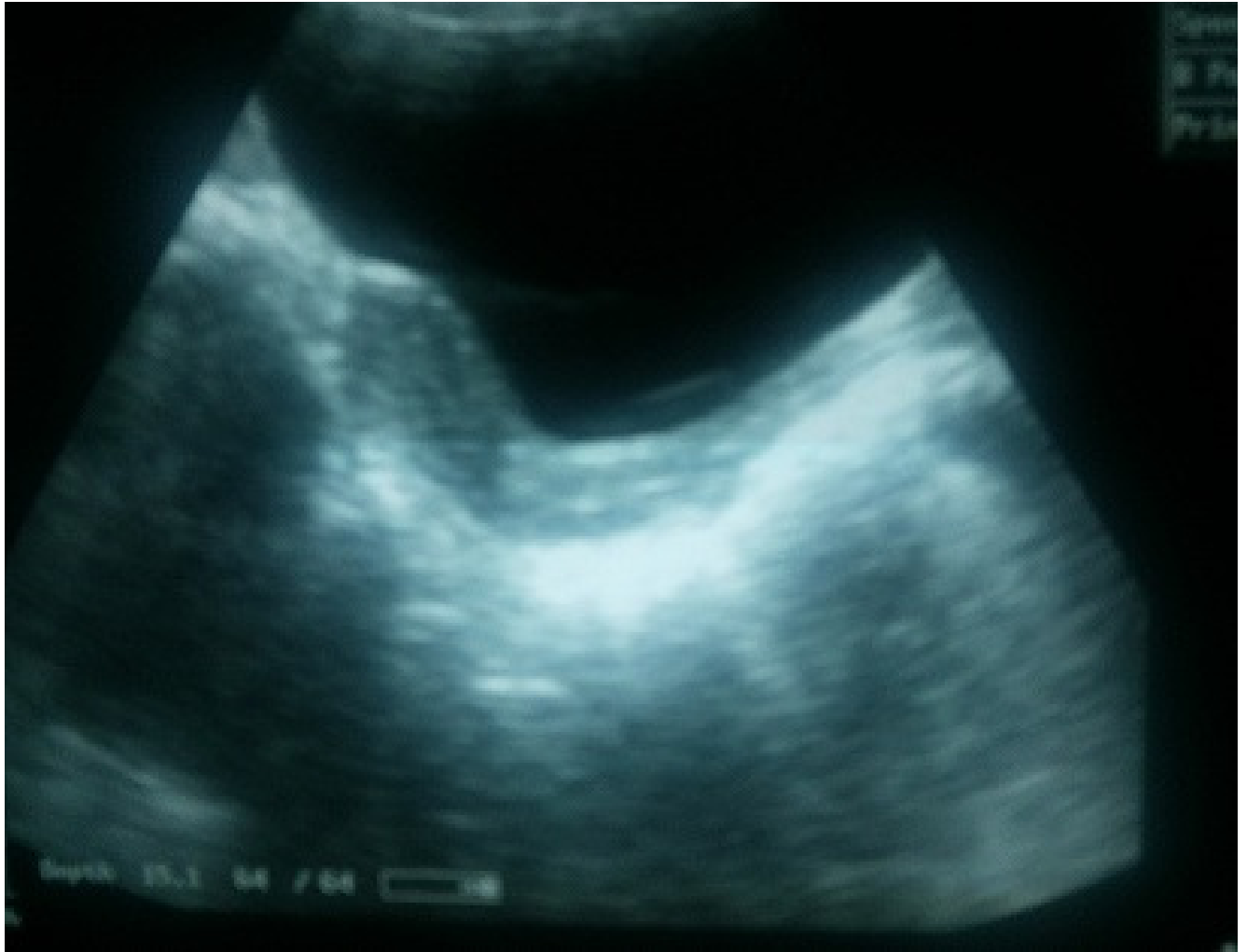


Figure.11. Patient's Position in pelvic FAST

Always put the transducer in the midline of the pelvis first ,and little above symphysis pubis. The transducer can be aligned with umbilicus and a then a view of the urinary bladder and the P O D(or) rectovesical pouch obtained.

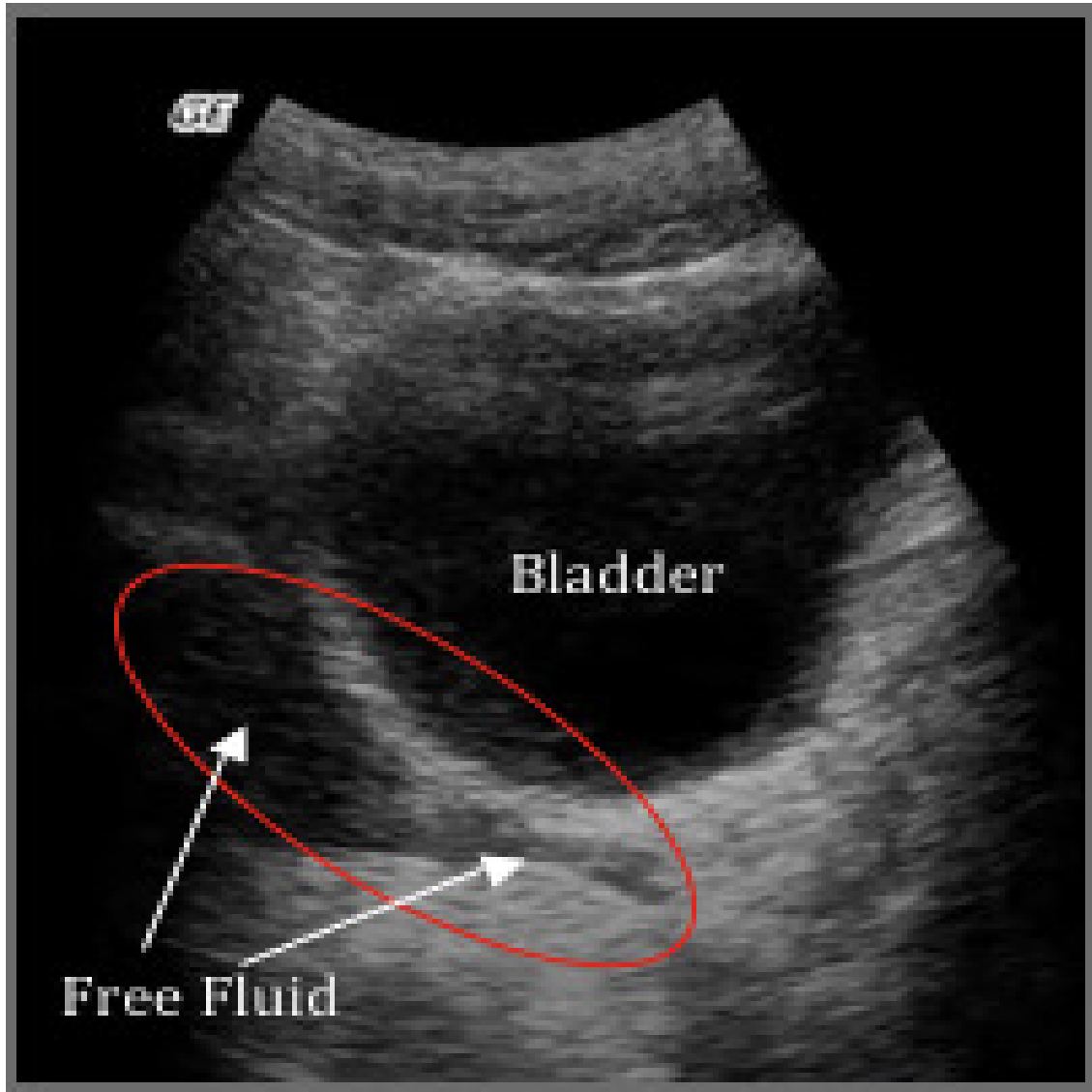
By simply rotating the transducer by 90 degree both transverse and longitudinal views are obtained. Pouch of douglas is the most dependant area of abdominal cavity and the fluid will tend to collect in this space even before other area. This pelvic fast examination is considered as the most reliable and sensitive among other views in fast protocol ³⁹.

Figure. 12. Normal pelvic FAST



NOTE: there is no fluid level between the uterus and the rectum.

Figure. 13. Fluid Positive pelvic-FAST



Note that the arrow mark shows the presence of free fluid just behind the urinary bladder.

4. Pericardial



Figure. 14. Position for peri-cardial FAST

To visualize the heart and pericardium the transducer probe to be placed over the xiphisternum in the midline, and angulation of the probe to be maintained slightly upwards and towards the left shoulder till a good view of the heart and Rt lobe of liver is obtained.

The patient should be in a position of semi flexed knees if possible. This is the same view which is particularly the subcostal windows used in transthoracic echo cardiography, and is good at detecting the presence of pericardial fluid if any.

Fig15. Normal peri-cardial FAST



Figure.16. Positive peri-cardial FAST



Note that there is a crescentic, hypoechoic area between the right and left ventricles, which is the presence of free pericardial fluid.

The right ventricle of the heart normally lies very close to the liver and it usually moves with respirations. An experienced sonologist will clearly

views this subtotal window and will identify the free fluid and cardiac trauma and valve dysmotility.

But our aim is to detect only the presence of free fluid within the pericardium in the fast study and same to be restricted to that only. Collection fluid within the pericardium may be blood from heart or major vessels like aorta. This collection of fluid may also present in tuberculous effusion, other inflammatory effusion, infection, and malignancy.

Meticulous care should be taken to interpret the sonologic findings and that can be done by a careful history taking. Pericardiocentesis and (or) thoracotomy may be mandatory in situations like pericardial tamponade which is a life-threatening one. The diagnosis of cardiac tamponade, after any cardiac surgery is beyond our scope of this study.

Whenever the trauma patients with low cardiac output, high venous pressure and hypotension—features of cardiac tamponade and there is pericardial fluid in FAST examination, cardiac tamponade and thereby thoracic injuries should be assumed⁴⁰.

FAST-INDICATIONS:

Nowadays many latest evidence based protocol for trauma assigned this FAST as a main tool for decision making whether to go for a n emergency laparotomy in a unstable and moribund victims. This fast can also be utilized for other injuries like penetrating abdominal injury ,chest wall injury , and bone fracture.

Figure.17. Algorithm-Blunt abdominal Injury –In unstable Patients

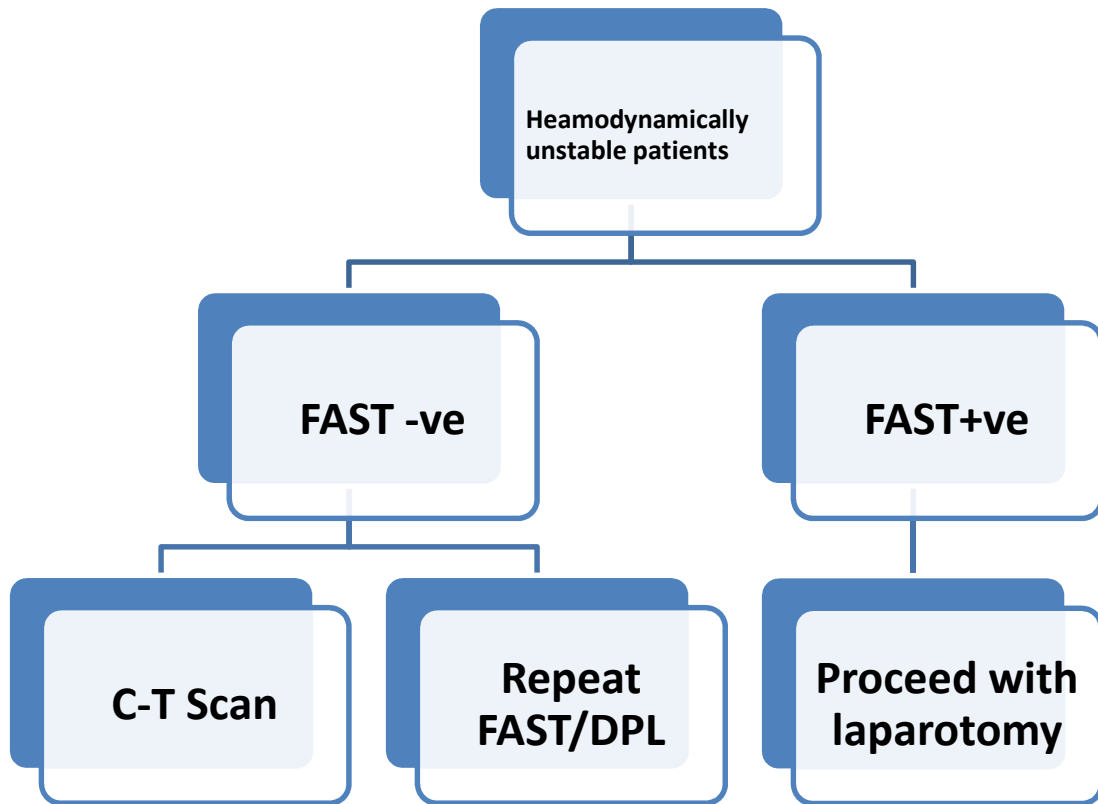
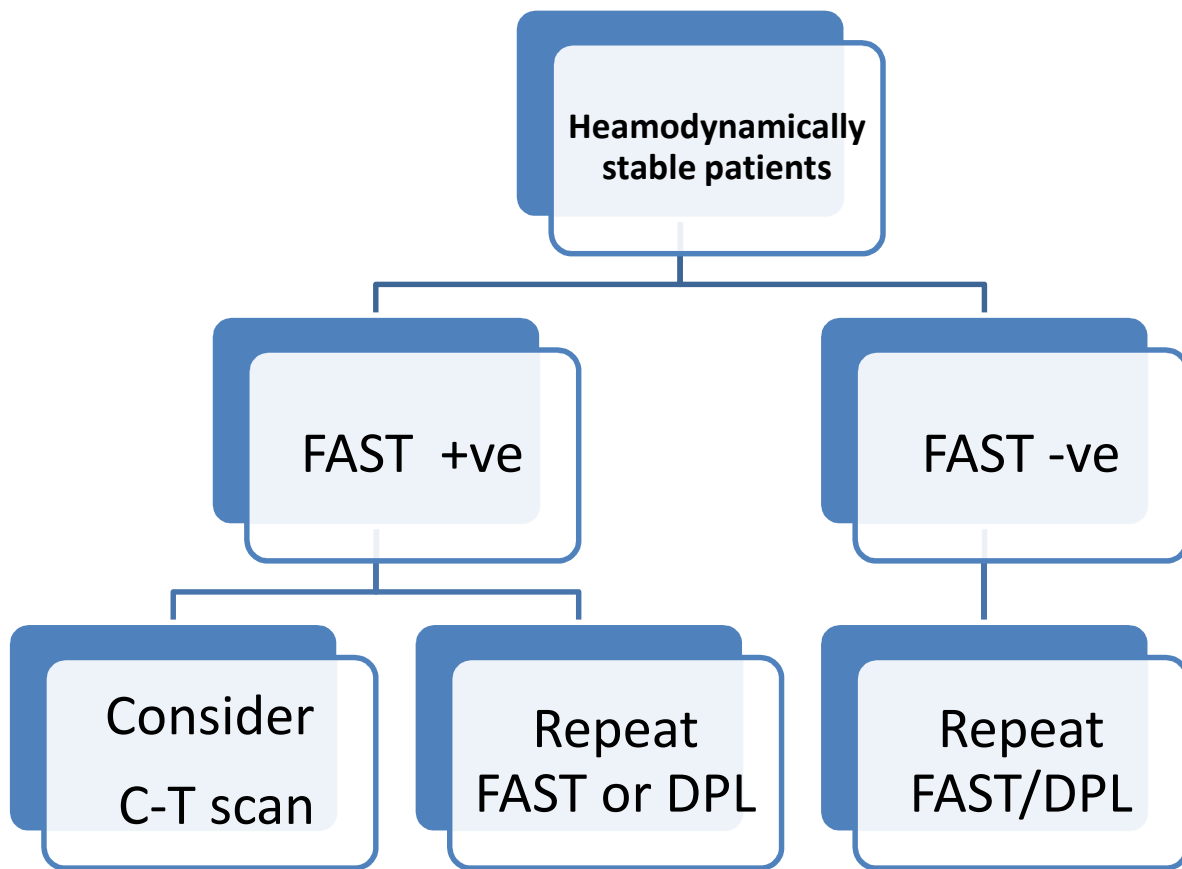


Figure.18. Algorithm-Blunt abdominal Injury –In stable patients



Many algorithm were used for stable patients Which includes FAST examination as an important screening modality in intra abdominal hemorrhage.

Diagnostic peritoneal lavage is also an important screening tool for an abdominal injury. Which identifies the presence of free fluid that is blood , urine, intestinal contents.

The more likely thing in FAST over DPL Includes the quickness, non invasive, portability of machine and its good specificity rate. The advantage over C-T scan includes quickness, portability, and repeatability. The time taken for performing the FAST also included in the list of advantages because a well knowledgable sonologist can do the FAST in minutes. If properly trained any body like surgeons ,emergency physician ,nurse can perform this Scan.

But in view of all advantages in FAST it has its own limitations. That includes significant rate of false negatives. The sole reason behind this is usually an early examination where only a little amount free fluid tend to collect that could not be observed easily. Also quality of the machine, and the quality of the probe, and the experience of the operators.

But these limitations can be solved by serial USG examinations Or D
P L when there is evolving free fluid collection , and FAST is negative⁴⁴.

Whenever there is FAST negative with the unstable patients always
suspect larger retroperitoneal heamorrhage. Morbid obesity and surgical
subcutaneous emphysema interferes with clarity of the image, and the results may
be indeterminate. In such cases a diagnostic P.L is mandatory.

FASt usually detects the fluid collection better than CT imaging, but
poor in the identification of the solid organ injury and intestinal injury .In that
cases CT Scan is the better alternative in localizing the site ,and grading of solid
organ injury like spleen, liver, and kidney.

METHODOLOGY:

Govt Rajaji Hospital Madurai admits all the victims of trauma, which includes the trauma victims with an blunt injury abdomen.

Pt's with history of blunt injury abdomen attending or taken to Govt Rajaji hospital from 01/01/2004 to 20/09/2014 were included in this study.

A verbal consent was taken from the conscious patients and unconscious patients Directly entered this study without any consent of the patient's attender's consent.

The sample size was 50.all the consecutive patients presenting with blunt abdominal trauma were included in the study. Inclusion and exclusion criteria for Including and excluding the patients in the study were defined and were applied to the patients.

Study design ---An Analytical study.

Source of Data:

50 Consecutive patients presented with history of blunt abdominal trauma to Govt Rajaji Hospital, Madurai based on comprehensive history and physical examination, subjected to FAST Examination and later taken up for Surgery or managed conservatively.

Sample size: – 50 patients with history of blunt abdominal trauma.

Inclusion criteria :

1. Patients presenting with h/o blunt injury to abdomen were included.
2. Pt's with a h/o of Blunt injury abdomen associated with intra abdominal injuries (polyt-rauma) were also included.

Certain patients in whom some adverse factors, which affect the view quality

Of ultra sonography, and influence the outcome of results were excluded from the study.

Exclusion criteria :

1. Known cases of ascites.
2. Previous history of liver abscess or anyother intra-abdominal abscess/cysts.
3. Post-operative cases (3 months)
4. Pregnant women

In our study we performed FAST protocol examination in 50 consecutive patients with blunt abdominal trauma.fig. 15 shows the ultrasound machine (mindray6600) situated in the casualty, with which the FAST scans are performed as bedside procedure for patients with Blunt abdominal trauma (fig16)

All the patients with the History of BAT were screened by FAST Examination for Evidence of intra-Abdominal free fluid .The FAST Scan was performed in the casualty during resuscitation .FAST scan will not disturb the management of patients.

Fig 19. Ultrasound Machine Situated in Casualty.



Figure. 20. Probes used in Ultrasound Machine Situated in Casualty.



Patients were divided into FAST Positive and FAST Negative based on the

Mere Presence(or) absence of free fluids , and that was compared with Laparotomy findings of free fluids ,and CT Scan findings for free fluid in patients who were managed non-operatively.,(conservative management).

Fig 21: Patient with Blunt Abdominal Trauma



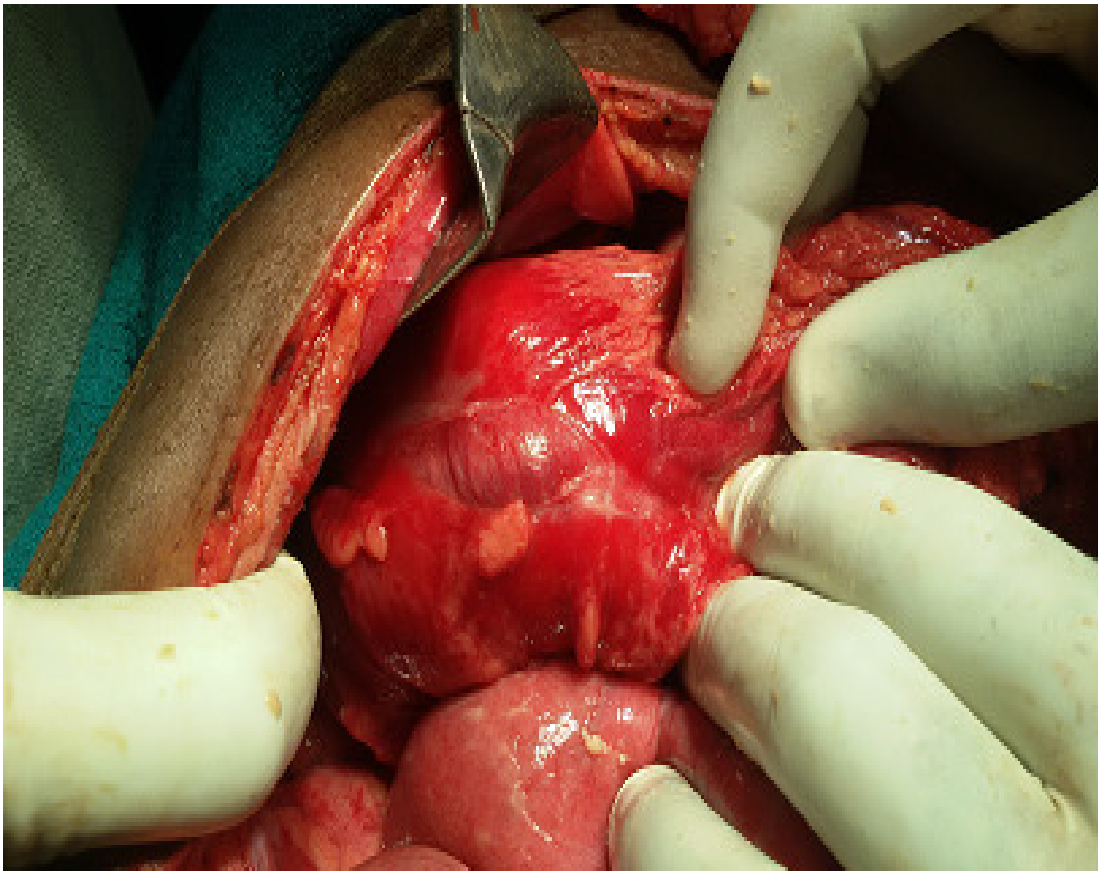
Patient with a H/o blunt abdominal injury admitted our hospital has been resuscitated he was FAST positive and up for Emergency explorative laporotomy.

Fig 22: Patient with Blunt Abdominal Trauma Intra-operative findings – LIVER LACERATION



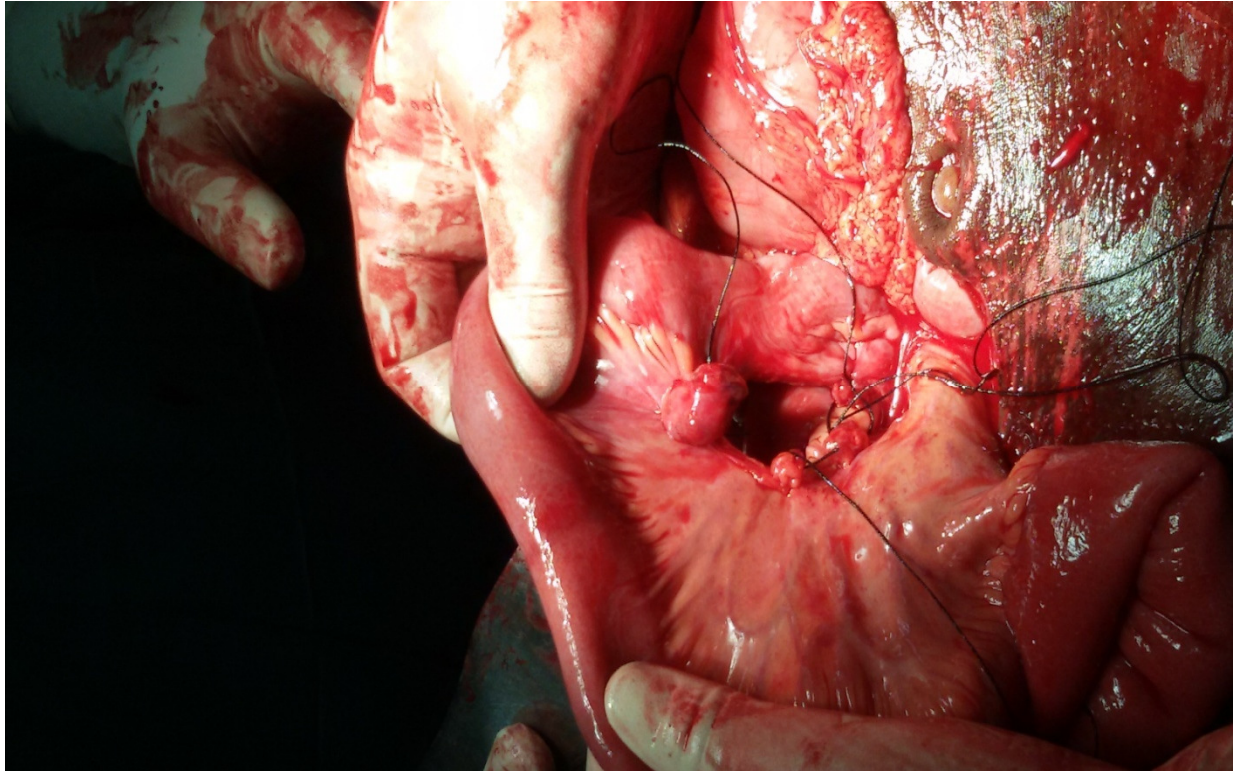
Intra operative picture of a patient with blunt injury abdomen. On FAST our radiologists detects massive haemoperitoneum. That was confirmed by Laparotomy findings. Note blood clots a laceration. Bleeding was controlled by abgel packing all around the laceration.

Fig 23: Patient with Blunt Abdominal Trauma Intra-operative findings – SEROSAL TEAR TRANSVERSE COLON



Note that there is a serosal tear in the transverse colon which was closed with 3-0 silk.

Fig 24: Patient with Blunt Abdominal Trauma Intra-operative findings – mesenteric tear.



Note that there is a large tear in the mesentery very close to the ileo caecal junction. Haemoperitoneum around 1.5 litres have been evacuated. Patient transfused with blood and taken up for emergency laparotomy.

STATISTICAL ANALYSIS

FAST EXAMINATION FINDINGS	INTRA OPERATIVE/CT FINDINGS FOR FREE FLUID			
		POSITIVE	NEGATIVE	TOTAL
	POSITIVE	a	b	
	NEGATIVE	c	d	
TOTAL				

About fifty patients with blunt abdominal injury are studied with Fast examination. Based on the existence of free fluid patients are divided into FAST positive or FAST negative. They are compared with intra operative findings of free fluid and ct scan findings of free fluid in conservatively treated patients.

THE SENSITIVITY = $a // (a+c) \times 100 = \underline{\hspace{2cm}}$ %

i.e., Fast +ve / Lap +ve = True positive.

THE SPECIFICITY = $d // (b+d) \times 100 = \underline{\hspace{2cm}}$ %

i.e., Fast -ve / lap -ve = True negative

THE +VE PREDICTIVE VALUE = $a // (a+b) \times 100 = \underline{\hspace{2cm}}$ %

I.e., lap +ve / Fast +ve

THE -- VE PREDICTIVE VALUE = $d // (c+d) \times 100 = \underline{\hspace{2cm}}$ %

i.e., Lap -ve / Fast -ve

Results will be compared by calculating sensitivity and specificity.

Sensitivity:

It is considered as a statistical index of Diagnostic accuracy of a given test. It is defined as the ability to identify correctly all those who have the disease.(TRUE POSITIVE) .

Specificity:

It is defined as the ability to identify correctly all those who have not the disease.(TRUENEGATIVES).

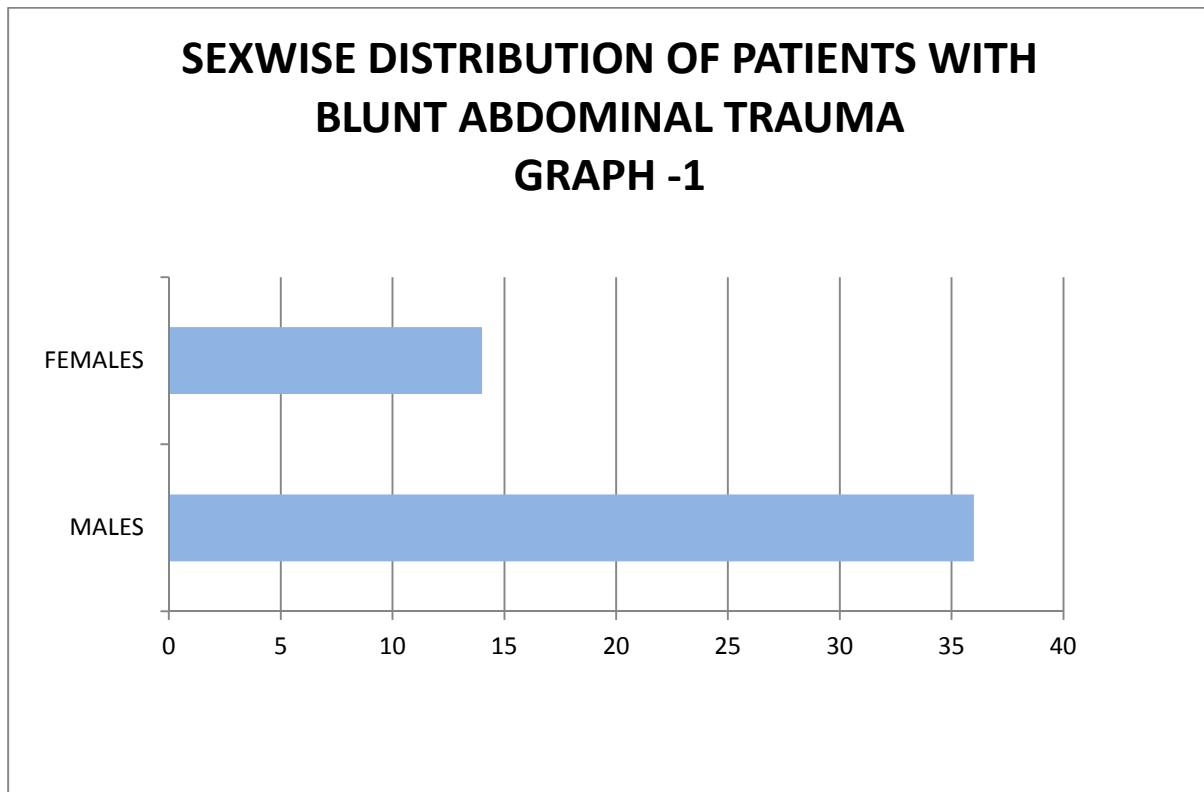
Predictive value:

The performance of a screening test is measured by its “predictive value “which reflects the diagnostic power of the test. This depends upon the sensitivity specificity ,and prevalence of the disease.The more the prevalence the more will be the accuracy of the predictive value of positive screening test.

RESULTS

TABLE NO.01: SEXWISE DISTRIBUTION OF PT'S WITH BLUNT INJURY ABDOMEN

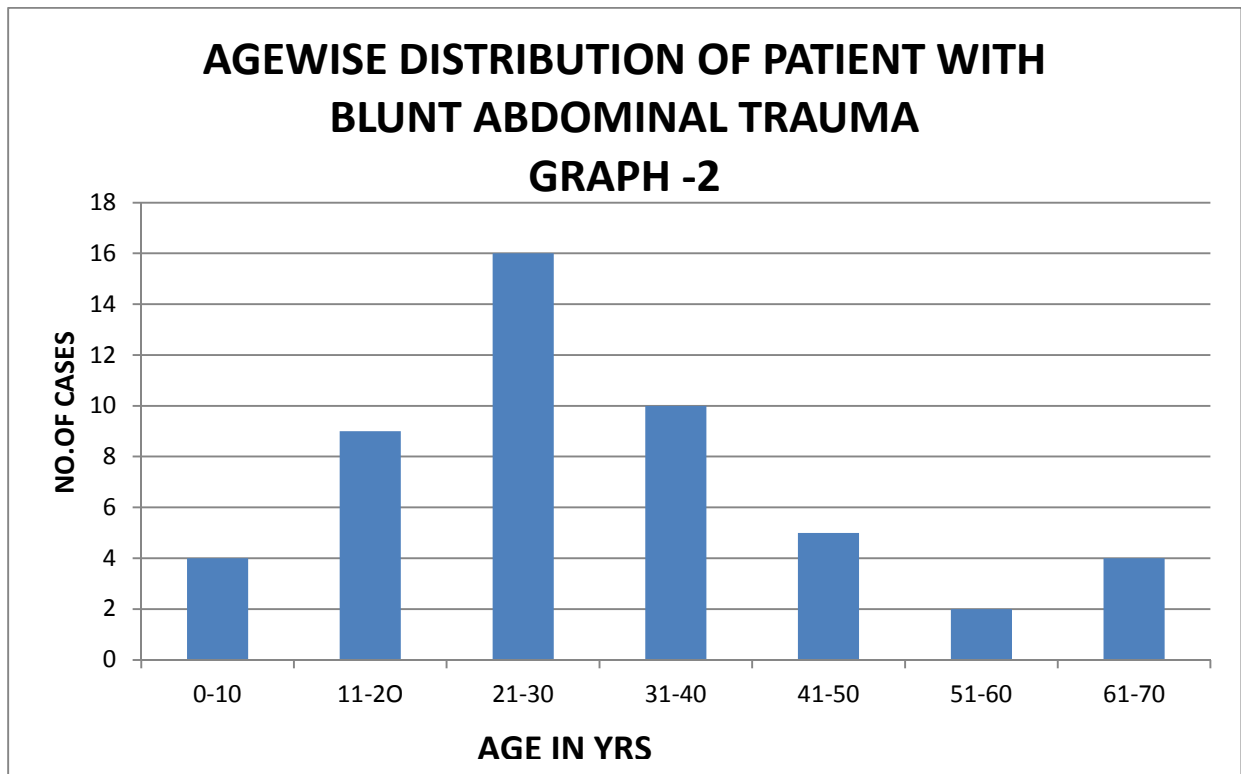
SEX	NO OF CASES	PERCENTAGE (%)
MALES	36	72
FEMALES	14	28
TOTAL	50	100



NO. OF PATIENTS	MALES-36	FEMALES -14
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TABLE NO.02: AGEWISE DISTRIBUTION OF PATIENTS WITH BLUNT ABDOMINAL TRAUMA

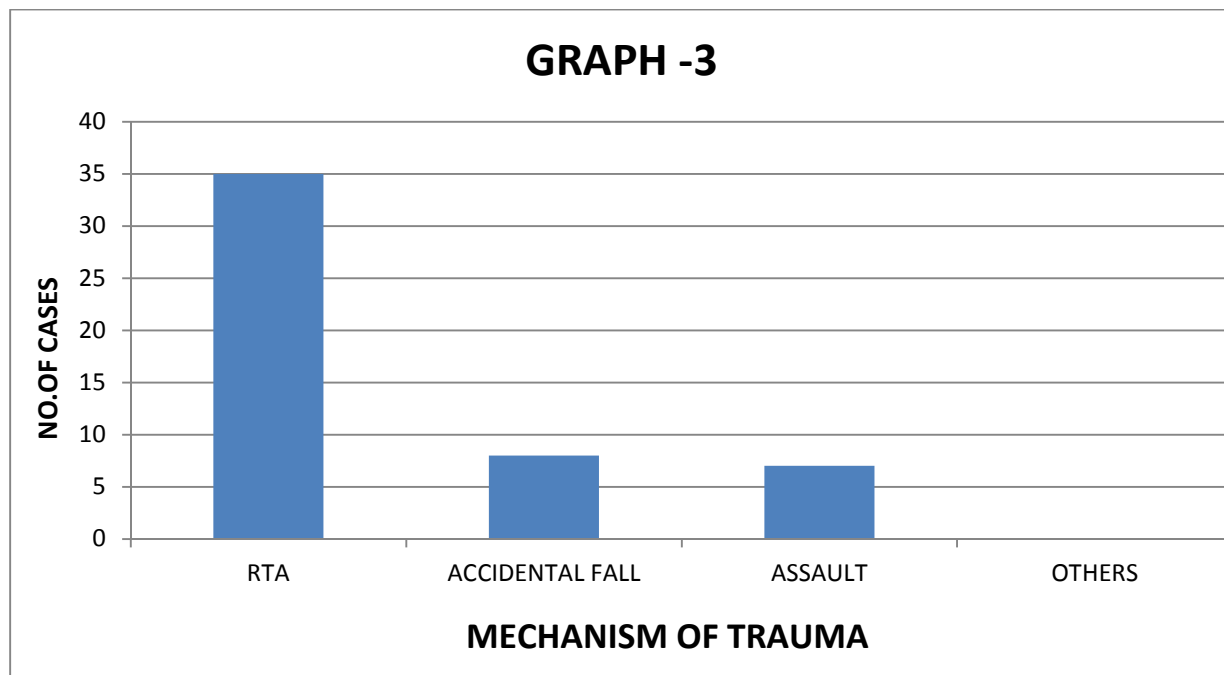
AGE	NO OF CASES	PERCENTAGE (%)
0-10 YRS	4	8%
11 TH -20 TH YRS	9	18%
21 ST -30 TH YRS	16	32%
31 ST -40 YRS	10	20%
41 ST -50 YRS	5	10%
51 ST -60 YRS	2	4%
61 ST -70 YRS	4	8%



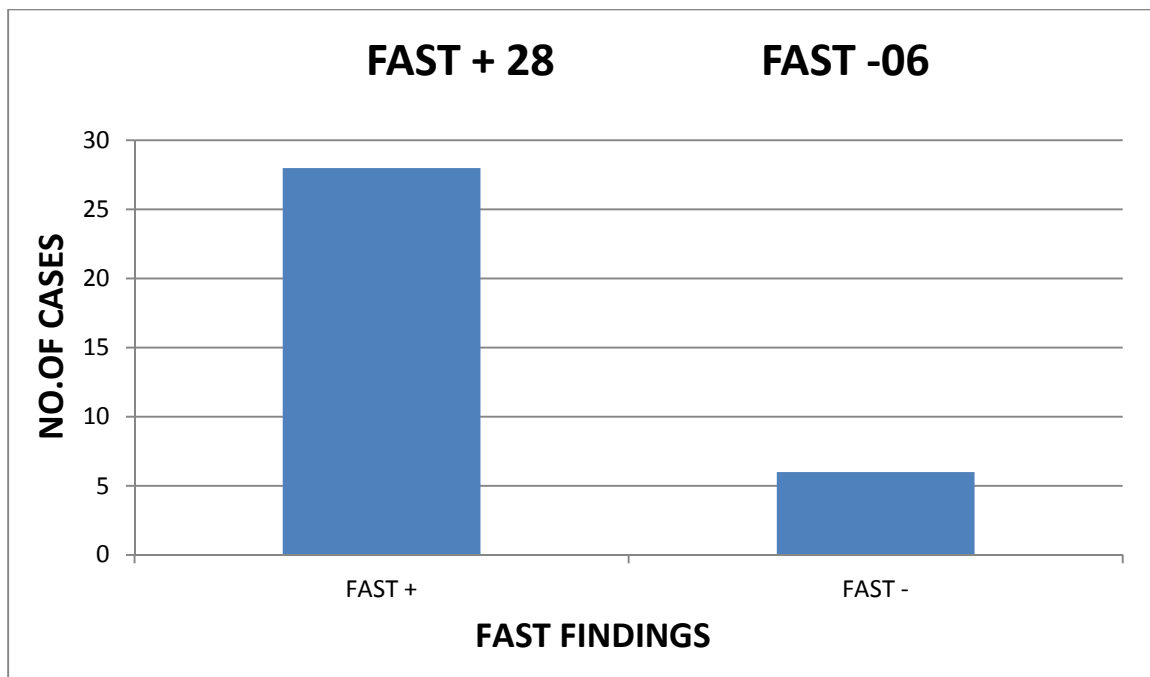
In our study patients in the age group of 21-30 yrs were more i.e 16 patients (32%)

**TABLE NO.03: DISTRIBUTION OF PATIENTS WITH
'BLUNT ABDOMINAL TRAUMA' DEPENDING ON THE
MECHANISM OF TRAUMA**

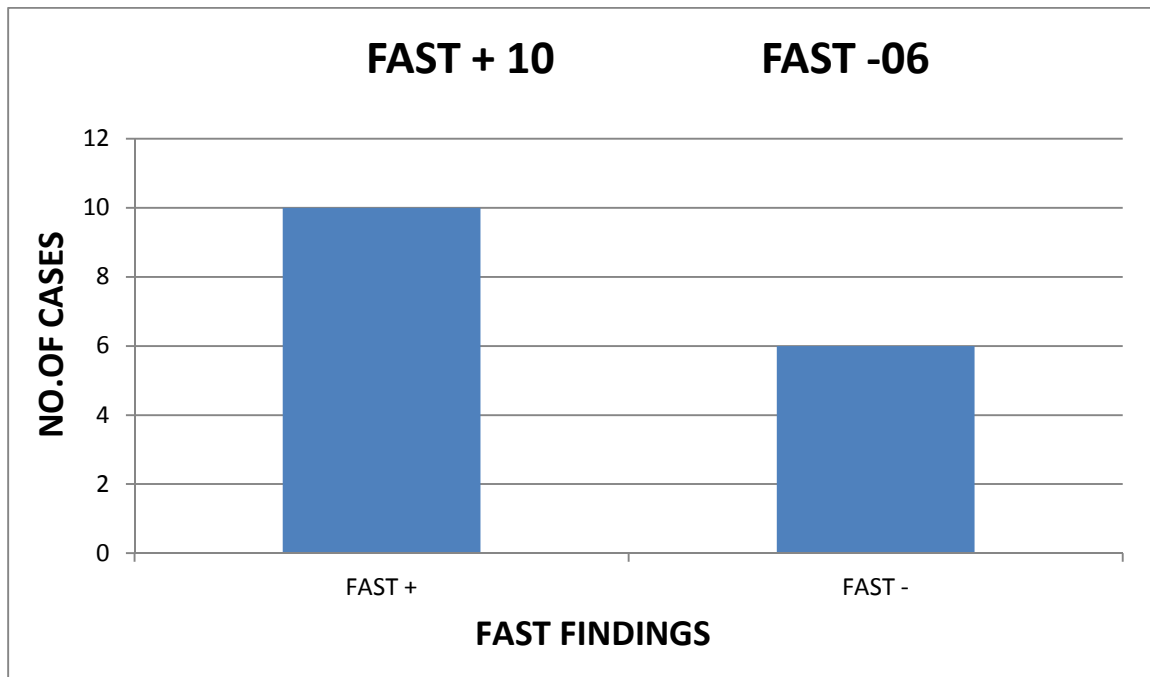
MECHANISM OF TRAUMA	NO OF CASES (n=50)	PERCENTAGE (%)
RTA	35	70
ACCIDENTAL FALL	08	16
ASSAULT	07	14
OTHERS	00	00



GRAPH 04: DISTRIBUTION OF PATIENTS BASED ON PRESENCE OR ABSENCE OF FREE FLUID IN OPERATED CASES



GRAPH 05: DISTRIBUTION OF PATIENTS BASED ON EVIDENCE OF FREE FLUID IN NON-OPERATED CASES



**TABLE NO.04: FAST EXAMINATION OBSERVATION
IN DETECTING FREE FLUID IN ABDOMEN IN
COMPARISION WITH INTRA OPERATIVE FINDINGS**

FAST EXAMINATION FINDINGS	INTRA OPERATIVE FINDINGS			
	DISEASE	POSITIVE	NEGATIVE	TOTAL
	POSITIVE	28	00	28
	NEGATIVE	05	01	06
TOTAL	33	01	34	

SENSITIVITY : 84%

SPECIFICITY : 100%

POSITIVE PREDICTIVE VALUE : 100%

NEGATIVE PREDICTIVE VALUE: 16%

**TABLE NO.05: FAST EXAMINATION OBSERVATION
IN DETECTING FREE FLUID IN ABDOMEN IN
COMPARISION WITH CT SCAN FINDINGS**

FAST EXAMINATION FINDINGS	CT SCAN FINDINGS			
	DISEASE	POSITIVE	NEGATIVE	TOTAL
	POSITIVE	08	02	10
	NEGATIVE	03	03	06
TOTAL	11	05	16	

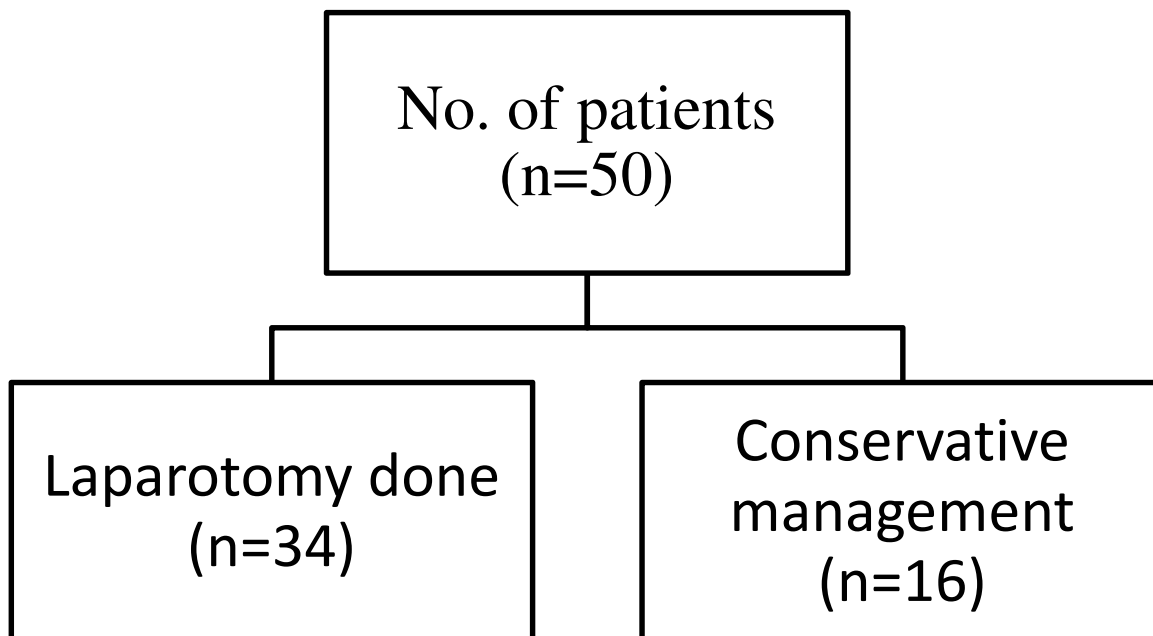
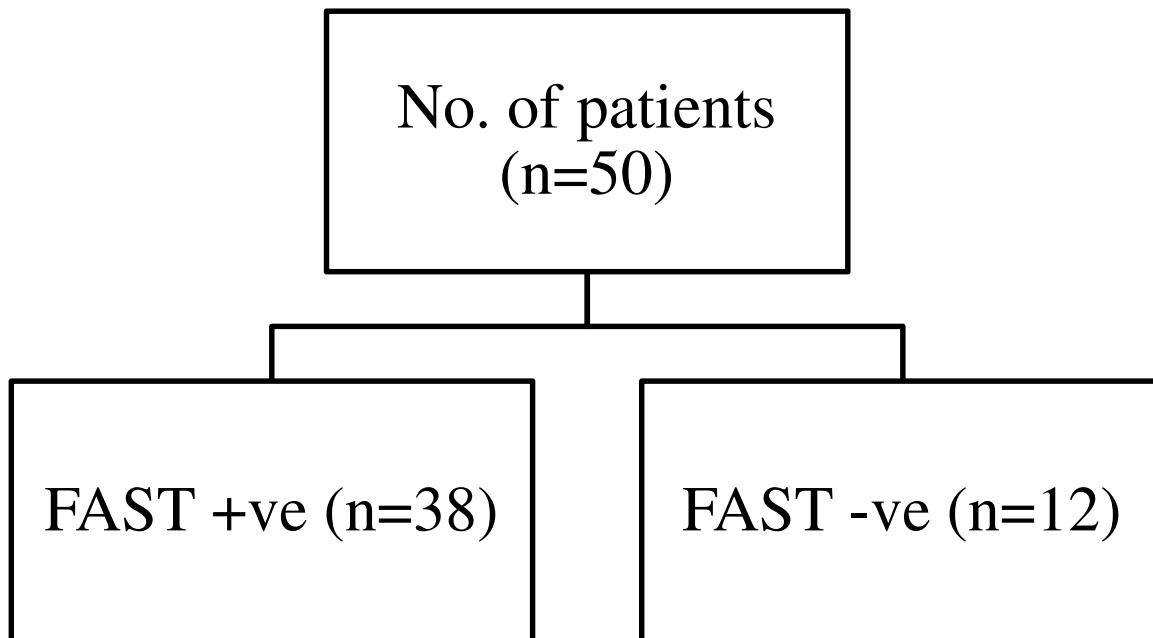
SENSITIVITY : 72%

SPECIFICITY : 60%

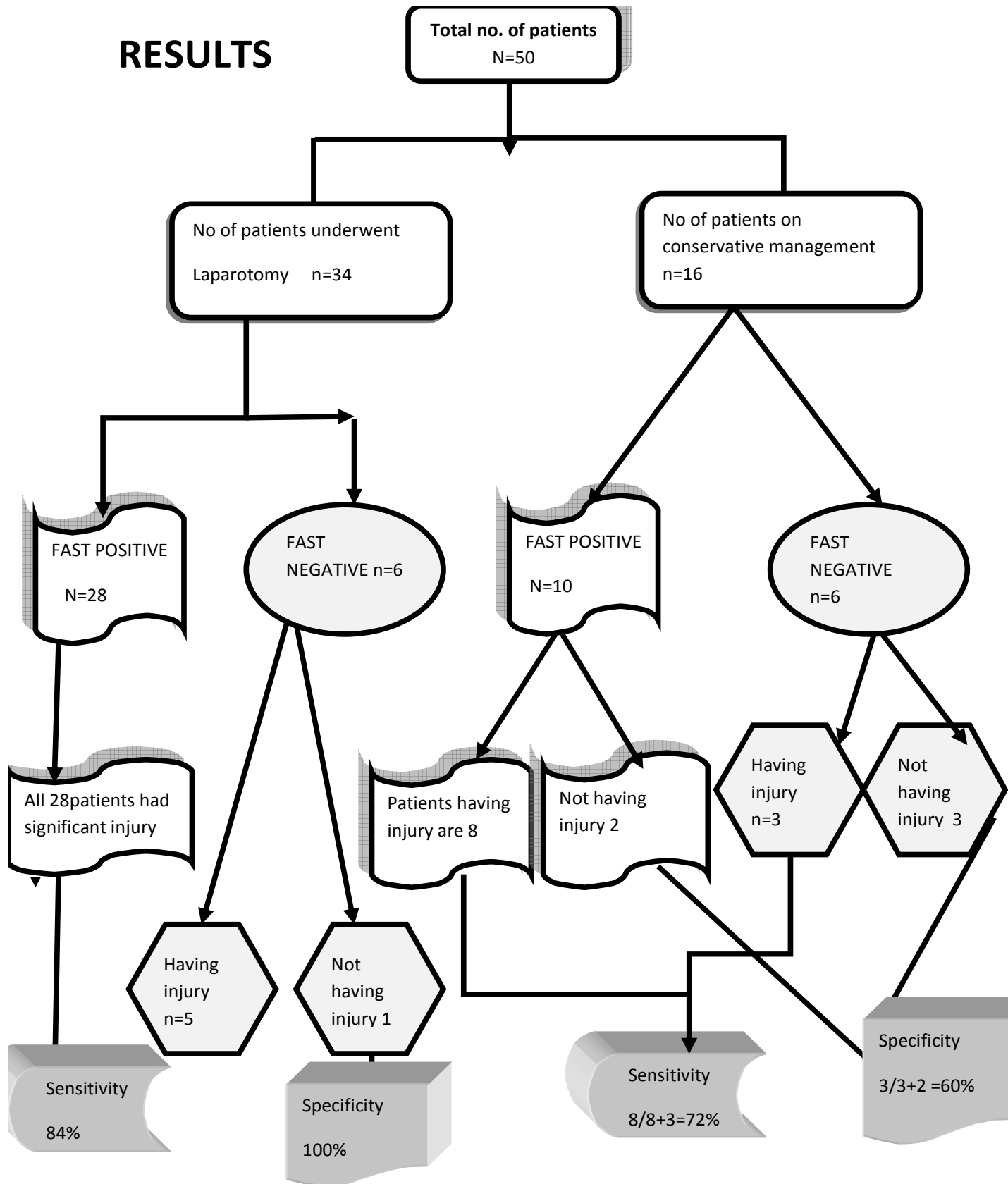
POSITIVE PREDICTIVE VALUE : 80%

NEGATIVE PREDICTIVE VALUE: 50%

RESULTS



RESULTS



- 50 patients with history of blunt abdominal injury were included in the study, conducted from 01-01-2014 to 20-09-2014, out of which 36 were male and 14 were females. Mostly the patient were in the age of 20-50 yrs.
 - RTA was the most common mechanism of trauma seen in 35 patients. 35 patients presented with hypotension and hemodynamic instability.
 - FAST findings were positive in 38 patients and negative in 12 patients. 34 patients underwent laparotomy and 16 patients were treated conservatively. Out of 34 patients who underwent laparotomy, 28 patients were FAST positive and 6 were negative.
 - All 28 patients had significant intra-abdominal injury & among 6 FAST negatives, 5 patients had injuries and 1 patient did not have any injury(True negative).
 - Splenic and hepatic injury were the most common organ injury. Among 16 conservatively treated patients, 10 were FAST positive and 6 were FAST negative.

- Out of 10 FAST positives, patients having injuries are 8 and patients not having injuries are 2 ..
- Out of 6 FAST negatives, Patients having injuries are 3, and patients not having injuries are 3 .
- Average time taken for each FAST Scan was 10 minutes.
- Specificity of FAST was 100% in comparison with laparotomy findings and 60% when compared to CT scan findings. The Sensitivity was 84% in comparison with laparotomy findings and 72% when compared to CT scan findings.
- FAST has the +ve predictive value of 100% and 80% in comparison with laparotomy and CT scan findings respectively. The negative predictive value of FAST was found to be 16% and 50% in comparison with laparotomy and CT scan findings respectively.

EVIDENCE

In a study, deciding tool in a hemodynamically unstable patients regarding need of laparotomy, Fast's sensitivity is 100percentage,&the specificity is 95percentage. And the -ve predictive value is 100% (Where, Rozyski & a1, McuKenny & a1).

In other study detecting free intra abdominal fluid when comparing with Diagnostic peritoneal lavage and C-T scan & laparotomy, Fast's sensitivity is 75%, specificity is 96% and -ve prediictive value is 96%(16 study, 6354 patients, 1994 to 2002)^{58,59,60}The Amount of fluid that can be detected (minimal ml) is 75 ml.⁶³

Regarding training programs for the emergency surgeons ,&physicians stated that atleast 25 reports to be gained before leaving indepentantly.Too many scanning cases in te training programmes , the best is the accuracy.

DISCUSSION

In our study FAST was done in 50 patients with blunt abdominal trauma were included . of which 38 patients have free intra peritoneal fluid (FAST POSITIVE).Among the FAST +ve only 28 had significant intra abdominal organ injury in 34 laparotomy patients . The sensitivity was found to be 84 % . This implies the diagnostic accuracy of FAST.

FAST NEGATIVE patients were 6 and they are put in to conservative management. These patient's results are compared with C-T scan findings .Among 6 patients 5 patients have minor intra abdominal injury but one patient did not have any injury. The specificity was found to be 100%. That is the diagnostic efficacy in detecting the true negatives (those who do not having the injury)

When comparing this study with another study (Soffer et al)(2006) Which showed USG to have 89% sensitivity and 97 % specificity. This almost consistent with our study.

In other study detecting free intra abdominal fluid when comparing with Diagnostic peritoneal lavage and C-T scan & laparotomy, Fast's sensitivity is 85%, specificity is 96% and -ve predictive value is 96%(16 study, 6354 patients, 1994 to 2002)^{58,59,60}The Amount of fluid that can be detected (minimal ml) is 75 ml.⁶³

There is always an inadequate and in accurate clinical examination of abdomen in a case of abdominal injuries due to altered levels of consciousness, patients various reactions to the clinical examination in intra abdominal injuries.

Hence a prompt screening and best diagnostic test is mandatory in the management of B A T. That test should be easy to work, reliable in interpretation, and that should give an efficient discrimination Whether to operate or not on the patient.

Speedy USG screening test to detect the mere presence or absence of intraperitoneal free fluid and intra pericardial free fluid comprising the focused assessment with sono graphy for trauma (FAST) testing. FAST is becoming a gold standard diagnostic test in emergency trauma care centers.

The advantage of FAST in trauma centre lies in it's rapidity ,portablility , noninvasiveness, and best even in the hands of trained personnals also include the repeatability in detecting the intra cavitory heamorrhge and internal organ leak.

Bouelenger and associates reported that FAST examination has occupy the position of D P L in many of the trauma care centres

The aim (or) goal of Fast is to identify the free fluid in the abdominal cavity as a standard pointer of intra abdominal injuries . Recently in trauma care practice FAST has been taken for a two cogrous role .

First one is its rapid identification of internal injury in a very unstable patient and the need for an emergency laparotomy. The second one is that even though a controversial one, it excludes the stable one for further imaging modalities like C T Scan with or without contrast enhancing.

Institutional trauma care centers have accepted fast's has the role of both. Hence fast + ve unstable Pts were operated and fast's -ve Pt's were put in the protocol of conservative management.

The results of Fast's are interpreted according to the findings of sonogram and history taking and abdominal examination. Recently authors uses the H H FAST (Hand Held FAST)⁵².

This Portable hand – held (H-H) ultrasonography (U-S) machines becoming more popular and easily available for emergency physicians. This aids better , easy ,and acceptable tool in an emergency ward and in mass casualty ⁵²

In an international meet, emphasized that the role of portable and compact USG unit in the diagnosis of organ damage in abdominal trauma.

Krikpatrick et al. have reported about their role in fast using a Hand Held USG unit in the assessment of trauma in various American centers. But care should be taken that this Hand Held units should be accompanied by a floor unit in certain situations. Interpretation of results includes the best clinical examination and history taking. Fast examination has been utilized exclusively for identifying the intra peritoneal free fluids.

Various studies have mentioned about the efficacy of Fast by emergent-logists, radio-logists and the trauma surgeons in detecting the intra peritoneal fluid with higher degree of accuracy⁵⁶.

Lethal intra-abdominal injuries may occur without the existence of free fluid within the peritoneal cavity. 'Their study asked, How good are both examinations at finding fluid, did this fluid correlate with injuries, and did these injuries require intervention?'. Blunt trauma pilot cohorts of 46 patients from Vancouver and 61 patients from Detroit, as well as a separate penetrating abdominal cohort have previously been reported⁵⁷.

Some time potentially dangerous injury can occur even without the collection of free fluid. some study evolving in to the efficacy in detecting the fluid and it's correlation with the organ injury.

The Summary of FAST –vs- CT Scan -vs- Diag. Peritoneal Lavage.

Quickness(speed)	:FAST>> D PL>>C-T Scan
The Sensitivity	: DPL>>C-T Scan & FAST scan
The Specificity	:C-Tscan>>FAST>>DPL
Identifying the injury	:CT>>FAST>>DPL
Easy/portability	: FAST>>DPL>>C- Tscan
Safety	:FAST>>C-Tscan>>D P L
Cost	:DPL<<FAST<<C-Tscan

CONCLUSION

- 1) 'Blunt abdominal trauma' is commonly seen in male population.
- 2) 'Blunt abdominal trauma' is commonly seen in the age group of 20-50.
- 3) The most frequent risk factor or mechanisms causing blunt abdominal injury are Road Traffic Accidents.
- 4) The usual clinical presentation of Pt with Blunt Injury abdomen with history of blunt abdominal , pain abdomen and hypotension. In our study almost all of the patients presented with pain abdomen and 35 patients out of 50 were presented with hypotension.
- 5) The average time taken for FAST Scan was 10 minutes.
- 6) Splenic and liver injury were the most frequent organ injury.

- 7) The sensitivity of FAST Scan is 84% (No of true positives) i.e., those who are having intra abdominal organ injury when compared to laparotomy findings in FAST positive patients. and 72% of patients in comparison with CT scan findings in conservatively treated patients who were opted for C-T Scan.

- 8) The specificity of FAST Scan is 100% (true negative patients i.e., those patients who are not having any injury) in comparison with laparotomy and 60% in comparison with CT scan findings of free fluid in conservatively treated patients..

- 9) The positive predictive value of FAST Scan is 100% when compared to laparotomy findings and 80% in comparison with CT scan findings.

- 10) The negative predictive value of FAST Scan is 16% when compared to laparotomy findings and 50% in comparison with CT scan findings.

Overall it was noted in the study that FAST has the high specificity that is, it is useful in detecting the patients who do not have the disease, in our study

It can be concluded that FAST is a useful diagnostic modality in patients with blunt abdominal injury with haemodynamic instability.

Patients with FAST findings positive for free fluid and haemodynamic instability should be taken up for urgent operative intervention that is Exploratory Laparotomy and proceed. But in stable patients CT scan is the investigation of choice and the patients can be observed and managed non operatively.

SUMMARY

The clinical assessment of blunt abdominal injury in an acute emergency ward still a major diagnostic problem. Per Abdominal examination does not yield a proper diagnosis In all case, especialy in a severely injured and unconscious patient. Various investigations used are diagnostic peritoneal lavage (DPL) and C-T scan both of which have disadvantage. The reliable, and perfect preoperative tool in the treatment of patients with blunt abdominal trauma is to assess whether To operate or notice necessary and not the exact organ of injury.– BY Polk

Presence of free fluid in trauma patients could best be assessed by focuses abdominal USG. And mostly the Fluid is blood in cases of trauma .due to internal organ injury and bleeding.

Various meta analysis reported that surgeons , emergency physicians , and Trauma nurses can do a best and accurate USG in the assessment of Fast in BAT if properly trained.

The diagnosis of internal organ injury in trauma patients is still a difficult thing. And it aids in the prompt management and it gives a better trauma outcomes. Avoiding the negative laparotomies .

Diagnostic peritoneal lavage is outdated as there is still a chance of injury to the intra abdominal organ injury & is time consuming. Also fluid introduction in to the peritoneal cavity may interfere with further imaging modalities. But used to the type of fluid collection intra peritoneally whether urine in bladder injury , blood in solid organ injury , bilious in small bowel injury , feculent in large bowel injury. With this knowledge we could try with conservative treatment in a stable patients.

In CT scan it can visualize the intra abdominal pathology in detail, but the disadvantage of ct scan is its location, It is usually located at a distance from the emergency department, the patient has to be stabilized before transferring. When using a double contrast medium, it usually consumes time of about 40 mins to 1 hour for scanning.

The protocol for FAST examination has been followed in the United States. Four view scanning techniques has been utilized by them. The four views are as follows, sub-xiphisternum, morrison's pouch, left upper quadrant, and suprapubic. Some other protocols has been developed to image the paracolic gutters. But there is no much significant benefit by including the paracolic gutters in fast.

The main aim of FAST scan to identify the evidence of free fluid in the abdomen. But a -ve scan wont rule out any internal organ injury. Presence of fluid indicates massive intra abdominal bleeding

Conclusion from this study includes the FAST examination as one of the precious tool in the resuscitation process. The reports will not be shown to the trauma team members and will not contribute to patient management decisions.

In our study we noted that Road Traffic Accidents was found to be the most common cause for B A T. The average time taken for FAST Examination was 10 minutes. Pain abdomen and hypotension was found to be the most common presentation. Most of the patients presented with Splenic injury, which is the most common organ injury.

We conclude that the advantages of FAST Protocol are that it is non invasive, quick, portable, accurate and could be done during resuscitation. Its use doesn't have a higher hand over other investigations especially in hemodynamically unstable patients.

ANNEXURE 1
STUDY PROFORMA

PATIENTS NAME : IP NO. :

AGE : SEX :

DATE OF ADMISSION : DATE OF DISCHARGE:

RELIGION :

OCCUPATION :

ADDRESS :

MECHANISM OF INJURY :

TIME OF INJURY :

PLACE OF INJURY :

PRESENTING COMPLAINTS:

GPE :

P/A EXAMINATION :

OTHERS :

FAST EXAMINATION :

SCAN STARTING TIME : SCAN FINISHING TIME :

QUALITY OF THE SCAN : BEST
AND PROBE

FAIR

PRESENCE OF FREE FLUID

ABSENCE OF FREE FLUID

COULD NOT BE ASSESSED

ADDITIVE FACTORS :

OBESE PATIENTS

PREVIOUS SCARS

OTHERS

LAPAROTOMY FINDINGS:

FREE INTRAPERITONEAL FLUID:

POSITIVE

NEGATIVE

TYPE OF INTRAPERITONEAL FLUID:

HAEMOPERITONEUM

INTESTINAL CONTENTS

URINE

OTHER FINDINGS OF LAPAROTOMY:

CT SCAN FINDINGS IN OPERATED PATIENTS:

IN CONSERVATIVELY MANAGED PATIENTS:

ANNEXURE 2

CONSENT FORM

மதுரை அரசு இராஜாஜி மருத்துவமனைக்கு வரும் நோயாளிகளில் வயிற்றில் அடிபட்டு உள்ளவர்களுக்கு ஒரு ஆராய்ச்சி நடைபெற்று வருகிறது.நீங்களும் இந்த ஆராய்ச்சியில் பங்கேற்க நான் விரும்புகிறேன்.உங்களை சிஃ சிறப்புப் பரிசோதனைகளுக்கு உட்படுத்தி அதன் தகவல்களை / முடிவுகளை ஆராய்வேன்.இதனால் உங்கள் உடல் நஃ த்திற்கோ,அல்ஃ து சிகிச்சைக்கோ எந்தவித பாதிப்பும் ஏற்படாது என்பதையும் தெரிவித்துக் கொள்கிறேன். முடிவுகளை வெளியிடும் போதோ அல்ஃ து ஆராய்ச்சியின் போதோ தங்களது பெயரோ அல்ஃ து அடையாளங்களோ வெளியிடமாட்டோம் என்பதையும் தெரிவித்துக் கொள்கிறேன்.

இந்த ஆராய்ச்சியில் பங்கேற்பது தங்களுடைய விருப்பத்தின் பேரில் தான் நடக்கும். மேலும் நீங்கள் எந்நேரமும் இந்த ஆராய்ச்சியில் இருந்து விஃ கஃ ராம் என்பதனையும் தெரிவித்துக் கொள்கிறேன்.

இந்த சிறப்புப் பரிசோதனை முடிவுகளை ஆராய்ச்சியின் போது அல்ஃ து ஆராய்ச்சியின் முடிவின் போது தங்களுக்கு அறிவிப்போம் என்பதையும் தெரிவித்துக் கொள்கிறேன்.

ஆராய்ச்சியாளரின்
கையொப்பம்

பங்கேற்பாளர்
கையொப்பம்

ANNEXURE 3 - MASTER CHART

S.NO	NAME	AGE/SEX	IP NO.	MECHANISM OF TRAUMA	FAST FINDINGS	LAPAROTOMY FINDINGS	CT SCAN FINDINGS	HYPOTENSION AT ADMISSION (SYS B.P<90)	TIME TAKEN FOR FAST SCAN IN MINUTES
1	SUNDARAVALLI	16 /F	25912	RTA	+	FF + , DL	H-P	+	9
2	KALIMUTHU	25 /M	28312	RTA	+	FF + , JL	N-D	+	10
3	SAROJA	13 /F	26671	RTA	+	FF + , MT	N-D	+	9
4	SURIYA	24 /M	27892	RTA	+	FF + , MT	N-D	+	8
5	NANDINI	12 /F	28765	RTA	-	FF + , MT	N-D	+	11
6	MURUGAN	43 /M	29444	FFH	+	FF + , LL	N-D	+	8
7	ANNAKILI	32 /F	29802	RTA	+	FF + , UBR	N-D	-	10
8	BALU	40 /M	30012	FFH		FF + , RI	RI	+	9
9	PANDI	15 /M	30105	RTA	-	FF + , MT	N-D	-	9
10	ALAGAR	30 /M	31226	RTA	+	FF + , SI	N-D	+	10
11	MARUDU	21 /M	31335	AF	+	FF + , SI	N-D	-	11
12	DEIVAM	42 /F	31517	RTA	+	FF + , SI	N-D	+	11
13	MUTHUKANNU	45 /M	32871	RTA	+	FF + , SI	N-D	+	9
14	VIJAYAKUMAR	34 /M	32901	RTA	-	FF + , SB Isch.	SBI	+	12
15	RAKESH	10 /M	33502	AF	+	FF + , SI	N-D	+	12
16	NATARAJAN	48 /M	33912	RTA	+	FF + , SI	N-D	+	8
17	RAJENDIRAN	22 /M	34781	RTA	+	FF + , LBI	N-D	+	11
18	SHWETHA	4 /F	34996	AF	+	FF + , LBI	N-D	+	12
19	AMMASI	52 /M	35778	RTA	+	FF + , SI	N-D	+	10
20	PALRAJ	22 /M	35906	AF	+	FF + , MT, LBI	N-D	+	11
21	PANJU	33 /F	36142	RTA	+	FF + , SBI	N-D	+	9
22	KANNAN	19 /M	36415	RTA	+	FF + , MT	N-D	+	12
23	SUSILA	25 /F	36712	RTA	+	FF + , SI	SI	+	12
24	CHELLAIYA	35 /M	37990	RTA	+	FF + , EP	N-D	+	8
25	RAVICHANDRAN	32 /M	38118	RTA	+	FF + , SI	N-D	+	9

26	MOHAMMAED SADIK	22 /M	39765	RTA	+	FF + , SI, PT	N-D	+	10
27	LAKSHMANAN	70 /M	40001	RTA	+	FF + , SI	N-D	+	8
28	MALAISAMY	56 /M	40761	RTA	+	FF + , JP	N-D	+	9
29	MALARVIZHI	35 /F	41500	RTA	+	FF + , SBI	N-D	+	10
30	KARTHIK	25 /M	42042	RTA	+	FF + , EP	N-D	+	11
31	JEYARAMAN	22 /M	42998	RTA	+	FF + , SI	N-D	+	8
32	RAJESH	26 /M	43661	RTA	-	FF - , PW	N-D	+	9
33	RAMACHANDRAN	22 /M	43901	ASSAULT	-	FF + , UI	N-D	+	11
34	AVINASH	16 /M	44776	RTA	+	FF + , MT	N-D	+	9
35	SARA BEGUM	67 /F	45892	RTA	+	FF + , MT	N-D	-	12
36	SASI KUMAR	21 /M	46334	ASSAULT	-	FF + , LL	LL	-	11
37	DEVADOSS	22 /M	46987	RTA	+	FF - , NI	N-D	-	9
38	YOGESH	18 /M	47662	ASSAULT	-	FF + , MT	N-D	+	11
39	ABDUL KADAR	25 /M	48123	ASSAULT	-	FF + , ST	N-D	-	9
40	MUTHUKRISHNAN	35 /M	48984	RTA	+	FF - , NI	N-D	-	11
41	CHINNASAMY	70 /M	49348	RTA	+	FF + , MT	N-D	-	10
42	SELVI	8 /F	49789	ASSAULT	-	FF - , NI	N-D	-	9
43	RAJU	3 /M	50024	AF	-	FF + , LBI	N-D	+	11
44	ADAIKALAM	22 /M	50167	ASSAULT	+	FF + , MT	N-D	+	9
45	AMMAPONNU	35 /F	50998	RTA	+	FF + , MT	N-D	-	10
46	NAGARAJ	30 /M	51996	RTA	-	FF - , NI	N-D	-	10
47	OCCHHAMMAL	65 /F	52987	RTA	+	FF + , LL	N-D	+	10
48	BOSE	47 /M	53624	RTA	-	FF + , ST	N-D	-	8
49	GURUSAMY	8 /M	55023	AF	+	FF + , LL	N-D	-	9
50	VEERAN	18 /M	55877	RTA	+	FF + , MT	N-D	-	10

KEY WORDS TO MASTER CHART

ANNEXURE 4

AF	-	ACCIDENTAL FALL
CT	-	COMPUTED TOMOGRAPHY
EP	-	ENTERIC PERFORATION
FAST	-	FOCUSSED ABDOMINAL SONOGRAPHY FOR TRAUMA
HP	-	HAEMOPERITONEUM
JP	-	JEJUNAL PERFORATION
LBI	-	LARGE BOWEL INJURY
LL	-	LIVER LACERATION
MT	-	MESENTERIC TEAR
NI	-	NO INJURY, ND – NOT DONE
RI	-	RENAL INJURY
SBI	-	SMALL BOWEL INJURY
SI	-	SPLENIC INJURY
SB Isch.	-	SMALL BOWEL ISCHEMIA
ST	-	SEROSAL TEAR
UBR	-	URINARY BLADDER RUPTURE
UI	-	URETHRAL INJURY

LIST OF ABBREVIATIONS

BAT	–	BLUNT ABDOMINAL TRAUMA
CT	–	COMPUTED TOMOGRAPHY
DPL	–	DIAGNOSTIC PERITONEAL LAVAGE
FAST	–	FOCUSSED ABDOMINAL SONOGRAPHY FOR TRAUMA
FF	–	FREE FLUID
US	–	ULTRASONOGRAPHY

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Ref.No.5053/E1/5/2014

Madurai Medical College,
Madurai -20. Dated: 06 .2014.

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Sub: Establishment – Madurai Medical College, Madurai-20 –
Ethics Committee Meeting – Meeting Minutes - for June 2014 –
Approved list – reg.

The Ethics Committee meeting of the Madurai Medical College, Madurai was held on 24th June 2014 at 10.00 Am to 12.00 Noon at Anaesthesia Seminar Hall at Govt. Rajaji Hospital, Madurai . The following members of the Ethics Committee have attended the meeting.

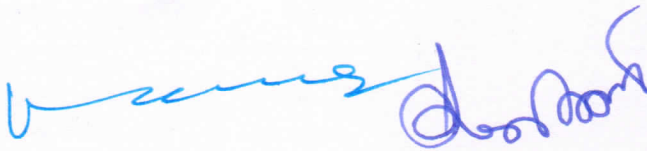
- | | | |
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The following project was approved by the committee

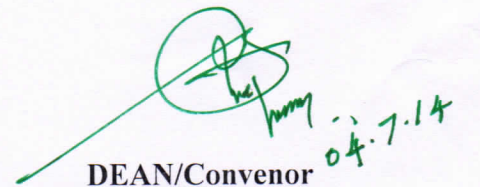
Dr.P.Vanitha, doctorvanitha@yahoo.com	PG in MS (General Surgery) Government Rajaji Hospital & Madurai Medical College, Madurai	A prospective study to assess the accuracy of diagnostic focussed abdominal sonography for Trauma (Fast) in Blunt abdominal trauma among the patients presenting to Govt.Rajaji Hospital, Madurai.	Approved
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Please note that the investigator should adhere the following: She/He should get a detailed informed consent from the patients/participants and maintain it confidentially.

1. She/He should carry out the work without detrimental to regular activities as well as without extra expenditure to the institution or to Government.
2. She/He should inform the institution Ethical Committee, in case of any change of study procedure, site and investigation or guide.
3. She/He should not deviate the area of the work for which applied for Ethical clearance. She/He should inform the IEC immediately, in case of any adverse events or Serious adverse reactions.
4. She/He should abide to the rules and regulations of the institution.
5. She/He should complete the work within the specific period and if any Extension of time is required He/She should apply for permission again and do the work.
6. She/He should submit the summary of the work to the Ethical Committee on Completion of the work.
7. She/He should not claim any funds from the institution while doing the work or on completion.
8. She/He should understand that the members of IEC have the right to monitor the work with prior intimation.



Chairman Member Secretary
Ethical Committee



DEAN/Convenor 04.7.14
Madurai Medical College & Govt.
Rajaji Hospital, Madurai- 20.

To
The above Applicant
-thro. Head of the Department concerned

**A PROSPECTIVE STUDY TO ASSESS THE ACCURACY OF
DIAGNOSTIC FOCUSED ABDOMINAL SONOGRAPHY FOR
TRAUMA (FAST) IN BLUNT ABDOMINAL TRAUMA AMONG
THE PATIENTS PRESENTING TO GOVT RAJAJI HOSPITAL
MADURAI.**

Dissertation submitted to

The Tamil Nadu Dr. M.G.R. Medical University, Chennai.

With fulfillment of the regulations for the award of the degree of

MASTER OF SURGERY (GENERAL SURGERY)

Branch-I



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DEPARTMENT OF GENERAL SURGERY
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