

Commentary

It only seems appropriate to devote this edition of literature highlight to the event of the century; the COVID-19 pandemic. What apparently started as a curious cluster of severe respiratory infections in Wuhan has grown into a phenomenon that will potentially impact every human being on this planet. While there are numerous (wild? implausible?) theories regarding the origins of this virus from bat soup to alien intervention there has been intense scientific scrutiny into the nature of the disease and the means to mitigate its effects and stop its spread. Even as the health care professionals in Wuhan struggled with the enormous workload they were thinking ahead and trying to get information out to the rest of the world, sharing their experience to try and mitigate the potential catastrophe. Radiologists have been at the fore front of this effort as it became clear early on that severe disease is invariably associated with radiological changes on chest x-rays and Computerised Tomography (CT) scans.

There has been an interesting progression in the scientific content of the published radiological studies around COVID-19. The initial reports were descriptive like Huang et al in Lancet. They moved on to more thoughtful studies where they addressed the scientific value of the radiological observations trying to establish the value of imaging in both diagnosis and prognostication. Ai et al in Radiology comparing CT findings to Polymerase Chain Reaction (PCR) as a diagnostic tool were among the first to look at this. The longitudinal descriptions of the disease trying to find features that suggest which patients will need mechanical ventilation and/or have bad outcomes like the one from Wang et al in Radiology have been particularly useful. Finally, there are pieces that look at the potential impact of the pandemic on radiology departments and practices both in terms of workload management and on trying to keep the health care workers and patients safe.

Another interesting fact in all of this is that all of the highlighted articles are published on the web and have been published with extremely short lead times as medical editors realise the importance and immediacy of the need to get this information out there.

While all of us struggle to cope with this pandemic, each in our own way, please remember that this is most certainly not unique in its occurrence. The Spanish flu pandemic of 1918 infected 500 million people worldwide and killed a tenth of them. 50 million deaths. While I agree that it was in the pre-antibiotic era it was also in the pre HIV, pre cancer chemotherapy era when the mean life expectancy was under 50 years for both men and women. Humanity survived that. We will survive this. In addition to washing our hands, maintaining social distancing, valuing our health care professionals and being socially responsible in looking after the vulnerable members of our society we need stop forwarding every WhatsApp, Facebook, Twitter or any other social media post and message that comes to us. This last measure is likely to save many lives and sanities.

Take care of yourselves and your loved ones. Stay safe. May Allah protect us all.

PS. Remember Allah only helps those who help themselves. Waiting for divine intervention without preparing for and acting against an enemy has never been wise. Even the Prophet having absolute trust and knowledge of Allah s help, raised an armed force when faced with an invasion.

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Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China

BACKGROUND: A recent cluster of pneumonia cases in Wuhan, China, was caused by a novel betacoronavirus, the 2019 novel coronavirus (2019-nCoV). We report the epidemiological, clinical, laboratory, and radiological characteristics and treatment and clinical outcomes of these patients.

METHODS: All patients with suspected 2019-nCoV were admitted to a designated hospital in Wuhan. We prospectively collected and analysed data on patients with laboratory-confirmed 2019-nCoV infection by real-time RT-PCR and next-generation sequencing. Data were obtained with standardised data collection forms shared by the International Severe Acute Respiratory and Emerging Infection Consortium from electronic medical records. Researchers also directly communicated with patients or their families to ascertain epidemiological and symptom data. Outcomes were also compared between patients who had been admitted to the intensive care unit (ICU) and those who had not.

FINDINGS: By Jan 2, 2020, 41 admitted hospital patients had been identified as having laboratory-confirmed 2019-nCoV infection. Most of the infected patients were men (30 [73%] of 41); less than half had underlying diseases (13 [32%]), including diabetes (eight [20%]), hypertension (six [15%]), and cardio-

vascular disease (six [15%]). Median age was 49.0 years (IQR 41.0–58.0). 27 (66%) of 41 patients had been exposed to Huanan seafood market. One family cluster was found. Common symptoms at onset of illness were fever (40 [98%] of 41 patients), cough (31 [76%]), and myalgia or fatigue (18 [44%]); less common symptoms were sputum production (11 [28%] of 39), headache (three [8%] of 38), haemoptysis (two [5%] of 39), and diarrhoea (one [3%] of 38). Dyspnoea developed in 22 (55%) of 40 patients (median time from illness onset to dyspnoea 8.0 days [IQR 5.0–13.0]). 26 (63%) of 41 patients had lymphopenia. All 41 patients had pneumonia with abnormal findings on chest CT. Complications included acute respiratory distress syndrome (12 [29%]), RNAemia (six [15%]), acute cardiac injury (five [12%]) and secondary infection (four [10%]). 13 (32%) patients were admitted to an ICU and six (15%) died. Compared with non-ICU patients, ICU patients had higher plasma levels of IL2, IL7, IL10, GSCF, IP10, MCP1, MIP1A, and TNF α . **Interpretation** The 2019-nCoV infection caused clusters of severe respiratory illness similar to severe acute respiratory syndrome coronavirus and was associated with ICU admission and high mortality. Major gaps in our knowledge of the origin, epidemiology, duration of human transmission, and clinical spectrum of disease need fulfilment by future studies.

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Correlation of Chest CT and RT-PCR Testing in Coronavirus Disease 2019 (COVID-19) in China: A Report of 1014 Cases

BACKGROUND: Chest CT is used for diagnosis of 2019 novel coronavirus disease (COVID-19), as an important complement to the reverse-transcription polymerase chain reaction (RT-PCR) tests.

PURPOSE: To investigate the diagnostic value and consistency of chest CT as compared with comparison to RT-PCR assay in COVID-19.

METHODS: From January 6 to February 6, 2020, 1014 patients in Wuhan, China who underwent both chest CT and RT-PCR tests were included. With RT-PCR as reference standard, the performance of chest CT in diagnosing COVID-19 was assessed. Besides, for patients with multiple RT-PCR assays, the dynamic conversion of RT-PCR results (negative to positive, positive to negative, respectively) was analyzed as compared with serial chest CT scans for those with time-interval of 4 days or more.

RESULTS: Of 1014 patients, 59% (601/1014) had positive RT-PCR results, and 88% (888/1014) had positive chest CT scans. The sensitivity of chest CT in suggesting COVID-19 was 97% (95%CI, 95-98%, 580/601 patients) based on positive RT-PCR results. In patients with negative RT-PCR results, 75%

(308/413) had positive chest CT findings; of 308, 48% were considered as highly likely cases, with 33% as probable cases. By analysis of serial RT-PCR assays and CT scans, the mean interval time between the initial negative to positive RT-PCR results was 5.1 – 1.5 days; the initial positive to subsequent negative RT-PCR result was 6.9 – 2.3 days). 60% to 93% of cases had initial positive CT consistent with COVID-19 prior (or parallel) to the initial positive RT-PCR results. 42% (24/57) cases showed improvement in follow-up chest CT scans before the RT-PCR results turning negative.

CONCLUSION: Chest CT has a high sensitivity for diagnosis of COVID-19. Chest CT may be considered as a primary tool for the current COVID-19 detection in epidemic areas.

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Coronavirus Disease 2019 (COVID-19): A Systematic Review of Imaging Findings in 919 Patients

OBJECTIVE: Available information on CT features of the 2019 novel coronavirus disease (COVID-19) is scattered in different publications, and a cohesive literature review has yet to be compiled.

MATERIALS AND METHODS: This article includes a systematic literature search of PubMed, Embase (Elsevier), Google Scholar, and the World Health Organization database.

RESULTS: Known features of COVID-19 on initial CT include bilateral multilobar ground-glass opacification (GGO) with a peripheral or posterior distribution, mainly in the lower lobes and less frequently within the right middle lobe. Atypical initial imaging presentation of consolidative opacities superimposed on GGO may be found in a smaller number of cases, mainly in the elderly population. Septal thickening, bronchiectasis, pleural thickening, and subpleural involvement are some of the less common findings, mainly in the later stages of the disease. Pleural effusion, pericardial

effusion, lymphadenopathy, cavitation, CT halo sign, and pneumothorax are uncommon but may be seen with disease progression. Follow-up CT in the intermediate stage of disease shows an increase in the number and size of GGOs and progressive transformation of GGO into multifocal consolidative opacities, septal thickening, and development of a crazy paving pattern, with the greatest severity of CT findings visible around day 10 after the symptom onset. Acute respiratory distress syndrome is the most common indication for transferring patients with COVID-19 to the ICU and the major cause of death in this patient population. Imaging patterns corresponding to clinical improvement usually occur after week 2 of the disease and include gradual resolution of consolidative opacities and decrease in the number of lesions and involved lobes.

CONCLUSION: This systematic review of current literature on COVID-19 provides insight into the initial and follow-up CT characteristics of the disease.

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Temporal Changes of CT Findings in 90 Patients with COVID-19 Pneumonia: A Longitudinal Study

BACKGROUND: CT may play a central role in the diagnosis and management of COVID-19 pneumonia. Purpose: To perform a longitudinal study to analyze the serial CT findings over time in patients with COVID-19 pneumonia.

MATERIALS AND METHODS: During January 16 to February 17, 2020, 90 patients (male:female, 33:57; mean age, 45 years) with COVID-19 pneumonia were prospectively enrolled and followed up until they were discharged or died, or until the end of the study. A total of 366 CT scans were acquired and reviewed by 2 groups of radiologists for the patterns and distribution of lung abnormalities, total CT scores and number of zones involved. Those features were analyzed for temporal change.

RESULTS: CT scores and number of zones involved progressed rapidly, peaked during illness days 6-11 (median: 5 and 5), and followed by persistence of high levels. The predominant pattern of abnormalities after symptom onset was ground-glass opacity (35/78 [45%]

to 49/79 [62%] in different periods). The percentage of mixed pattern peaked (30/78 [38%]) on illness days 12-17, and became the second most predominant pattern thereafter. Pure ground-glass opacity was the most prevalent sub-type of ground-glass opacity after symptom onset (20/50 [40%] to 20/28 [71%]). The percentage of ground-glass opacity with irregular linear opacity peaked on illness days 6-11 (14/50 [28%]) and became the second most prevalent subtype thereafter. The distribution of lesions was predominantly bilateral and subpleural. 66/70 (94%) patients discharged had residual disease on final CT scans (median CT scores and zones involved: 4 and 4), with ground-glass opacity (42/70 [60%]) and pure ground-glass opacity (31/42 [74%]) the most common pattern and subtype.

CONCLUSION: The extent of lung abnormalities on CT peaked during illness days 6-11. The temporal changes of the diverse CT manifestations followed a specific pattern, which might indicate the progression and recovery of the illness.

American College of Radiology 2020; Coronavirus (COVID-19) Outbreak: What the Department of Radiology Should Know

In December 2019, a novel coronavirus (COVID-19) pneumonia emerged in Wuhan, China. Since then, this highly contagious COVID-19 has been spreading worldwide, with a rapid rise in the number of deaths. Novel COVID-19 - infected pneumonia (NCIP) is characterized by fever, fatigue, dry cough, and dyspnea. A variety of chest imaging features have been reported, similar to those found in other types of COVID-19 syndromes. The purpose of the present review is to

briefly discuss the known epidemiology and the imaging findings of COVID-19 syndromes, with a focus on the reported imaging findings of NCIP. Moreover, the authors review precautions and safety measures for radiology department personnel to manage patients with known or suspected NCIP. Implementation of a robust plan in the radiology department is required to prevent further transmission of the virus to patients and department staff members.