بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

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MONA MAGHRABY

Faculty of Medicine - Ain Shams University
Department of Anesthesia,
Intensive Care and Pain Management

Accuracy of Initial Chest Computed Tomography Scan for Diagnosis of COVID-19:
A Systematic Review

Submitted for Partial Fulfillment of Master Degree
in ***Intensive Care***

By

Michael Nabil Botros Armanious
M.B., B.Ch. Faculty of Medicine, Sohag University (2013)

Under supervision of

Prof. Dr. Sameh Michel Hakim Fahmy
Professor of Anesthesiology, Intensive Care and Pain Management
Faculty of Medicine - Ain Shams University

Dr. Waleed Hamed Abdelmenaem Nofal
Assistant Professor of Anesthesiology, Intensive Care and Pain Management
Faculty of Medicine - Ain Shams University

Dr. Peter Naiem Abdelmassiah Ibrahim
Lecturer of Anesthesiology, Intensive Care and Pain Management
Faculty of Medicine - Ain Shams University

Ain Shams University
Faculty of Medicine
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Michael Nabil Botros Armanious

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List of Abbreviations

Abb.	Full term
ARDS	*Acute Respiratory Distress Syndrome*
ACR	*American College Of Radiology*
ALT	*Alanine Aminotransferase*
AST	*Aspartate Aminotransferase*
BI-RADS	*Breast imaging reporting and data system*
BSTI	*British Society of Thoracic Imaging*
CAP	*Community Acquired Pneumonia*
CDC	*Centers For Disease Control And Prevention*
CO-RADS	*COVID-19 Reporting and Data system*
COVID-19	*Corona Virus Disease 19*
CRP	*C-reactive protein*
CT	*Computerized Tomography*
CTPA	*CT Pulmonary Angiogram*
CXR	*Chest radiography*
ESR	*Erythrocyte Sedimentation Rate*
FDG	*Fluorodeoxyglucose*
G-CSF	*Granulocyte Colony-Stimulating Factor*
GGO	*Ground-Glass Opacification*
HRCT	*High resolution computed tomography*

List of Abbreviations (Cont...)

Abb.	Full term
IL-1β	*Interleukin-1β*
LDH	*Lactate dehydrogenase*
LI-RADS	*Liver Imaging Reporting and Data system*
MIS-C	*Multisystem Inflammatory Syndrome In Children*
PCR	*Polymerase Chain Reaction*
QUADAS-2	*Quality Assessment of Diagnostic Accuracy Studies*
RT-PCR	*Reverse-Transcription Polymerase Chain Reaction*
RSNA	*Radiological Society Of North America*
SARS-CoV-2	*Severe Acute Respiratory Syndrome Coronavirus 2*
SOFA	*Sequential Organ Failure Assessment*
STR	*Society Of Thoracic Radiology*
SUVs	*Standard Update Value*
TGF-β1	*Transforming Growth Factor-B1*
TNF-α	*Tumor Necrosis Factor-A*

INTRODUCTION

Coronavirus disease 2019 (COVID-19) is an infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS- COVID-19). The first cases were seen in Wuhan, China, in late December 2019 before spreading globally, the current outbreak was officially recognized as a pandemic on 11 March 2020 ***Li et al.,(2020).***

On 13 January 2020, the first confirmed case outside China was diagnosed, a Chinese tourist in Thailand. On 20 January, the first confirmed case in the United States was confirmed to be a man who had recently returned from Wuhan. The infection was declared a Public Health Emergency of International Concern (PHEIC) on 30 January 2020 by the WHO. On 28 February 2020, the WHO increased the global risk assessment of COVID-19 to "very high" which is the highest level. On 11 March 2020, COVID-19 was declared a pandemic by the WHO. On 27 March 2020, the USA surpassed China as the country with the most confirmed cases. The number of confirmed cases globally exceeded one million on 3 April 2020, two million on 15 April, five million on 21 May, and 10 million on 28 June. The number of global deaths surpassed 100,000 on 10 April, 200,000 on 26 April and 500,000 on 28 June 2020 ***Li et al., (2020).***

COVID-19 typically presents with systemic and/or respiratory manifestations. Common manifestations include fever (85-90%), cough (65-70%), fatigue (35-40%), sputum production (30-35%) and shortness of breath (15-20%). Less common manifestations include myalgia/arthralgia (10-15%), headaches (10-36%), sore throat (10-15%), chills (10-12%) and pleuritic pain. Rare manifestations include nausea, vomiting, nasal congestion (<10%), diarrhea (<5%), palpitations, chest tightness seizures, paresthesia, and altered consciousness. COVID-19 sufferers have reported high rates of disturbances of smell and taste including anosmia, hyposmia, ageusia, and dysgeusia. ***Wang et al., (2020).***

Diagnosis of COVID-19 depends on laboratory findings, Reverse transcriptase-polymerase chain reaction (RT-PCR) test and CT chest findings. Laboratory findings include relative lymphopenia, increased prothrombin time (PT), increased lactate dehydrogenase (LDH), mild elevations of inflammatory markers: C-reactive protein (CRP) , Erythrocyte sedimentation rate (ESR) and D-dimer ***Wang et al., (2020).***

Reverse transcriptase-polymerase chain reaction (RT-PCR) test is believed to be highly specific, but with sensitivity reported as low as 60-70% and as high as 95-97% if combined with CT chest. The SARS-CoV-2 can be specifically detected in respiratory secretions or plasma samples RT-PCR. However, some patients with likely COVID-19 may have negative initial RT-PCR, which may be due to insufficient cellular material for

detection or improper extraction of nucleic acids from clinical materials ***Ye et al.,(2020).***

The most frequent findings are ground-glass opacities (GGO): bilateral, sub pleural, peripheral, crazy paving appearance (GGOs and inter-/intra-lobular septal thickening), air space consolidation, broncho vascular thickening in the lesion, traction bronchiectasis airspace opacities, whether described as consolidation or, less commonly, GGO pleural effusion is rare (3%) ***Ye et al., (2020)***.

Aim of the Work

This systematic review aims at determining current evidence regarding accuracy of initial chest CT scan for detection of COVID-19 infection.