



The Egyptian Society of Chest Diseases and Tuberculosis
Egyptian Journal of Chest Diseases and Tuberculosis

www.elsevier.com/locate/ejcdt
www.sciencedirect.com



ORIGINAL ARTICLE

Could chest ultrasonography replace routine chest X-rays in mechanically ventilated patients?



Magdy M. Khalil¹, Ashraf A. ELMaraghy^{*}, Yehia R. Yousef²

Chest Department, Faculty of Medicine, Ain Shams University, Egypt

Received 19 February 2015; accepted 19 April 2015

Available online 6 July 2015

KEYWORDS

Chest ultrasound;
Mechanical ventilation;
Respiratory intensive care unit;
Chest X-ray

Abstract *Background:* Although conventional chest radiography remains the first routine radiologic examination in mechanically ventilated patients, chest ultrasound provides more accurate information, with less ionizing radiation and less time delay.

Objective: To compare between sensitivity of chest ultrasound and routine daily chest X-ray in diagnosis and follow up of diseases in mechanically ventilated patients admitted at Respiratory ICU of the Ain Shams University Hospital.

Design: The study was carried out as a prospective analytical study.

Patients and methods: The study was conducted upon twenty-five mechanically ventilated patients (16 male patients and 9 female patients), with a mean age of 58.8 years (SD \pm 15.64) who were admitted at the Respiratory Intensive Care Unit of the Ain Shams University Hospital during the period from October 2012 to May 2013. Chest ultrasound examination was done for patients on mechanical ventilation on the first day of enrollment prior to seeing their chest X-ray, then follow up daily chest ultrasound examination was done over the entire period of mechanical ventilation with comparison of examination results with that of chest X-ray.

Results: Initial chest ultrasound was more sensitive in the detection of pleural effusion (40% of cases) than chest X-ray (8% of cases). This superiority of chest ultrasound over chest X-ray persisted in follow up studies (44%, 8% respectively). As regards consolidation, there was no statistically significant difference between chest ultrasound (consolidation was detected in 16 out of 25 cases) and chest X-ray (consolidation was detected in 15 out of 25 cases) in the initial studies, and also along the follow up period, chest ultrasound detected consolidation in 17/25 patients, while CXR detected consolidation in 18/25 patients. In the follow up of five mechanically ventilated patients with no obvious radiologic abnormalities on chest X-ray, initial and follow-up ultrasound

* Corresponding author. Mobile: +20 1001770702.

E-mail addresses: dr_mmk2001@yahoo.com (M.M. Khalil), ashrafelmaraghy@yahoo.com (A.A. ELMaraghy), dr_yehiary@yahoo.com (Y.R. Yousef).

¹ Mobile: +20 1005257684.

² Mobile: +20 1289028051.

Peer review under responsibility of The Egyptian Society of Chest Diseases and Tuberculosis.

<http://dx.doi.org/10.1016/j.ejcdt.2015.04.007>

0422-7638 © 2015 The Authors. Production and hosting by Elsevier B.V. on behalf of The Egyptian Society of Chest Diseases and Tuberculosis. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

was also free and detected no localized abnormality. There was a statistically significant relationship between chest ultrasound findings in cases with pleural effusion and in cases with consolidation and clinical progress.

Conclusion: Chest ultrasound is a reliable tool for evaluation of mechanically ventilated patients.

© 2015 The Authors. Production and hosting by Elsevier B.V. on behalf of The Egyptian Society of Chest Diseases and Tuberculosis. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

Mechanical ventilation is an essential life support for patients in the intensive care unit, emergency department and operating room who cannot sustain adequate homeostasis through spontaneous ventilation. This life saving modality is implemented in a wide spectrum of clinical situations that result in respiratory failure, whether being hypoxic or hypercapnic, acute or chronic. The wide breadth of causes of respiratory failure encompasses many specialties in both adult and pediatric practices especially pulmonary medicine [1].

Mechanical ventilation is indicated when the patient's spontaneous ventilation is inadequate to maintain life. It is also indicated as prophylaxis for imminent collapse of other physiological functions, or ineffective gas exchange in the lungs. Because mechanical ventilation only serves to provide assistance in breathing and does not cure a disease, the patient's underlying condition should be correctable and should resolve over time [2].

Chest X-rays are the main imaging tools in intensive care units. Chest X-rays also are associated with concerns inherent to their use, considering both healthcare givers and patient perspectives. In the recent years; several studies have focused on the feasibility of lowering the number of bedside chest X-rays performed in the intensive care unit. Such a decrease may result from two independent and complementary processes: a raw reduction of chest X-rays due to the elimination of unnecessary investigations and replacement of the chest X-rays by an alternative technique [3].

Routine chest X-rays theoretically have two main advantages. First, some potentially life-threatening situations that might otherwise be missed could be discovered and treated. Second, scheduling chest X-rays during morning rounds might be more efficient on a logistical point of view. In contrast, the on-demand strategy might avoid unnecessary radiation exposure and provides substantial cost savings [4].

The radiological diagnostic approach of the thorax in the critically ill patient has traditionally been based on anteroposterior chest X-rays. However, it is generally accepted that it has important limitations regarding its diagnostic accuracy of pleuro-pulmonary diseases. The introduction of computed tomography largely solved this problem, but with the dual disadvantage of a larger radiation dose and the unavoidable transportation outside the intensive care unit. In this context, the lung ultrasound has become an alternative technique, with the advantage that due to its portability, it is done at the patient's bedside [5].

Ultrasonographic examination in pulmonology provides a revolutionary advance because it is very helpful in the diagnosis and management of various pleural and peripheral pulmonary defects. Lung ultrasonography allows the clinicians to diagnose some pulmonary abnormalities more rapidly,

including the diagnosis of pleural effusion. Ultrasound examination also provides great assistance for the clinicians to perform invasive techniques in the field of pulmonology, which may increase the success rate and reduce the likelihood of complications [6].

Chest ultrasonography has many uses, both diagnostic and interventional. It is used in the diagnosis of diseases of the pleural space such as pleural effusion, pleural thickening, pleural masses and pneumothorax. It is used also in the diagnosis of diseases of the lung parenchyma such as pneumonia and lung abscesses, neoplasms, pulmonary embolism and arteriovenous malformations. It can also be used in the diagnosis of diseases of the chest wall such as enlarged lymph nodes, rib abnormalities and also diaphragmatic abnormalities like diaphragmatic paralysis. Chest ultrasonography can also be used in interventional procedures of the pleural space such as thoracocentesis and pleural biopsy. In lung cancer, the peripheral lung tumors that are in contact with or near the pleural surface can be safely biopsied under ultrasound guidance [7].

Patients and methods

The present study was conducted upon twenty-five mechanically ventilated patients (16 male patients and 9 female patients), with a mean age of 58.8 years (SD \pm 15.64) who were admitted at the Respiratory Intensive Care Unit of the Ain Shams University Hospital during the period from October 2012 to May 2013.

All patients were subjected to the following:

- Initial clinical assessment upon recruitment in the study, then daily follow up for acute signs of improvement or deterioration. Clinical assessment included:
 - Blood pressure; systolic between 100 and 140 mmHg, and diastolic between 60 and 90 mmHg. [8].
 - Temperature; ranging between 36.8 °C and 38.2 °C. [8].
 - Pulse rate; ranging between 60 and 100 beats per minute [8].
 - Chest inspection, percussion and auscultation for intensity and type of breath sounds and for adventitious breath sounds.
 - Oxygen saturation.
- Daily arterial blood gases and other routine laboratory investigations as needed.
- Mode of mechanical ventilation.
- Daily chest X-ray as requested by treating physicians.
- Daily chest ultrasonography.

Chest ultrasound examination was done for patients on mechanical ventilation on the first day of enrollment prior to

Download English Version:

<https://daneshyari.com/en/article/3399951>

Download Persian Version:

<https://daneshyari.com/article/3399951>

[Daneshyari.com](https://daneshyari.com)