Recommendations on COVID-19 Computerized Tomography Study Reporting: The Need to Optimize Reporting Categories Based on Local Conditions and Available Resources

Dear Editor

Soon after emerging in China in December 2019, the novel coronavirus disease 2019 (COVID-19) reached Iran on February 19, 2020. Shortly afterward, Iran rapidly became an epicenter of the outbreak throughout the Middle East. As of June 7, 2020, the latest number of confirmed cases in Iran stood at 171 789, with 8 281 having lost their lives to the virus.[1]

The global concern for this rapidly-progressing outbreak has prompted the formulation of national guidelines for patient stratification and decision-making processes vis-à-vis COVID-19 infection.[2-4]

Many advisory bodies, including the Radiological Society of North America (RSNA), advocate diagnoses only based on positive reverse transcription-polymerase chain reaction (RT-PCR) tests; however, the scarcity of test kits has forced China to base the final diagnosis and treatment on a combination of clinical and imaging findings. This shift may have contributed to the rapid rise in disease statistics in China.[5]

Similarly in Iran, the shortage of RT-PCR test kits and facilities has compelled us to rely on typical clinical data and chest computed tomography (CT) findings to ensure optimal patient management. The wait for RT-PCR results in many instances could adversely affect patient management and viral spread under circumstances of limited resources and test scarcity, which underscores the utmost significance of the accurate and uniform reporting standards of CT studies. The current circumstances necessitate reliance on CT reports not only to establish diagnoses in many instances but also to ensure the optimal allocation of the limited available resources without endangering patients' lives. Time and time again, the decision on where to admit patients with suspected corona infection hinges on CT scan findings. Inappropriate triage can potentially affect patients' survival or adversely facilitate the spread of the infection.

The Iranian Society of Radiology (ISR) has issued recommendations for reporting COVID-19 chest CT studies (March 2020).[2] Given the abovementioned logistical and financial constraints, we have drawn upon the up-to-the-minute COVID-19 literature to revise, update, and simplify the preexisting template so that it reflects our local situation. While the basic concepts are very similar to the templates proposed by the ISR, the British Society of Thoracic Imaging (BSTI), and the RSNA, we have embedded recommendations on patient management that include not only individual patient treatment and isolation, but also admission policies. In the absence of widespread, timely, and reliable RT-PCR tests, as well as the unacceptably high false-negative results of the oropharyngeal swab (nasal swabs are scarce in many areas) obtained early in the course of the disease, we have placed an additional burden of decision on CT reports based on the degree of the confidence of the diagnosis of COVID-19. This, of course, is founded on the high pretest probability due to the presence of an epidemic and in correlation with typical clinical findings in keeping with the national guidelines.

We have, thus, devised the following categories and definitions to ensure maximal conformity with international recommendations while meeting our local needs (Table 1), in compliance with available financial and logistic resources. Accordingly, we have made a distinction between CT findings with a high-enough disease probability to justify the hospital admission of patients to COVID-19 wards, even with a negative PCR test, and findings of lesser predictive value. We have, therefore, had to distinguish between truly specific findings under clinical circumstances and findings that are, albeit not uniquely diagnostic/characteristic, suggestive of COVID-19. Consequently, early in the outbreak, we subdivided the "typical" category to two subcategories (CovT1 and T2) based on presumed predictive values and assigned different admission recommendations to each category. By way of example, presumed bilateral peripheral or round multifocal ground-glass opacities (GGO) in the proper clinical settings are predictive enough to recommend admission to COVID-19 wards, whereas we recommend admission in the gray zone when unilobar consolidation and GGO are present.

While we acknowledge the presumptive nature of the predictive value and, hence, await future data confirmation, we have found these recommendations helpful in our clinical decision-making.

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Table 1: Proposed structure for the reporting of CT findings concerning COVID-19 pneumonia and management recommendations

Category	Description	CT Finding	Conclusion	Other Concerns	Treatment
Typical	• Limited resources necessitate reliance on CT scanning for diagnosis in many cases.	• CovT1-bilateral (multilobar), peripheral GGO2 +/-consolidation/ crazy paving/reverse halo • CovT2-multifocal multilobar unilateral GGO+/- consolidation	• Findings are typical or highly suggestive of viral types of pneumonia, including COVID-19 infection, in the proper clinical settings. Isolation and testing for the coronavirus (eg, RT-PCR) are recommended.	• Count as a positive CT scan in the CT registry. • Admit to COVID-19 wards even if RT-PCR is negative.	• Isolation and treatment for COVID-19 are recommended as per the national protocol.
Possible	• These Findings should be considered suspicious only if the clinical setting is typical for COVID-19 and there is no alternative reason for the findings.	• Unilobar (unilateral) GGO • Lobar consolidation • Patchy consolidation without GGO • Pleural effusion with nonspecific parenchymal involvement	•Findings are not typical of COVID-19. Still, if there is strong clinical suspicion, isolation and testing for the coronavirus (eg, RT-PCR) are recommended.	• Count as a negative CT scan in the CT registry • Admit to the gray zone until RT-PCR is positive.	• Isolation and treatment for COVID-19 are recommended as per the national protocol.
Other Diagnoses	• In the absence of typical/ possible findings, these features clearly suggest an alternative diagnosis.	• Tree-in-bud sign • Cavity • Perihilar GGO • Pulmonary edema (pleural effusion and interlobular septal thickening) • Subpleural fibrosis without GGO similar to IPF • Solitary or occasional nodule • Bulky hilar LAP / mediastinal LAP	• Findings are consistent with"diagnosis". • Imaging findings are not consistent with COVID-19.	• Count as a negative CT scan in the CT registry. • Admit to the non–COVID-19 ward.	
Normal	• Normal chest CT	• Normal chest CT findings However, in the presence of typical clinical findings, isolation, and testing for the coronavirus (eg, RT-PCR) are recommended.			

CT, Computed tomography; COVID-19, Coronavirus disease 2019; CovT1, Typical COVID; GGO, Ground-glass opacity; RT-PCR, Reverse transcription-polymerase chain reaction; IPF, Idiopathic pulmonary fibrosis; LAP, Lymphadenopathy

We understand that our local recommendations may appear fluid and depend on the availability of resources. At the outset of the outbreak, we would admit only bilateral GGO/consolidation cases with typical distributions to COVID-19 wards and allocate gray zone isolation rooms to cases with unilateral, though otherwise typical, findings. As the outbreak spread further and, as such, consumed more of the available hospital beds and resources, we were obliged to omit the distinction between the unilateral multilobar and bilateral cases and regard both groups as "typical". We, thus, omitted the unilateral/ bilateral subcategory among the typical cases for two main reasons. First and foremost, the distinction no longer affected patient management and secondly, we intend to ensure uniformity with the Society of Thoracic Radiology/Radiological Society of North America recommendations to be able to apply future international study results to our population.

In conclusion, although classification recommendations ensure global or nationwide uniformity and facilitate the application of literature data to guarantee updated patient care, local variations can curb their utility under specific conditions. National guidelines, while more cognizant of indigenous variations, would also benefit from attempts to conform to similar guidelines and to enable data and experience sharing.

Conflict of Interest: None declared.

Sepideh Sefidbakht[1], MD; Mehrzad Lotfi[1], MD; Mohsen Moghadami[2], MD; Reza Jalli[1], MD; Alireza Shakibafard[3], MD; Pooya Iranpour[1], MD; Seyed Hamed Jafari[1], MD; Bijan Bijan[1,4,5], MD

[1]Medical Imaging Research Center, Department of Radiology, Shiraz University of Medical Sciences, Shiraz, Iran;
[2]Clinical Microbiology Research Center, Nemazee Hospital, Shiraz University of Medical Sciences, Shiraz, Iran;
[3]Shiraz University of Medical Sciences, Shiraz, Iran;
[4]Sutter Medical Group (SMG), Sacramento, California, USA;
[5]University of California Davis Medical Center (UCDMC), Sacramento, California, USA

Correspondence:
Pooya Iranpour, MD;
Department of Radiology, Nemazee Hospital, Zand Blvd, Postal code: 71936-13311, Shiraz, Iran
Tel: +98 9173160114
Fax: +98 71 36474329
Email: Pooya.iranpour@gmail.com; iranpour@sums.ac.ir
Received: 25 April 2020
Revised: 19 May 2020
Accepted: 6 June 2020

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