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ULTRASONOGRAPHY IN EVALUATION OF PNEUMOTHORAX

Radio-Diagnosis

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ABSTRACT

-Lung sonography is a reliable technique in the evaluation of various thoracic diseases. The ultrasonographic diagnosis of pneumothorax is based on the analysis of artifacts. It is possible to confirm or rule out pneumothorax by combining the following signs: lung sliding, the A and B lines, and the lung point. One fundamental advantage of lung ultrasonography is its easy access in any critical situation, especially in patients in the intensive care unit. For this reason, chest ultrasonography can be used as an alternative to plain-film X-rays and computed tomography in critical patients and in patients with normal plain films in whom pneumothorax is strongly suspected, as well as to evaluate the extent of the pneumothorax and monitor its evolution. As ultrasound machines have become more portable and easier to use, lung sonography now allows a rapid evaluation of an unstable patient, at the bedside.

KEYWORDS

pneumothorax, ultrasound, chest x ray, low cost, sustainable

INTRODUCTION

The use of thoracic ultrasound has gained slow acceptance due to the traditional teaching that the air-filled lungs are not ultrasound friendly.The utility of a simple thoracic X-ray and CT in the study of pneumothorax is very well defined but in some cases---especially in patients in a critical condition thoracic X-rays are hard to interpret and in many occasions these patients cannot go to the CT room. It is under these circumstances that the thoracic ultrasound is a useful alternative.1 Also it is an accessible cheap and innocuous technique. Several studies have proven that in order to diagnose pneumothorax the pulmonary ultrasound of the bedhead of patients is as efficient or even more efficient than the conventional X-ray performed when the patient is in the supine position. Gas molecules produced in the lung cause some sort of dispersion in the sound waves emitted by the transducer in infinite directions which in turn makes the formation of diagnostic images just impossible. However they cause a series of artifacts whose analysis we can use to confirm or discard pneumothorax. As a matter of fact evaluating one pneumothorax through an ultrasound is nothing but a study of artifacts. Our goal is to describe the main ultrasound signs of pneumothorax, consider its practical clinical applications and recognize the possible limitations of this modality.

Study group:

Patients attending the casuality of government general hospital Guntur.

Size:

50 patients over a period of six months from july 2021 to December 2021.

Probe selection and equipment.

A straight linear array high frequency probe (5–13 MHz) may be most helpful in analyzing superficial structures such as the pleural line and providing better resolution. 1–8 MHz curvilinear array probe may be more suitable for deeper lung imaging.

Technique and normal anatomy

In a supine patient this area corresponds to the anterior region of the chest at approximately the second to fourth intercostal spaces in the mid-clavicular line. The sonographer should first identify the landmarks of two ribs with posterior shadowing behind them and visualize the pleural line in between them

Ultrasound findings of pneumothorax

Lung sliding

The limit between the visceral pleura and the surface of lungs is visible in the ultrasound as an echogenic line---pleural line. Lung displacement in the thoracic cavity during respiration causes one alteration in the pleural line called "lung sliding''

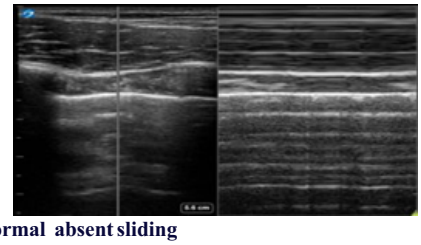

Fig 1 Normal absent sliding

Lines A and B

Lines A are the result of a reverberation artifact that translates into the appearance of several lines that run parallel to pleural lines at regular intervals.

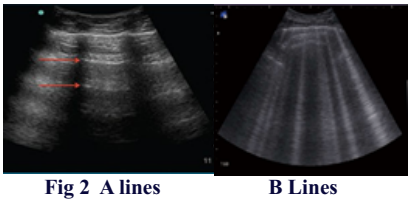

Fig 2 A lines **B Lines**

Lines B are a comet tail artifacts produced in the pleural line at the contact zone between the visceral pleura and the usually well-aired lung. Lines B can be seen separately in the normal lung and its number goes up in cases of interstitial or alveolar affectation

Lung point

It is the point where visceral and parietal pleural leaves separate. It is a dynamic image like the sign of lung sliding that contains findings of well-aired lung and pneumothorax. To find the lung point the transducer. slowly slides into the inferior-lateral portion of the thorax .Medially the lung sliding will be absent in the area of pneumothorax. More laterally there will be lung sliding where the visceral and parietal pleural leaves are still in contact. Lung point will be identified as the intermediate point where lung sliding will be visualized intermittently given that with the respiratory movement the collapsed lung intermittently slides into the area of pneumothorax.

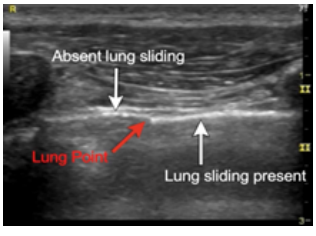

Fig 3

Table 1: ultrasound signs in pneumothorax

	Normal lung	pneumothorax
Lung sliding	present	absent
B Lines	present	absent
A Lines	Not seen	seen
Lung point	Not seen	seen

RESULTS:

out of the 50 patients 22 are diagnosed with pneumothorax and same is confirmed with CT and chest X ray which makes ultrasound as accurate diagnostic tool for pneumothorax.

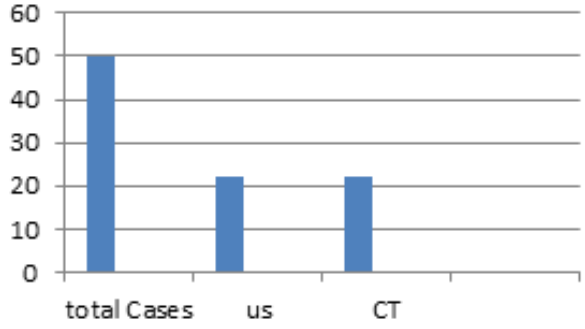

Table 2: number of pneumothorax cases diagnosed by CT and ultrasound.

CONCLUSION:

Despite lung ultrasound for the diagnosis of pneumothorax has been largely disregarded its practical utility has been confirmed. In our experience it is a fast, highly sensible noninvasive tool with a short curve of learning. Critical patients are the ones who will benefit the most from this modality. However if experienced in the use of this modality lung ultrasound can also be useful for the monitorization of pneumothoraces after lung post-biopsy and assessment of the retraction of pleural tube. However, cases with a large bulla in the lung or with pleural thickening can be misdiagnosed as pneumothorax on ultrasonography. Thus, chest ultrasonography cannot replace CT, which will continue to remain the "gold standard" in the diagnosis of pneumothorax, especially in the detection of small pneumothoraces.

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