

PROSPECTIVE EVALUATION OF THORACIC ULTRASOUND IN THE DETECTION OF PNEUMOTHORAX

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Introduction: Pneumothorax (PTX) occurs commonly in trauma patients and is confirmed by examination and radiography. Thoracic ultrasound (U/S) has been suggested as an alternative method for rapidly diagnosing PTX when X-ray is unavailable as in rural, military, or space flight settings; however, its accuracy and specificity are not known.

Methods: We evaluated the accuracy of thoracic U/S detection of PTX compared to radiography in stable, emergency patients with a high suspicion of PTX at a Level-1 trauma center over a 6-month period. Following University and NASA Institutional Review Board approval, informed consent was obtained from patients with penetrating or blunt chest trauma, or with a history consistent with PTX. Whenever possible, the presence or absence of the "lung sliding" sign or the "comet tail" artifact were determined by U/S in both hemithoraces by residents instructed in thoracic U/S before standard radiologic verification of PTX. Results were recorded on data sheets for comparison to standard radiography.

Results:

Mechanism	Screened Pts	X-Ray PTX	U/S PTX	False (+)	False (-)
Blunt	255	10	9/10	0	1/10
Gunshot	18	5	5/5	0	0
Stab	51	8	8/8	0	0
Spontaneous	15	10	9/10	0	1/10
TOTAL	342	33/33	31/33	0/33	2/33

Thoracic U/S had a 94% sensitivity; two PTX could not be reliably diagnosed due to subcutaneous air; the true negative rate was 100%. In one patient, the U/S exam was positive while X ray did not confirm PTX; a follow-up film 1 hour later demonstrated a small PTX. The average time for bilateral thoracic U/S examination

was 2 to 3 minutes. **Conclusions:** Thoracic ultrasound reliably diagnoses pneumothorax. Presence of the "lung sliding" sign conclusively excludes pneumothorax. Expansion of the FAST examination to include the thorax should be investigated.