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HRCT Thorax as a tool for preoperative assessment of RT-PCR Covid-19 negative patients with malignancies

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Abstract

Background: According to WHO, Cancer is the second leading cause of death globally, accounting for an estimated 9.6 million deaths, or one in six deaths, in 2018. Due to recent pandemic of COVID 19 there were limitations of health services in the country. For those patients in whom Surgery is the mainstay of treatment, the delay in the treatment was due to cancellations of elective surgeries as per government regulations and lack of transportation for patients due lockdown and curfew imposed to curtail the pandemic. In the latter half of the initial relaxation of the lockdown, a institutional protocol was framed for all those requiring surgical treatment. All patients were asked to get a RT-PCR (Reverse Transcriptase-Polymerase Chain Reaction) test done from GIIMS hospital, Kalaburagi. RT-PCR negative patients were admitted for surgery and subjected to HRCT Thorax (High-resolution Computer Tomography). This was done to avoid risk to health care workers, patients, and attenders and also screen asymptomatic carriers and false negative RTPCR status

Materials and methods: This is a Retrospective data based study conducted in department of radiology, Kidwai VTSM Peripheral Cancer Centre, Kalaburagi. HRCT Reports of 100 patients were analyzed by experienced radiologist of the institution.

Results: The number of patients under the CO-RADS 1 category was 63 and CO-RADS 2 category was 37, according to CO-RADS classification. The results of RT-PCR and HRCT were compared and there was a 100% positive correlation between RT-PCR and HRCT Thorax.

Conclusion: Above study supported the use of HRCT Thorax as a diagnostic tool in preoperative screening of cancer patients for COVID 19, particularly in RT-PCR negative cases.

Keywords: Covid-19, RTPCR, HRCT, CORADS

Introduction

Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus. Most people infected with the COVID-19 virus will experience mild to moderate respiratory illness and recover without requiring special treatment. Older people, and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness. Coronavirus disease 2019 (COVID-19) is an infectious disease caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) ^[1]. The first human cases of COVID-19 were first reported by officials in Wuhan, China, in December 2019 ^[2]. The disease rapidly spread throughout the world and was declared a pandemic by the World Health Organization (WHO) on March 12, 2020 ^[3]. On June 13, 2020, there were nearly 8 million confirmed cases and more than 425 000 confirmed deaths due to COVID-19 worldwide. There are currently no specific treatments or vaccines for COVID-19. However, there are many ongoing clinical trials evaluating potential treatments, and many efforts are underway to develop vaccines ^[1].

According to WHO, Cancer is the second leading cause of death globally, accounting for an estimated 9.6 million deaths, or one in six deaths, in 2018 ^[4]. Surgery is the mainstay of treatment for these locally advanced cancers and operating on these patients presents with a considerable risk of a high viral load while operating in the oral cavity and exposure to the aerosol generated during a 3-4 hours surgery.

The Real-time Reverse Transcriptase-Polymerase Chain Reaction (RT-PCR) test is the definitive test for COVID-19. It is highly specific with a reported sensitivity of 60%-70%. Thus, false negatives are a real clinical problem. HRCT Thorax for COVID-19 has high sensitivity, can be performed faster and when used in conjunction with RT-PCR the combined specificity

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and sensitivity for COVID-19 is up to 90%.

Materials and methods

The study was conducted at Kidwai VTSM Peripheral Cancer Center, Kalaburagi. 100 patients were included in the study after inclusion and exclusion criteria were executed. All patients undergoing surgery for malignancy were studied from 1st May to 30th August. The patients were admitted 2 days before the date of surgery for initial assessment by RT-PCR testing. The

patients with a negative RT PCR report were then subjected to HRCT Thorax and only if there were no signs suggestive of a COVID-19 infection on the HRCT scan as well, the patients were taken up for surgery. The RT-PCR assays were performed by using Real-Time PCR at Government general hospital, Kalaburagi. Imaging analysis was done by radiologist at Kidwai VTSM Peripheral Cancer Center in the Department of Radiology.

Table No 1: CO-RADS Classification

	Level of Suspicion for Pulmonary Involvement of COVID-19	Summary
CO-RADS 0	Not interpretable	Scan technically insufficient for assigning a score
CO-RADS 1	Very low	Normal or noninfectious
CO-RADS 2	Low	Typical for other infection but not COVID 19
CO-RADS 3	Indeterminate	Features compatible with COVID-19, but also other diseases
CO-RADS 4	High	Suspicious for COVID-19
CO-RADS 5	Very high	Typical COVID-19
CO-RADS 6	Proven	RT-PCR positive for SARS-CoV-2

Results and observations

The study included 100 patients undergoing surgery. Out of 100 patients, 68 were male and 32 were females. All patients were tested for Covid by RTPCR and those who tested negative with RTPCR were subjected to HRCT Thorax to rule out false negatives. As per table no.2, out of 100 patients 63% (63/100) belonged to CORADS 1 and 37% (37/100) belonged to CORADS 2.

Table No 2: CORADS classification and No of Patients

CORADS classification	No. of Patients
CO-RADS 1	63
CO-RADS 2	37

Among 100 patients, 80 patients had minor abnormalities (CORADS 1, 2) which are unrelated to COVID-19 infection as mentioned in table no 3.

Table No 3: HRCT minor abnormalities unrelated to Covid infection

HRCT Details	No of Patients	CORADS
Atelectasis / fibrotic lesions	19	CO-RADS-1
Emphysema	9	CO-RADS-1
Chest wall / breast lesions	5	CO-RADS-1
Non calcified nodules / Lung metastatic nodules	9	CO-RADS-2
Calcified nodules / calcified Granulomas	4	CO-RADS-2
Sub pleural nodules	7	CO-RADS-2
Cyst	4	CO-RADS-2
Mediastinal lymph nodes	3	CO-RADS-1
Bronchiectatic changes	7	CO-RADS-1
Centrilobular nodules	8	CO-RADS-2
Fibrocavitary lesions	5	CO-RADS-2

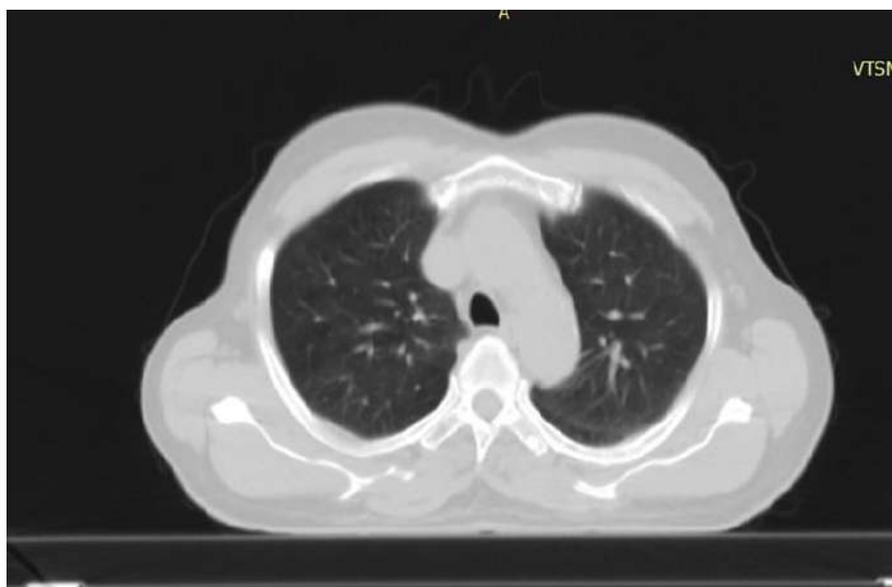


Fig 1: HRCT Thorax (CORADS-1): No abnormality in both lung fields detected

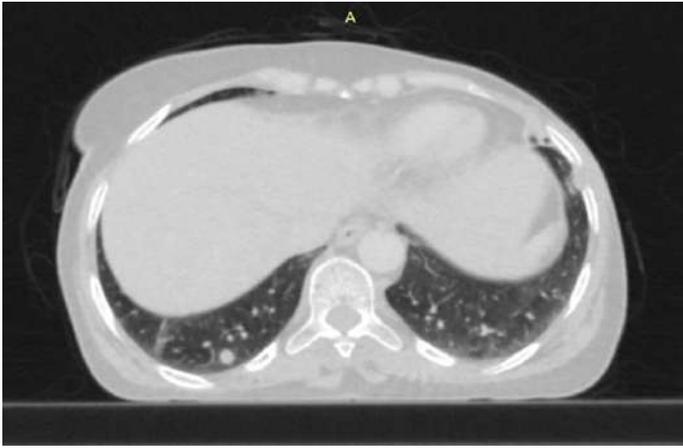


Fig 2: HRCT Thorax (CORADS-2): A small soft tissue lung nodule (Metastatic lesion), of size 8 x 6mm noted in posterior basal segment of right lung lower lobe

Discussion

Chest CT is used in the diagnosis of coronavirus disease 2019 (COVID-19) and is an important complement to reverse-transcription polymerase chain reaction (RT-PCR) tests. CT scan thorax is more accurate, specific, non-invasive method for detecting early Covid-19 infections. The predominant CT findings of COVID-19 infection are bilateral, peripheral and basal predominant ground-glass opacity, consolidation, or both^[5, 6]. Opacities often have an extensive geographic distribution.

The present conducted at Kidwai memorial institute has shown 80% of abnormalities on CT imaging in RTPCR negative patients which are unrelated to the Covid-19 infection. The findings in our study were substantiated by study conducted by Ai Tao, *et al.*,^[7] where patients with negative RT-PCR tests, more than 70% had typical CT manifestations due to the overlap of CT imaging features between COVID-19 and other viral pneumonia and false-positive cases of COVID-19 can be identified with chest CT. manifestations, and dynamic CT follow-up. The findings of our study are also consistent with study conducted by Ganta R, *et al.*,^[8] which showed that 60 patients showed minor abnormalities on HRCT thorax.

The purpose of this study was to ensure safety of Front liners which was done by excluding false negative cases by subjecting them to Ct scan thorax which was considered more accurate and sensitive than viral nucleic acid assay and the findings were also proven by FANG, *et al.*, compare the sensitivity of chest CT and viral nucleic acid assay at initial patient presentation and found 51 patients with chest CT and RT-PCR assay performed within 3 days, the sensitivity of CT for COVID-19 infection was 98% compared to RT-PCR sensitivity of 71% ($p < .001$).

Conclusion

Chest CT has a high sensitivity for diagnosis of coronavirus disease 2019 (COVID-19) and can be used as primary tool for the current COVID-19 detection in patients undergoing surgeries for malignancies in RTPCR negative cases.

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