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Role of Efast in Detecting Pneumothorax in Polytrauma Patients

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Abstract:
Aim and objective:*To study the role of EFAST in detecting pneumothorax in polytrauma patients admitted in TAEI ward in GRH Madurai. In this study we evaluate the accuracy of EFAST in detecting pneumothorax compared with CT chest or chest X-ray.*
Materials and methods: *It is a prospective study conducted in GRH Madurai for a period of one year. Study population includes 100 patients with history of blunt injury chest of both sexes admitted in GRH during the period of 2021-2022. In all patients EFAST was done and compared with chest X-ray and CT chest.*
Observation and results:*All data collected were analyzed. Out of 100 patients in this study about 56 patients were confirmed to have pneumothorax.Thorough clinical examination in blunt injury chest patients revealed presence of pneumothorax in 10 patients out of 56 positive patients.About 39 patients were diagnosed to have pneumothorax in EFAST and all patients required tube thoracostomy placement. There were 17 false negative cases.The sensitivity of EFAST is found to be 69.64% and specificity is found to be 95.45%.Only 13 out of 56 were found to be positive for pneumothorax in chest X- ray. The sensitivity of chest X-ray in diagnosing pneumothorax is 23.21% and specificity was found to be 100%.*
Conclusion:*Thus, the sensitivity of EFAST exceeds chest X-ray and clinical examination or combination both in diagnosing pneumothorax in polytrauma patients and so it can be used as a valuable tool in detecting pneumothorax in poly trauma patients.*

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I. INTRODUCTION:

EFAST (Extended focused assessment with sonography for trauma)is a versatile diagnostic tool which helps in basic trauma evaluation, influences bed-side decision making and helps determine whether or not intervention is needed or not for an unstable trauma patient.Ultrasound in thoracic evaluation during trauma includes both respiratory and cardiovascular systems. Chest trauma is responsible for 20% deaths in trauma patients. Pneumothorax is one of the most serious thoracic injury and major cause of death in trauma patients. Pneumothorax is often detected by clinical examination and chest X-ray in the past but CXR are often inaccurate because air may layer anteriorly and this may be difficult to see in a supine chest X-ray. EFAST is more sensitive in detecting pneumothorax than chest X-rays and it takes less than 5 minutes to look for life threatening pneumo/hemothorax and pneumoperitoneum using EFAST.

II. AIM AND OBJECTIVES

This is a prospective study evaluates the role of EFAST in detecting pneumothorax in polytrauma patients admitted in TAEI ward, GRH Madurai for a period of one year.

III. MATERIALS AND METHODS

METHODOLOGY:
Patients with history of blunt injury chest attending Govt Rajaji TraumaCare Centre for a period of 1year (2021-2022)were included in this study.Informed consent was taken from all patients.All patients with history of blunt chest injuries were screened by EFASTexamination for evidence of pneumothorax. EFAST was compared with clinical examination, chest X-ray and CT chest.

INCLUSION CRITERIA :

- Patients above 12 years of age of both sexes.
- Pregnant patients.

EXCLUSION CRITERIA :

- Patients less than 12 years of age
- Patients with penetrating chest injury excluded from the study.

IV. OBSERVATION AND RESULTS

AGE DISTRIBUTION:

Most common age group falls under 31 to 40 years next followed by 41-50 years. In extremes of ages pneumothorax were found to be minimal.

AGE DISTRIBUTION	NO. OF CASES
<20	3
20-30	15
30-40	28
40-50	23
50-60	14
>60	17

SEX DISTRIBUTION:

Among 100 patients studied majority of patients were male (92 patients) and only 8 patients were females. Sex distribution of number of cases presenting with pneumothorax:

SEX DISTRIBUTION	PNEUMOTHORAX
Male (92)	51
Female (8)	5

MECHANISM OF INJURY:

Out of 100 patients the most common cause of blunt injury chest resulted from RTA which accounts for about 88% and the second most common cause being accidental fall 10%.

Totally out of 100 patients 56 patients were confirmed to have pneumothorax in CT chest.

	Pneumothorax positive
Clinical	10
EFAST	41
CXR	13
CT chest	56
Combined clinical and CXR	14

CLINICAL EXAMINATION IN PNEUMOTHORAX:

Thorough clinical examination in blunt injury chest patients revealed presence of pneumothorax in 10 patients out of 56 positive patients. No investigation is superior to clinical examination in helping to identify the need for urgent thoracostomy in trauma patients. Presence of tracheal shift to opposite side, desaturation with decreased breath sounds on same side and presence of subcutaneous emphysema points out to presence of pneumothorax. In clinically unstable patients ICD was inserted immediately after clinical examination and these patients were excluded from the study because of performing tube thoracostomy before EFAST, chest X- ray or CT chest. All 10 patients clinically positive for pneumothorax required intercostal drain tube insertion.

EFAST IN PNEUMOTHORAX:

EFAST examination was done in recumbent or semi-recumbent position in the anterior chest wall at 2nd to 3rd intercostal space and at 4th – 5th intercostal space in lateral chest wall for all 100 patients and about 39 patients were diagnosed to have pneumothorax and all patients required tube thoracostomy placement. There

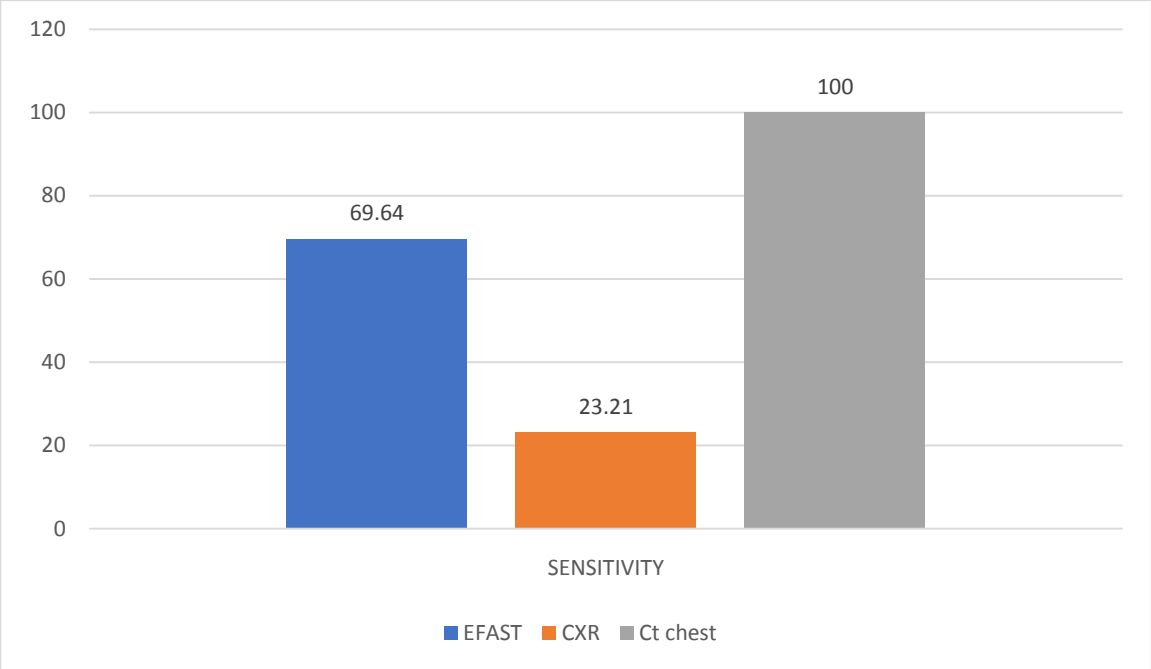
were 2 false positive cases. Most of the missed pneumothorax were minimal occult pneumothorax in apical of posterior positions.

Pneumothorax		
Yes	**True positive** **39**	**False positive** **2**
No	**False negative** **17**	**True negative** **42**

The sensitivity of EFAST is found to be 69.64% and specificity is found to be 95.45%. The specificity of EFAST is high. The sensitivity largely depends on the examiner due to operator error and also due to pre-existing lung diseases in the patients like COPD.

CHEST X-RAY IN PNEUMOTHORAX:

Chest X-ray done after primary and secondary survey in supine position for all patients and only 13 out of 56 were found to be positive for pneumothorax. Large pneumothoraces were easily identified by chest X-ray. The sensitivity of chest X-ray in diagnosing pneumothorax is 23.21%.



The specificity was found to be 100%. Thus, the sensitivity of EFAST exceeds chest X-ray and clinical examination or both in diagnosing pneumothorax in polytrauma patients.

V. CONCLUSION:

Thus, from the above study it is concluded that, in view of easy availability, cost effectiveness, no radiation exposure, portability and better sensitivity and specificity in diagnosing pneumothorax making ultrasound chest to be the better investigation modality for blunt injury chest which can prevent the morbidity and mortality due to difficulty in early diagnosis of pneumothorax requiring prompt intervention.

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