DOWNLOAD PDF LUNG ULTRASOUND IN THE CRITICALLY ILL THE BLUE PROTOCOL

Chapter 1 : Download Lung Ultrasound in the Critically Ill: The BLUE Protocol PDF - Download medical boo

This review article describes two protocols adapted from lung ultrasound: the bedside lung ultrasound in emergency (BLUE)-protocol for the immediate diagnosis of acute respiratory failure and the fluid administration limited by lung sonography (FALLS)-protocol for the management of acute circulatory failure.

Received Jul 4; Accepted Nov This is an open access article distributed under the terms of the Creative Commons Attribution License http: This article has been cited by other articles in PMC. Abstract Lung ultrasound is a basic application of critical ultrasound, defined as a loop associating urgent diagnoses with immediate therapeutic decisions. It requires the mastery of ten signs: Two more signs, the lung pulse and the dynamic air bronchogram, are used to distinguish atelectasis from pneumonia. It includes a venous analysis done in appropriate cases. Pulmonary edema, pulmonary embolism, pneumonia, chronic obstructive pulmonary disease, asthma, and pneumothorax yield specific profiles. It makes sequential search for obstructive, cardiogenic, hypovolemic, and distributive shock using simple real-time echocardiography right ventricle dilatation, pericardial effusion , then lung ultrasound for assessing a direct parameter of clinical volemia: Other aims of lung ultrasound are decreasing medical irradiation: A , cost-effective gray-scale unit, without Doppler, and a microconvex probe are efficient. Lung ultrasound is a holistic discipline for many reasons e. Its integration can provide a new definition of priorities. Lung ultrasound, Acute respiratory failure, Acute circulatory failure, Pulmonary oedema, Pulmonary embolism, Pneumonia, Pneumothorax, Interstitial syndrome, Fluid therapy, Haemodynamic assessment, Intensive care unit Lung ultrasound in the critically ill The possibility of exploring the lung using ultrasound, at the bedside and noninvasively, is gaining popularity among intensivists. Lung ultrasound would be of minor interest if the usual tools bedside radiography, CT did not have drawbacks irradiation, low information content for radiography, need for transportationâ€¦. This review will show that ultrasound can be used instead of CT in many cases. At this time, although an old idea [2], ultrasound was not routine in the ICUs and had neglected this vital organ [3]. Many doctors thought that lung ultrasound was unfeasible [4 , 5]. For demonstrating that this dogma was wrong, deciphering the artifact code was the easy part, but publishing was the hard one, far from finished. We will briefly consider the elements of this code, then major clinical uses. Lung ultrasound is part of critical ultrasound, defined as a whole-body approach using simple machines, one universal probe, new applications [6 , 7]. Our priority was to publish lung ultrasound, leaving little time for developing basic fields search for blood in trauma, venous line insertionâ€¦. Seven principles of lung ultrasound 1 Lung and critical ultrasound is performed at best using simple equipment. Standardized areas can be defined [8]. The signs arising from the pleural line are foremost dynamic. Ten signs The Japanese microconvex probe we use is directly applied to the intercostal space. In ARDS Pink-protocol , a more comprehensive analysis includes four stages of investigation anterior, lateral, posterior, apical. Ten signs are currently assessed. All our studies directly compared ultrasound with CT.

DOWNLOAD PDF LUNG ULTRASOUND IN THE CRITICALLY ILL THE BLUE PROTOCOL

Chapter 2 : Lung Ultrasound in the Critically Ill : Daniel A. Lichtenstein :

Written by a pioneer in critical care ultrasound, this book discusses the basic technique and "signatures" of lung ultrasound and explains its main clinical applications. The tools and clinical uses of the BLUE protocol, which allows diagnosis of most cases of acute respiratory failure, are.

Lung ultrasound LU relies on direct visualization of structures and artifact interpretation. LU has a very high diagnostic accuracy. A training structure and competencies specific to critical care in the UK have been developed. Critically ill patients need rapid access to accurate and reproducible imaging techniques to diagnose pathology, implement, and monitor treatment. Point-of-care ultrasound US has become firmly established in acute and critical care settings FAST, vascular access, echocardiography and is now emerging as an important tool in the assessment of the lungs. Lung ultrasound LU can be performed quickly and easily in critically ill patients. It has a higher diagnostic accuracy than physical examination and chest radiography combined. LU can also be used to guide fluid management, weaning, and therapeutic procedures such as thoracocentesis. LU is relatively quick to learn with a steep learning curve. By attaining competencies with appropriate training, the Intensivist can effectively utilize LU as a point-of-care investigation. This article will take the reader through the physics and physiology of LU, outline how to perform a scan, describe the US appearances of normal and pathological lung conditions, and put these in the context of the intensive care setting. This is a measure of the resistance of particles in a medium to mechanical vibrations. Resistance increases in proportion to the density of the medium and the propagation velocity of US in the medium. When US hits a relatively large and flat boundary between mediums with different impedances, some of the sound is transmitted across the boundary and some is reflected an echo. The greater the difference in Z, the greater the reflection. Fluid has a constant Z resulting in no echoes and so appears black. Soft tissues have very similar values of Z resulting in minimal reflection. Soft tissue and air reflect This means structures below the pleura in an air filled lung cannot be visualizedâ€”only artifacts will be seen. LU relies on the interpretation of artifacts in conditions where the lung is predominantly aerated. These artifacts will vary depending on the ratio of air and fluid. If the lung is highly fluid filled, then it can be directly visualized. Pneumothorax consists of only air below the parietal pleura while a pleural effusion is only fluid. Probe selection US machines available in critical care settings are likely to have either a linear vascular access probe , curvilinear abdominal probe or phased array echo probe , or a combination. A great advantage of LU is that useful images can be obtained with each of these. Each probe has pros and cons. Linear probe 8â€”12 MHz These high-frequency probes give good resolution of superficial structures. As the anterior pleura is relatively superficial, excellent images of the pleura and lung sliding can be obtained. The poor penetration of high-frequency US and the narrow sector width mean deeper structures are poorly imaged. Lung sliding can be easily visualized as can IS. Effusions, consolidated lung, and the diaphragm are also well imaged because of the good penetration and large sector width. The large footprint of the probe means some angulation is needed to avoid the ribs when scanning postero-laterally. They can be used to demonstrate all the signs of LU but the clarity of the images is not as good. General points The clearest images are obtained by having the image as shallow as possible with the focus point at the level of interest. The frequency can be adjusted to enhance the image, depending on the depth. Increasing the frequency on a curvilinear probe will improve the appearance of lung sliding whilst worsening the appearance of a consolidated lung base. How to perform a scan US convention is that the left side of the image as you look at it should correspond with either the right side of the patient if transverse or cephalad if longitudinal. A comprehensive examination can be performed on supine patients. There are several systems that have been described in the literature to examine the thorax. One is a 3-point examination of each lung. It is therefore an excellent starting point for a novice. Method Apply two hands side by side without your thumbs over the anterior chest with your wrists in the anterior axillary line and your upper little finger resting along the clavicle. Your lower little finger will be aligned with the lower border of the lung the phrenic line

DOWNLOAD PDF LUNG ULTRASOUND IN THE CRITICALLY ILL THE BLUE PROTOCOL

Fig. All views are longitudinal and not transverse. Lichtenstein with kind permission from Springer. Upper anterior point This corresponds to the base of the middle and ring fingers on the upper hand. It lies over the upper lobe. Lower anterior point This is the middle of the palm on the lower hand close to the nipple in a man. It lies over the middle or lingular lobe. These points will miss the heart on the left. Postero-lateral point From the lower anterior point move laterally and posteriorly as far as possible behind the posterior axillary line limited by the bed. It lies over the lower lobe. With a curvilinear probe rib shadows can then be minimized by rotating the probe slightly to lie between the ribs cephalad will still be on the left of the image. More comprehensive scanning techniques have also been described and are recommended for advanced practitioners. Normal appearance All signs in LU arise from the pleural line except for subcutaneous emphysema which will abolish it as there is air above it. Rib shadows will be seen as the sound is reflected back to the probe and in between them the bright white pleural line about 0. Fig 2 Online video: If reading the pdf online, click on the image to view the video. Close Air below the pleural line reflects most US back to the transducer. This is itself a reflector, meaning some of the US waves will bounce back and forth between the pleura and transducer generating artifacts called A lines. They are horizontal lines below the pleura with the same spacing as the distance between the probe and the pleural line. Because they demonstrate the presence of air below the pleura, they are present both in normal lungs and in pneumothorax. Turning the probe transversely will abolish the rib shadows so more of the pleural line can be seen. The danger of this is that an inexperienced user may interpret a rib as the pleural line and incorrectly diagnose absent lung sliding. Lung sliding The visceral and parietal pleura are normally closely opposed with a minute amount of fluid between them and slide over one another with respiration. The appearance of this is backwards and forwards movement of the pleura often with little blebs appearing to move up and down the pleural line. Small artifacts white or black lines projecting a few millimetres below the pleural line move with sliding. These are more commonly seen with high-frequency probes and have no clinical significance. They are not B lines see later. Any B lines present will move to and fro with lung sliding. The whole of the sub-pleural space between the ribs will shimmer Fig. Subcutaneous tissue above the pleural line generates horizontal straight lines while there will be a sandy appearance below the pleural line created by the movement of lung sliding Fig. Lung sliding will be reduced with low tidal volumes or in hyper-inflated lungs. It will be absent in any condition in which the pleura are either not directly opposed pneumothorax, effusion , are stuck together pneumonia, ARDS, pleurodesis , or in absent respiration pneumonectomy, one lung intubation. It should not be necessary to use M-mode to demonstrate the presence or absence of slidingâ€"2D is sufficient. Interstitial syndrome IS is a sonographic entity caused by Clinical examination and supine radiography have poor sensitivity for detecting interstitial oedema. These are artifacts generated by the juxtaposition of alveolar air and septal thickening from fluid or fibrosis. Their characteristics are Occasional B lines can be seen in normal lungs especially at the bases. Up to two between two adjacent ribs can be considered normal. Three or more between rib spaces or close together in a transverse image are pathological. They can be localized, disseminated, homogenous, or non-homogenous depending on the pathology. They are present in any disease affecting the interstitium. The commonest cause is pulmonary oedema where they are the equivalent of Kerley B lines. When oedema becomes more severe ground-glass appearance on CT B lines become more numerous and closely spaced. Very severe oedema causes them to fuse with a hyperechoic confluent pattern that fills the space between two ribs white lung. LU can distinguish between causes of IS.

Chapter 3 : Practical approach to lung ultrasound | BJA Education | Oxford Academic

Lung Ultrasound in the Critically Ill is a monograph by Daniel A. Lichtenstein, who is recognized as an international leader in lung ultrasound. Dr. Dr. Lichtenstein first introduced the "BLUE protocol" in a landmark article published in (Chest ;).

With lung ultrasound, however, the amount of lung consolidation and pleural effusion can be assessed semiquantitatively. Lung ultrasound consists of the identification of 10 signs, and there are several well-established protocols such as the BLUE Bedside Lung Ultrasonography in Emergency protocol for diagnosing acute respiratory failure and the FALLS Fluid Administration Limited by Lung Sonography protocol for managing acute circulatory failure. With this protocol, it becomes possible to differentiate between pulmonary edema, pulmonary embolism, pneumonia, chronic obstructive pulmonary disease, asthma, and pneumothorax [1]. The FALLS protocol uses the potential of lung ultrasound for the early demonstration of fluid overload at an infra-clinical level [2]. It is used in patients with acute respiratory failure, allowing a sequential search for obstructive, cardiogenic, hypovolemic, and distributive shock using simple real-time echocardiography in combination with lung ultrasound, with the appearance of B lines considered to be the endpoint of fluid therapy. In addition, ultrasound can help to guide airway management in a patient with acute respiratory distress who needs to be intubated and mechanically ventilated PINK protocol. In a patient with acute respiratory distress who is often ventilated and difficult to transport, computed tomography CT is not an easy option, and lung ultrasound can help to predict difficult airway and proper endotracheal tube size, or to confirm proper endotracheal tube placement with avoidance of desaturation during CT [3]. In addition, lung ultrasound can be used to determine the cause of fever distinguishing pneumonia from atelectasis [4], and to rule out pneumothorax, hypovolemia, pulmonary embolism and pericardial tamponade in cardiac arrest SESAME protocol [5]. In the critical care setting, lung ultrasound is increasingly used, as it allows bedside visualization of the lungs. Critical care ultrasound is a combination of simple protocols, with lung ultrasound being a basic application, allowing the assessment of urgent diagnoses and therapeutic decisions. Although chest radiographs CXR and CT are mostly used for daily or prompt evaluation of lung in the ICU, there are significant drawbacks such as the huge radiation hazard, need for transportation, and risk of contrast use. On the other hand, lung ultrasound has advantages of absence of radiation, bedside availability, good reproducibility, and cost efficiency [6]. Ultrasound is far superior for the detection of pneumothorax and pleural effusion compared with CXR and provides accurate quantitative data regarding the volume of pleural effusions, lung consolidations, and pneumothorax [7 , 8]. Although supine portable CXR is notoriously unreliable in the evaluation of pneumothorax, in the absence of tube thoracostomy or subcutaneous emphysema, ultrasound has sensitivity and specificity superior to CXR for the detection of pneumothorax [9]. Plain CXR is most sensitive for pleural effusion when the patient is in the upright or lateral decubitus position, but optimal positioning is difficult in the ICU. While previous studies on lung ultrasound were mostly for use in medical ICUs, the authors demonstrated the usefulness of lung ultrasound in the surgical ICU. Their indications for lung ultrasound included hypoxemia, abnormal CXR without hypoxemia, fever, and difficult weaning. Lung ultrasound was helpful for diagnosis of pneumonia, atelectasis, pulmonary edema, or a combination of these diseases. In addition, lung ultrasound detected lung parenchymal consolidation with air bronchogram, pulmonary edema, and pneumonia even in patients without CXR abnormalities. In the surgically ill and injured patients, combined with venous, cardiac, and abdominal examination, ultrasound investigation of lung can provide an overview of cardiac performance and intravascular volume and practically guide management for hemodynamic optimization. Lung ultrasound can be extended from neonates to adults, and from medical to surgical and several other disciplines anesthesiology, emergency medicine, etc. The higher rate of detection of ultrasound, combined with its ease and increasing accessibility, makes for a powerful diagnosis in the ICU. Although lung ultrasound requires acquisition of an ultrasound machine and training of physicians, it allows a critical care provider to quickly respond to a majority of critical situations. Therefore, lung ultrasound could be a reasonable, fully operational, bedside gold standard in the ICU. Conflict of Interest No potential conflict of interest relevant to this article was reported. Relevance of lung ultrasound in the diagnosis of acute respiratory failure: Fluid administration limited by lung sonography: Expert Rev Respir Med ; 6: Ultrasound for the anesthesiologists: The dynamic air bronchogram: How can the use of lung ultrasound in cardiac arrest make ultrasound a holistic discipline: Med Ultrason ; Intensive Care Med ; Using thoracic ultrasonography to accurately assess pneumothorax progression during positive pressure ventilation: A prospective comparison of supine chest radiography and bedside ultrasound for the diagnosis of traumatic pneumothorax. Acad Emerg Med ; Ultrasound in the management of thoracic disease. Crit Care Med ; 35 5 Suppl: The use of lung ultrasound in a surgical intensive care unit. Korean J Crit Care Med ;

Chapter 4 : BLUE-protocol and FALLS-protocol: two applications of lung ultrasound in the critically ill.

Lung Ultrasound in the Critically Ill comprehensively explains how ultrasound can become the stethoscope of modern medicine. It is a superb complement to the author's previous book, Whole Body Ultrasonography in the Critically Ill.

Chapter 5 : Lung ultrasound in the critically ill

Lung Ultrasound in the Critically Ill see BLUE-protocol) Lung rockets Three (or more) B-lines between two ribs FALLS-protocol. Lung ultrasound as a method for.

Chapter 6 : Lung Ultrasound In The Critically Ill: The Blue Protocol Download

The pathophysiological basis of the BLUE-protocol shows that each acute condition able to generate a pleural effusion is also able to generate a lung consolidation (and vice versa, more logically).

Chapter 7 : Lung Ultrasound in the Critically Ill

Unauthorized use is prohibited. Usage may be subject to security testing and monitoring. Misuse is subject to criminal prosecution. No expectation of privacy except as otherwise provided by applicable privacy laws.

Chapter 8 : Lung Ultrasound in the Critically Ill: The BLUE Protocol

Lung Ultrasound within the significantly Ill comprehensively explains how ultrasound can turn into the stethoscope of recent drugs. it's a terrific supplement to the author's prior ebook, Whole physique Ultrasonography within the severely Ill.