Comparison of Chest Ultrasound and Chest Computed Tomography Prior to Medical Thoracoscopy

Thesis

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B y

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﴿بسم الله الرحمن الرحيم﴾

قَالُواْ سُبْحَانَكَ لاَ
عِلْمَ لَنَا إِلاَّ مَا
عَلَّمْتَنَا إِنَّكَ أَنتَ
الْعَلِيمُ الْحَكِيمُ

صدق الله العظيم

البقرة آية 32

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The candidate

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LIST OF Abbreviations

2D	Two-dimensional
B-mode	Brightness mode
CAP	Community-acquired pneumonia
Cc	Cubic centimeter
Cm	Centimeter
COPD	Chronic obstructive pulmonary disease
CT	Computed tomography
CTPA	Computed tomographic pulmonary angiogram
CXR	Chest radiograph
DPLD	Diffuse parenchymal lung disease
HRCT	High resolution computed tomography
ICU	Intensive care unit
Kg	Kilogram
LDH	Lactate dehydrogenase
MDCT	Multi-detector computed tomography
MHz	Megahertz
ml	Millilitre
mm	Millimeter
M-mode	Motion mode
MPM	Malignant Pleural Mesothelioma
MRI	Magnetic resonance imaging
MT	Medical thoracoscopy
No.	Number
PA	Posteroanterior
PE	Pulmonary embolism
Rt.	Right
SD	Standard deviation
TB	Tuberculosis
TUS	Thoracic ultrasound
UK	United Kingdom
US	Ultrasound
VATS	Video assisted thoracoscopic surgery
VS	Versus

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Introduction

A pleural effusion is an abnormal collection of fluid in the pleural space resulting from excess fluid production or decreased absorption ***(Diaz-Guzman and Dweik, 2007).***

The tests most commonly used to diagnose and evaluate pleural effusion include chest x-ray, computed tomography (CT) scan of the chest, ultrasound of the chest (US), thoracentesis, and pleural fluid analysis. When the pleural effusion has remained undiagnosed despite previous less-invasive tests, thoracoscopy may be performed ***(Colice et al., 2000).***

Thoracoscopy is a minimally invasive procedure that allows visualization of the pleural space and intrathoracic structures. It enables the taking of pleural biopsies under direct vision, therapeutic drainage of effusions and pleurodesis in one sitting ***(Lin et al., 2006).***

Because thoracoscopy is diagnostic in more than 90 percent of patients with pleural malignancy and negative cytology, it is the preferred diagnostic procedure in patients with cytology-negative pleural effusion who are suspected of having pleural malignancy ***(Antony et al., 2001).***

Transthoracic ultrasound has received increased interest from chest physicians in recent years as it has the advantages of bedside availability, absence of radiation, and guided aspiration of fluid-filled areas and solid tumors ***(Beckh et al., 2002).***

Ultrasound has been proved to be a reliable, efficient, and informative imaging modality for the evaluation of a wide variety of chest diseases ***(Beckh et al., 2002).***

Thoracic CT is an imaging method that uses x-rays to create cross-sectional pictures of the the chest and upper abdomen ***(Stark, 2007).***

Chest CT scans can be used to find out whether you have a lung problem in addition to pleural effusion ***(Rocco et al., 2008).***

In a previous study, chest ultrasound was equally able to detect pleural fluid location when compared with chest CT. Chest ultrasound was superior to chest CT in its ability to resolve the internal components of pleural fluid including fibrin strands, which may indicate early organization of an effusion ***(Kim et al., 2000).***

Aim of the work

The aim of the current study is to compare chest ultrasound and chest computed tomography findings prior to medical thoracoscopy to examine the concordance and discordance between them, and how would US affect the conduct and the outcome of the procedure.

Chest Ultrasonography & Chest CT

There are many radiological techniques in thoracic imaging including; Chest radiography, Computed tomography, High resolution computed tomography, Ultrasound, and Magnetic resonance imaging ***(Aziz and Hansell, 2008).***

Diagnostic ultrasonography is the only clinical imaging technology currently in use that does not depend on electromagnetic radiation. This modality is based on the properties of sound waves, and hence the mechanical and acoustic properties of tissues. Diagnostic ultrasound is mechanical energy that causes alternating compression and rarefaction of the conducting medium, traveling in the body as a wave usually at frequencies of 2–10 MHz, well beyond audible frequencies ***(Middleton et al., 2004).***

Diagnostic ultrasonography is a very valuable tool for imaging the chest because it causes no clinically significant biological effects, is a real-time examination, and has multi planar imaging capability. In real time, one can focus the study on a painful or palpable area. This modality of ultrasonography can be portable, very significant for ICU and emergency room ***(Koh et al., 2002).***