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Original Research Paper

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HIGH RESOLUTION COMPUTED TOMOGRAPHY VS RT-PCR CORRELATION FOR DIAGNOSIS OF COVID-19

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ABSTRACT

To restrain the spread of this pandemic of COVID-19 we need an accurate and quick diagnostic tool. The diagnostic tool should be cost effective and sensitive as well. Real time RTPCR has been widely accepted throughout the world and is being done as a primary screening test, while HRCT is done to analyze lung involvement. It has been found that a significant number of patients with negative RTPCR test have featured on HRCT suggestive of COVID-19. This study entails comparison of RTPCR and HRCT in terms of efficacy, cost and rapidness for diagnosis of COVID-19 infection.

KEYWORDS :

INTRODUCTION

Covid 19 is a viral disease caused by virus SARS-CoV-2 (Severe acute respiratory syndorme) [1]. Real time Reverse transcriptase- polymerase chain reaction (RT-PCR) is WHO approved tool for the diagnosis of CoVId-19 and is the basis for further management. RT-PCR is very specific for the detection of COVID-19, however the sensitivity is 65-70% meaning that patients with COVID-19 are tested negative. [2]

It was found that, many of these 'COVID suspected' cases with typical clinical findings of COVID-19, showed positive HRCT results and negative RTPCR result. Thus, a negative result of RTPCR test does not exclude the possibility of COVID-19 infection and should not be used as the only criterion for treatment or patient management decisions. [3]

On computed tomography (CT), following features are found in the patients with COVID-19 are as follows: [4]

- Ground glass opacities (Most common feature)
- Crazy paving pattern
- Vascular dilatation
- Traction bronchiectasis
- Fibrosis
- Consolidation

Based on the features found on CT, staging of the disease can be done i.e. early, progressive, peak or resolution. Involvement of the lung parenchyma helps in determining the severity score and for prognosis and progression of the disease. [4]

1. 5% involvement
2. 5%-25% involvement
3. 26%-49% involvement
4. 50%-75% involvement
5. 75% involvement.

The total CT score is the sum of the individual lobar scores and can range from 0 (no involvement) to 25 (maximum involvement), when all the five lobes show more than 75% involvement.

Other findings could include septal thickening, bronchiectasis, pleural thickening and subpleural involvement in the later stages of the disease.

		CT FINDINGS
CORADS-1	NO	Normal or noninfectious
CORADS-2	LOW	Abnormalities with infections other than COVID 19.
CORADS-3	INDETERMINATE	Unclear whether COVID 19 is present.
CORADS-4	HIGH	Abnormality suspicious for COVID
CORADS-5	VERY HIGH	Typical COVID 19
CORADS-6	PCR +	

Pleural effusion, pericardial effusion, lymphadenopathy, cavitation, CT halo sign, and pneumothorax are some of the uncommon but possible findings seen with disease progression. [5]

HRCT is also cost effective and results can be obtained within 1-2 hours.

INCLUSION AND EXCLUSION CRITERIA:

Inclusion Criteria:

Patients with flu-like symptoms

Patients willing to do both HRCT and RTPCR

Exclusion criteria:

Patients with both HRCT and RTPCR status negative.

AIMS AND OBJECTIVES

- To evaluate the percentage of false negative RTPCT results.
- To minimize the percentage of false negative studies, hence reducing further spread of the disease by isolating and providing proper management to the patients with positive findings on HRCT

METHODOLOGY

We compared the HRCT and RTPCR studies of suspected patients in D Y Patil hospital, Navi Mumbai. It was found that many patients with negative swab test had findings on HRCT which were suggestive of COVID-19 infection.

PROJECT DURATION: 1 year

STUDY END POINTS:

SAMPLE SIZE: 932 patients

TIMELINES AND ORGANIZATION OF WORK ELEMENTS: 1 year

CONCLUSION:

In a study done on 932 patients, 115 patients with negative RTPCR status had CTSS score greater than 0 which is approximately 12.33% of the total. 12.3 % patients are false negative with potential risk of spreading the infection.

Out of the 932 patients, 817 patients were RTPCT positive and 115 were RTPCR negative.

Out of the 817 RTPCR positive patients, 594 patients showed features suggestive of covid on HRCT and 223 patients did not.

Hence HRCT along with RTPCR should be the modality of choice for screening of patients with symptoms like fever, cough/ cold, sorethroat, myalgia and gastrointestinal

symptoms.

DISCUSSION:

RT-PCR (Real time reverse transcriptase- polymerase chain reaction) technique, as the name suggests is a quantitative test based on the polymerase chain which detects the nucleic acid present in the SARS-CoV 2 virus present in the upper and mid respiratory tracts. RNA strand present in the SARS-CoV2 is converted into DNA strand, multiple copies of this DNA strand is made by adding chemical reagents in a PCR thermocycler machine within a few hours. Fluorescence emitted by the copies of the virus, if present, is detected by the machine and the result is demonstrated.

The swab is taken from the oropharynx and nasopharyx, with the latter being more sensitive. Sample is taken on 5^{th} – 14^{th} day of the onset of the symptoms. Presence of the virus is confirmed when the Ct is < 40. Rt-PCR can deliver results in 6-8 hours.

HRCT takes approximately 15- 20 minutes and demonstrates Covid related changes immediately. Covid specific changes which include ground glass opacities seen in periphery, consolidation and fibrosis can help in the diagnosis within a few minutes after acquiring images. Based on the involvement of the area of lung, scoring is done.

The radiation hazard of the HRCT should also be taken into consideration. The effective dose of one HRCT chest is approximately 5-7 mSv which is comparable to approximately 2 years of natural radiation. [6]

Scoring along with the clinical examination of the patient which includes oxygen saturation, breathlessness, comorbidities like hypertension and blood pressure management can be decided. Hence HRCT chest of the patient plays and very important role in diagnosing and deciding further management of the patient.

Rt-PCR positive status alone is not reliable for hospital admission and management of the patient.

While RT-PCR is cost effective, HRCT chest is quick and reliable method for diagnosis of Covid-19 pneumonitis and should be done along with RTPCR.

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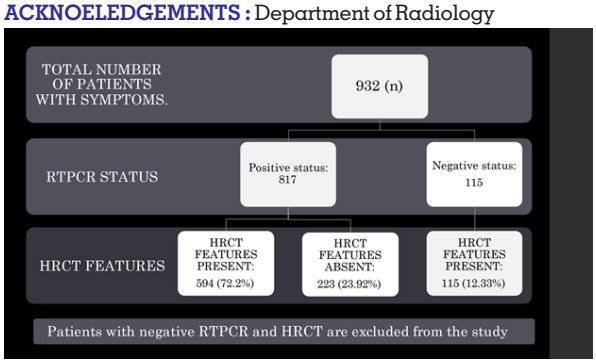

REFERENCES:

[1] Tahamtan, alireza. "Real-time RT-PCR in COVID-19 detection: issues affecting the results." tjems.org. https://www.tjems.org/s/Transmission-of-COVID19.pdf (accessed October 12, 2021).
[2] NCBI article: [https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7189409/]
[3] Lei P, Huang Z, Liu G, Wang P, Song W, Mao J, Shen G, Zhou S, Qian W, Jiao J. Clinical and computed tomographic (CT) images characteristics in the patients with COVID-19 infection: What should radiologists need to know? J Xray Sci Technol. 2020;28(3):369-381. doi: 10.3233/XST-200670. PMID: 32280076; PMCID: PMC7369068.
[4] Imaging Profile of the COVID-19 Infection: Radiologic Findings and Literature Review NG Ming-Yen, LEE1 Elaine YP, YANG Jin, YANG4 Fangfang, LI Xia, WANG4 Hongxia, LUI Macy Mei-sze, LO Christine Shing-Yen, LEUNG Barry, KHONG Pek-Lan, HUI Christopher Kim-Ming, YUEN Kwok-yung, KUO Michael David
[5] American Journal of Roentgen American Journal of Roentgenology. 2020;215: 87-93. 10.2214/AJR.20.23034 Read More: https://www.ajronline.org/doi/10.2214/AJR.20.23034nology. 2020;215: 87-93. 10.2214/AJR.20.23034
[6] Yut, L. (n.d.). Radiation dose reduction in computed tomography . openaccessjournals.com. Retrieved October 30, 2021, from https://www.openaccessjournals.com/articles/radiation-dose-reduction-in-computed-tomography-techniques-and-future-perspective-8202.html