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Review Article

Interventional Radiology and CT Scan in SARS-CoV-2: A Review

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Coronavirus has been known to infect people all around the world for a long time. The World Health Organization (WHO) has deemed the situation with Coronavirus disease 2019 (COVID-19) to be an overall public health emergency. COVID-19, caused by the Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2), has become a worldwide phenomenon. The Reverse Transcription Polymerase Chain Reaction (RT-PCR) examination of samples from the respiratory tract is currently the best quality clinical diagnostic mechanical assembly for COVID-19. With a growing number of infected patients and a lack of RT-PCR testing kits in affected areas, alternative diagnostic and screening techniques are required. Clinical imaging, specifically chest computed tomography, is routinely utilized as a fundamental assessment in the diagnosis of COVID-19. Though the use of chest CT as a screening tool currently cannot be established, ongoing studies have shown a central role of CT in the early detection and monitoring of COVID-19 pulmonary signs. Interventional radiology (IR) provides advanced image-guided treatments for a wide range of patient conditions, from the healthy to the critically ill, and from elective outpatients to the general emergency room. Image-guided procedures were employed by interventional radiologists to treat Covid-19 complications in the lung, kidney, gastrointestinal tract, gallbladder, and vasculature. The role of various imaging techniques in SARS-COV-2 is discussed in this review. A literature search was performed to discover published studies that elaborate on the use of SARS-CoV-2 in interventional radiology and CT scan. An organized search of PubMed/Medline, Embase, ProQuest, Scopus, Cochrane, and Google Scholar was performed based on Mesh keywords.

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Abbreviations

- CT = Computed Tomography
- IR = Interventional Radiology
- MRI = Magnetic Resonance Imaging
- WHO = World Health Organization
- COVID-19 = Coronavirus Disease 2019
- SARS-COV2 = Severe Acute Respiratory Syndrome Coronavirus-2
- PPE = Personal Protective Means
- RT-PCR (PCR) = Reverse Transcription Polymerase Chain Reaction
- ACE2 = Angiotensin-Converting Enzyme 2
- CXR = Chest X-Ray
- PET = Positron Emission Tomography
- GGO = Ground-Glass Opacity
- HRCT = High Resolution Computed Tomography

- HIFU = High-Intensity Focused Ultrasound
- HCW = Health Care Work
- AGP = Aerosol Generation Procedures
- FFP = Filtering Face Pieces
- VTE = Venous Thromboembolism
- PE = Pulmonary Embolism
- AV = Arteriovenous
- DVT = Deep Vein Thrombosis
- ISRCC = Iranian Society of Radiology Advisers

1. Introduction

An unknown coronavirus has infected individuals all around the world for a long period. This virus, called 2019-nCoV for the time being, was originally discovered in persons visiting a wet market in Wuhan, China. The rapid response of the Chinese public health, clinical, and scientific communities to the illness and the initiation of disease transmission research took place [1]. WHO has just declared COVID-19 (the SARS-CoV-2 virus) to be a major health crisis [2]. Coronavirus disease 2019 (COVID-19), brought about by the intense severe respiratory condition coronavirus (SARS-CoV-2), has gotten progressively common around the world [3]. The following figure shows the mechanism of virus transmission to the target cell (Figure 1).

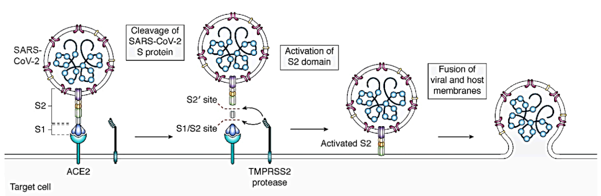

Figure 1. Apparatus of SARS-CoV-2 virus-related entrance. The SARS-CoV-2 S protein occupies the host ACE2 receptor and is consequently cleaved at S1/S2 and S2′ sites by the TMPRSS2 protease. This leads to the initiation of the S2 sphere and energizes the synthesis of the viral and host membranes [4].

The most advanced clinical diagnostic method for COVID-19 is reverse transcriptase-polymerase chain reaction (RT-PCR) analysis of samples from the respiratory system. However, this investigation reveals a high rate of false-negative results due to defective cell material or errors in recognition and extraction methods during bodily cavity swab examination [5]. Elective diagnosis and screening approaches are required due to an increasing number of infected individuals and a lack of testing kits in impacted locations [6]. Diagnostic imaging presently assumes a basic role in the characteristics and stage of COVID-19 [7]. COVID-19 computed tomography (CT) findings have recently been the focus of imaging literature [7][8]. Excessive CT scans will put a lot of pressure on radiology departments and increase the risk of infection in CT units[9]. Different imaging modalities, including chest x-ray, ultrasound, and positron emission tomography/computed tomography (PET/CT), have also been used in the diagnosis and management of COVID-19 patients [5]. During the outbreak of COVID-19, computed tomography (CT) is a helpful method for diagnosing COVID-19 patients [6]. SARS-CoV-2 is the most common cause of pneumonia throughout the outbreak period. In other words, if a patient's viral pneumonia is confirmed by CT scans, the viral pneumonia will most likely be COVID-19. Nonetheless, determining early ground-glass opacity (GGO) with conventional chest radiography is not always straightforward. So, chest CT imaging is thought to be useful and crucial in identifying COVID-19 as well as assessing and controlling the infection in patients during pandemics [7]. Computed tomography, particularly High-Resolution CT (HRCT), is utilized for the early determination of COVID-19 disease infection [8]. Interventional radiology (IR) has a critical role in patient treatment within the healthcare system in both acute and chronic disorders and plays a key role in the treatment of many oncologic patients, especially during the COVID-19 pandemic [10]. Interventional radiology (IR) is offered to increase the productivity and precision of the operation, while paying little attention to the organ, as well as the patient's comfort and well-being. IR now encompasses all medico-surgical specialties, with an increased number of actions, and is a substantial field of research that responds to a strong cultural desire to move toward a growing number of powerful medications that are also less invasive [9]. Both computed tomography scans and interventional radiology play an effective role in the coronavirus epidemic, so the purpose of this review is to provide a comprehensive assessment of the role of CT scans and interventional radiology in the diagnosis of the coronavirus to examine the results obtained from both to achieve a comprehensive comparison. The clinical scenarios associated with Covid-19 with final recommendations have been shown in **Figure 2**.

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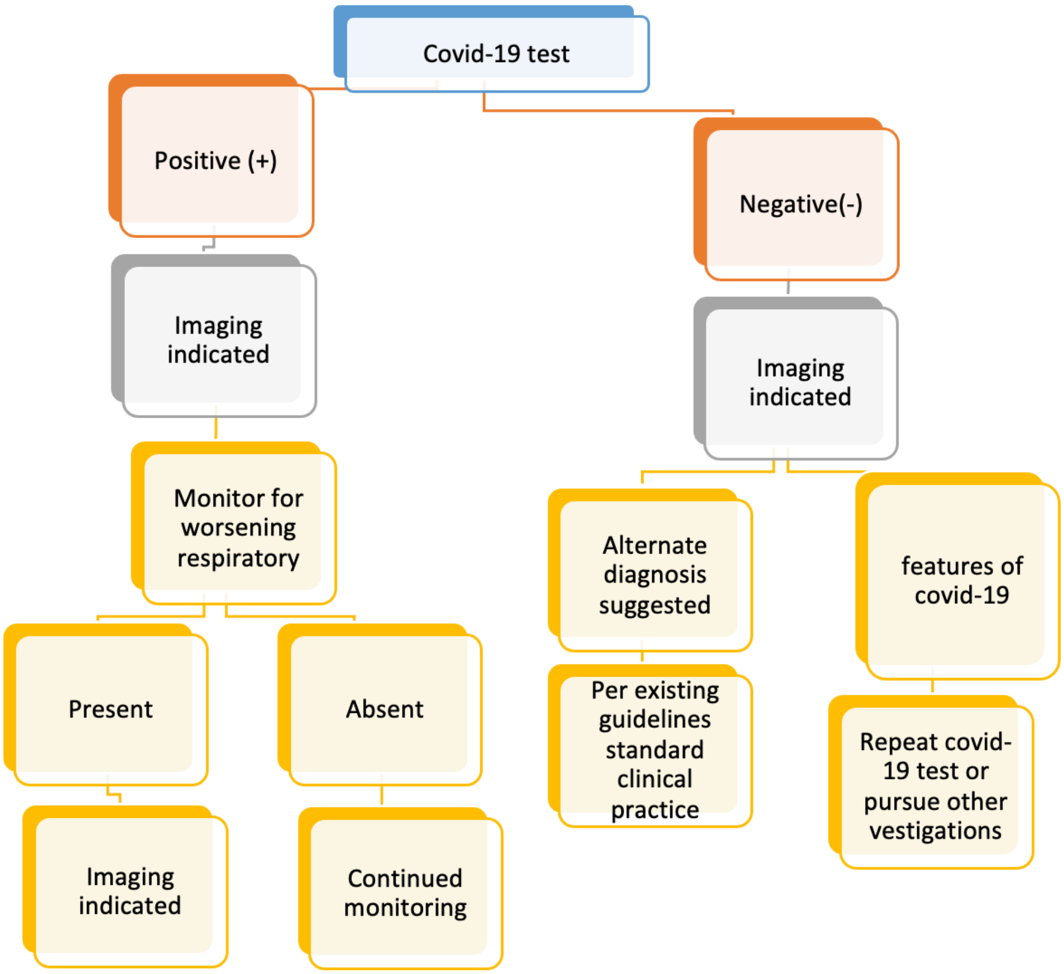

Figure 2. Moderate-to-severe features refer to indications of substantial pulmonary dysfunction or destruction. Pretest probability is based on the contextual occurrence of disease and may be further adapted by an individual's exposure risk [11].

2. Basic diagnosis of SARS-COV-2 by imaging

The SARS-CoV-2 disease, as well as the looming COVID-19 pandemic, presents severe diagnostic challenges [12]. Clinical imaging, including chest processed tomography, is frequently employed in the detection of COVID-19. Injury with ground-glass opacities (GGO), lung mix bilateral conflicting shadowing, pneumonic fibrosis, varied bruises, and crazy pattern design are some of the most common imaging findings in the lungs in COVID-19. These imaging insights were predicted to play a crucial role not only in the diagnosis and treatment of COVID-19 but also in the monitoring of infection spread and the assessment of healing feasibility [13].

2.1. Laboratory test

A real-time polymerase chain reaction is the most often used method for identifying hereditary material from SARS-CoV-2 (RT-PCR)[14]. Also, nucleic acid corrosive location-based methods have emerged as rapid and significant advancements in viral identification. Among nucleic analyses, the polymerase chain response (PCR) technique is considered the 'gold standard for the detection of some viruses, and it is described by its fast recognition, high sensitivity, and explicitness [15].

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However, this method produces a large number of false-negative results due to faulty cell material or errors in the finding and extraction procedures used during nasopharyngeal swab inspection [16]. Table 1 offers the advantages and disadvantages of using the RT-PCR method in COVID-19 detection.

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Advantages and disadvantages of RT-PCR		
METHOD	**ADVANTAGES**	**DISADVANTAGES**
RT-PCR	• High sensitivity • High sequence-specific • Gives accurate results • Tests directly for the virus	• Time-consuming • Analyzes one gene at a time • Inconsistency of the results depending on the laboratory • Required to know the gene sequence • Needs many amounts of RNA

Table 1. Summary of advantages and disadvantages of the RT-PCR method.

2.2. Imaging tests

Imaging tests for the determination of COVID-19 have acquired significance, given the inaccessibility of PCR methods in etiological diagnosis [17]. Although the findings in these tests are not specific to COVID-19, they may aid in the diagnosis if a credible clinical image or the existence of a confirmed or hypothetical history of contact with an infected person is present [18]. COVID-19 chest computed tomography (CT) findings have recently been the focus of radiological literature [16]. However, other imaging modalities, for example, chest x-ray, ultrasound, and positron emission tomography/computed tomography (PET/CT), have likewise been utilized in the analysis and the management of patients with COVID-19 [5]. As seen in Figure 3, the percentage of diagnostic methods in coronavirus recognition has been reported.

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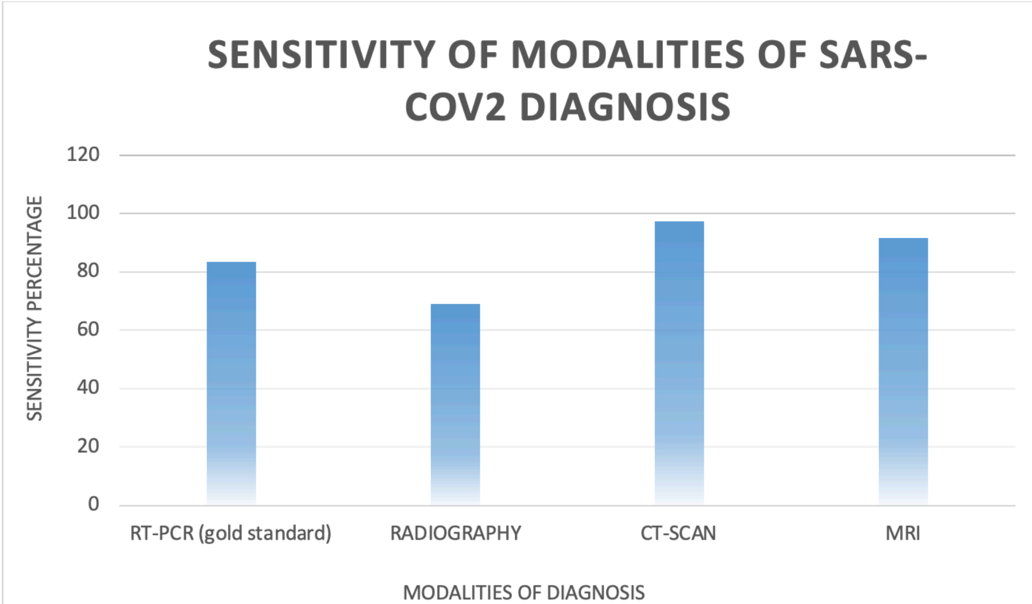

Figure 3. Sensitivity percentage of coronavirus diagnostic methods [19][20][21][22][23][24].

2.3. Comparison of RT-PCR and Imaging tests

Although the RT-PCR method plays an essential role in precisely identifying SARS-CoV-2-infected individuals, it also has some defects that restrict its applicability. Current obstacles to the widespread use of RT-PCR testing include a lack of testing units, as well as a long preparation time of several hours before results are obtained. Given the great clarity and sensitivity of the RT-PCR technique, it has been preferred that this method should be required to be used as a critical diagnostic tool (rather than chest CT). This process is focused on the recommendations made by the American College of Radiology during the COVID-19 epidemic. [25] Chest CT could be utilized as a supplemental means for patients who have encountered symptoms for over 2 days or who have side effects but had negative RT-PCR test results. Likewise, even though RT-PCR testing is often utilized to detect SARS-CoV-2, a chest CT scan characterizes the disease by recognizing lung abnormalities, for example, GGO (Ground Glass Opacity). [26]

3. Interventional radiology and SARS-COV2

Interventional radiology (IR) provides advanced image-guided treatments for a wide range of patient states, from the healthy to the hospitalized, and from elective outpatients to critically ill emergency room patients [27]. Interventional radiology is a specialty that includes diagnostic and therapeutic procedures such as image-guided biopsies, radiofrequency disease treatment, cryoablation, and high-intensity focused ultrasound (HIFU) [28]. IR units should be responsive and equipped to handle the COVID-19 incident, as they may play a key role in improving patient breathing through unobtrusive measures [29]. The table below shows the percentage of the usage of interventional radiology in patients with coronavirus. (Figure4)

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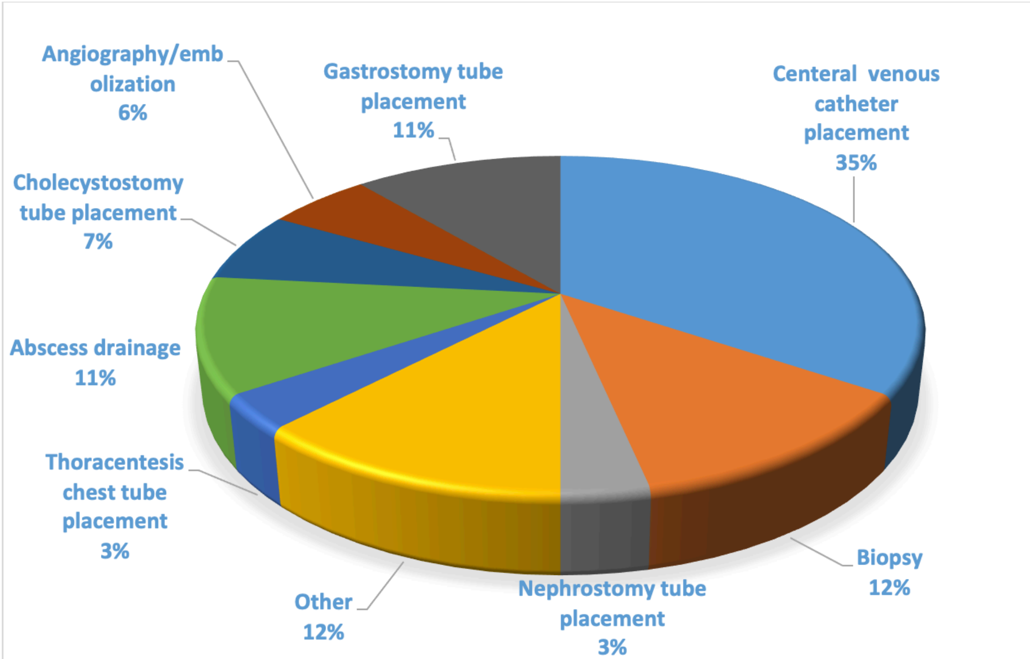

Figure 4. Interventional radiology measures in hospitalized COVID-19 patients [30].

3.1. Preparation of Interventional Radiology

It is critical for Interventional Radiology (IR) to provide secure and appropriate support while minimizing the risk of transmission to the radiology technicians [25]. IR confronts challenges from different viewpoints. No matter what, our patients and staff should be protected from nosocomial infections. Despite potentially dire circumstances, we must be prepared to provide excellent supportable sorts of aid [27]. To prevent intra-hospital transmission and cross-contamination of patients and HCWs (Healthcare Workers), the use of suitable personal protective means (PPE) as well as group separation and social removal are required (health care workers) [31]. To reduce the risk of HCW to HCW transmission, it is fair for all HCWs to wear protective veils while at work. Limiting eye-to-eye meetings and sitting alone or usually separated during suppers will also go a long way toward preventing cross-transmission among HCWs. Finally, it will be a collective acceptance of the full suite of actions that will ensure the safety of individuals from the IR administration and their patients. [32] The table below describes the protection levels against the virus and the procedures associated with each group, based on the recommendations of the World Health Organization. (Table2)

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Protection level	Personal protective means	Procedures
Level 1 protection	• Throwaway surgical cap • Throwaway surgical mask • Labor unvarying • Latex gloves	• Pre-examination triage, outpatient department • SARS-CoV-2 harmful inpatient
Level 2 protection	• Throwaway surgical cap • Medical protection mask(n95) • Labor unvarying • Gown • Disposable surgical gloves • Spectacles	• All doubted or confirmed SARS-CoV-2 patients should wear a throwaway surgical mask • Outpatient department • Isolation ward and ICU areas • Nasopharyngeal swab • Non-respiratory case examination of suspected or confirmed SARS-COV-2 patients • Percutaneous invasive procedures in doubted or confirmed SARS-CoV-2 patients.
Level 3 protection	• Disposable surgical cap • Medical protection mask (FFP3) • Work uniform • Gown • Throwaway surgical gloves • Full-face respiratory protective devices	• TEE in suspected or confirmed SARS-CoV-2 patients • Aerosol generation procedures (AGP): nasopharyngeal swab, endotracheal intubation.

Table 2. SARS-COV-2 related personal protection management. [30]

3.2. Interventional Radiology and the Response to COVID-19

COVID-19 patients all over the world have been influenced by interventional radiology techniques. Reports from Europe, Asia, and North America chart the effectiveness of IR methods employed during the COVID-19 epidemic [14][33][34][35]. IR elements that might be used Tube access (focal blood vessel lines, distal introduction catheters for extracorporeal) is well-known among individuals with COVID-19 illness. [34] IR experts might use their image-guided approaches to install dialysis catheters in COVID-19 patients with nephritic disillusionment who have been tested living structures due to Venous Thromboembolism (VTE). [36] Image-guided frameworks were used by interventional radiologists to treat Covid-19 loads in the respiratory organ, kidney, stomach-related tract, bladder, and vasculature. Future research might look at the true benefit of the minimally invasive nature of IR approaches in COVID-19 patients, as well as the lower risk of infective agent transfer compared to surgery [37]. The table below shows the multi-organ pathology leading to COVID-19 requiring a multidisciplinary approach to treatment, with interventional radiology serving to worry for several patients.) Table 3)

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COVID-19 complication	Interventional radiology procedure	Potential clinical benefit
Renal disease	• Central venous catheter placement • Peritoneal catheter placement • Nephrostomy tube placement • Renal biopsy	• Reform hemodialysis • Perform peritoneal dialysis • Relieve urinary obstruction • Guide treatment of renal disease
Thromboembolic disease - PE, DVT, critical limb ischemia	• IVC filter placement • Catheter-directed thrombolysis • Thrombectomy	• Potentially prevent life-threatening PE in patients unable to be anticoagulated. • Treat immense PE with potentially less bleeding hazard than systemic lytic therapy. • Restore blood flow, limb salvage
Bleeding	• Angiography with embolization	• Treat life-threatening arterial bleeding.
Dysphagia/malnutrition	• Gastrostomy feeding tube placement	• It may be done with less sedation and less aerosolization than the endoscopic approach.
Pleural expression/ascites	• Chest tube placement, thoracentesis, paracentesis	• Progress oxygenation and provide symptomatic relief
Abscess	• Percutaneous drainage	• Drain purulent fluid to determine infection
Cholecystitis	• Cholecystostomy tube placement	• Treat inflammation and infection of the gallbladder.

Table 3. The subsequent multi-organ dysfunction related to COVID-19 requires a multidisciplinary method to treatment, with interventional radiology contributing to the care of many patients [29].

4. CT scan and SARS-COV2

Even though the use of chest CT as a screening tool has yet to be addressed, current research has revealed that CT plays a critical role in the early detection and management of COVID-19 pneumonic symptoms. It has shown a high level of sensitivity but a limited level of specificity. [37] Pure GGOs were the most generally known CT findings after the indication began, according to the studies. The frequency of a mixed pattern of GGOs and unexpected straight opacities, on the other hand, peaked at 6-11 days. On chest imaging, lung abnormalities usually last a long time. [38] Meta-logical ramifications of great sensitivity as a group, however, the typical use of chest CT as a necessary tool for COVID-19 detection is limited by poor specificity. Chest CT should only be performed by those who have a thorough understanding of the clinical implications of RT-PCR assays. [39] CT has recently been validated and widely used in Covid-19 clinical administration. [40] The figure below shows the reported pattern of HRCT in patients with suspected Covid-19 set by the Iranian Society of Radiology Advisers (ISRCC). (Figure5)

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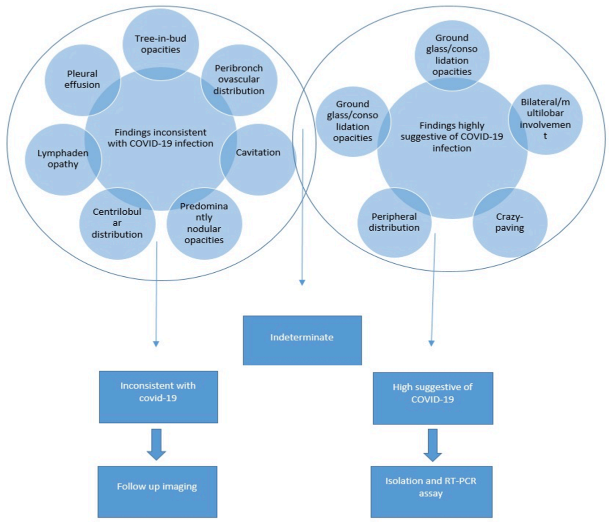

Figure 5. Reporting Pattern of HRCT of patients suspected of COVID-19 given by the Iranian Society of Radiology COVID-19 Consultant Group (ISRCC). High probability CT scan: profoundly suggestive event of any highly demonstrative findings without the presence of conflicting findings; indeterminate, presence of conflicting findings; vague: Presence of various highly interesting findings with at least one conflicting finding. [41]

4.1. Comparison of CT scan and RT-PCR in SARS-COV2

The discrepancy between clinical and imaging findings has been shown occasionally. It is estimated that up to 50% of COVID-19-infected individuals will have normal chest CT scans during the first two days of the acute symptoms. [42] The presence of COVID-19-infected patients was also a factor. Confirmed by specific RT-PCR and a standard chest CT upon confirmation, as well as a further amount after 2-3 weeks. [43] Strengthens the belief that normal chest CT results should not be used to rule out a diagnosis, particularly in individuals who have been sick for a long time. [44] Patients with a high level of clinical suspicion, common tomographic findings, and negative RT-PCR results have also been discovered; in such circumstances, center tests should be re-run, and call disconnection should be considered. [45] CT should not be utilized for COVID-19 screening in asymptomatic individuals; however, it may be considered in hospitalized patients, diagnostic cases, or particular clinical situations. The imaging findings of the COVID-19 respiratory condition are imprecise and similar to those of other respiratory infections, and they differ depending on the stage of the illness. They should be linked to evidence of COVID-19 infection in clinical and research settings. [6]

4.2. Role of CT SCAN in SARS-COV2

CT plays an important role in the diagnosis, planning, and monitoring of COVID-19 pneumonia patients. [8] Chest CT plays a significant role in the determination and board of COVID-19 and is regarded as the most delicate imaging approach for distinguishing issues due to its high sensitivity and quick access. [33] CT scans are used to detect and confirm pulmonary damage in COVID-19 illness, as well as to track its progression. CT scans are thought to be less precise than RT-PCR, although they are extremely sensitive in detecting COVID-19 and can play an important role in illness diagnosis and therapy. [34] The American College of Radiology, on the other hand, advises against using CT scans as a first-line test. (online:, 2020) Due to a paucity of packs and a false negative RT-PCR rate, CT scans were used as a clinical conclusion for COVID-19 in Hubei Province, China. [35] The significance of CT in the COVID-19 patient's administration course is unclear, and its use as an asymptomatic device may be unsuitable in areas with a low COVID-19 prevalence (low pre-CT test probability). [40]

4.3. CT scan findings in SARS-COV2

The progression of lung deviations from the norm on chest CT in COVID-19 patients appears to represent the movement of various forms of severe lung damage caused by viral pneumonia, such as Severe Acute Respiratory Syndrome (SARS). [36] Non-nosy chest CT exams include capturing many X-bar evaluations at various points over a patient's chest to produce cross-sectional images. [46][47] Radiologists examine the photos for any unusual traits that might lead to a diagnosis. [46] COVID-19 imaging highlights differ depending on how long after the onset of symptoms the patient has been sick. Bernheim et al., for example, found that towards the beginning of the illness (0-2 days), there were more normal conventional CT disclosures (56 percent). [48] With the highest level of lung contribution occurring roughly 10 days following the onset of symptoms. [49] In particular, Pan et al. depicted four unmistakable phases of the infection according to the start of the results. In the early stage (0-4 days), the most famous variety from the standard was GGOs. Taking everything into consideration, the increased quantity and size of GGOs, the constant

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differentiation of GGOs into multifocal, consolidative zones, and the development of a "crazy-paving" design were all indicators of the Progression stage (5-8 days). The existence of thick cementing and a more broad lung association were signs of the peak stage (9-13 days). Unions were gradually reabsorbed throughout the ingestion stage, and fixed lung symptoms, such as fibrotic groupings, appeared. [49] The last stage of the illness is usually depicted by an acute respiratory distress syndrome (ARDS) design, with findings encompassing pneumonia. [42] COVID-19's most significant trademark highlights include respective and fringe GGOs.[43] Consolidations of the lungs are also possible (liquid or solid material in compressible lung tissue). [48][49] De Wever et al. observed that ground-glass opacities are most noticeable 0-4 days following the onset of the side effect. Regardless of ground-glass opacities, crazy-paving patterns (i.e., random molded cleared stone patterns) arise as a COVID-19 infection progresses. [49] The expansion of the lungs was followed by the consolidation of the lungs. [48][49] The table below shows information about the stages of the infection.) Table 4)

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Stage	Early-stage	Progression stage	Peak stage	Absorption stage
Time of onset of symptoms	0-4 days	5-8 days	9-13 days	14-later days
Findings	• patients present with signs like fever, dry cough) • on histopathology, there may be congestion of alveolar capillaries resulting in alveolar and interlobular interstitial edema • The most common abnormality was GGOs	• there may be an escalation in the hyperinflammatory reaction. fibrous extensions that connect the alveoli begin to broaden. • The increasing range and extent of GGOs. • The slow transformation of GGOs into multifocal, consolidative areas and the development of a "crazy-paving" pattern.	• The vascular congestion diminishes, and fibrosis predominates. • More significant lung involvement and the presence of dense consolidations	• there is a different recovery and repair response within the lungs. • Consolidations were slowly reabsorbed, and repaired lung features, including fibrotic bands, appeared. • characterized by an acute respiratory distress syndrome

Table 4. CT scan stages in patients with COVID-19 [48][49][42][43][44]

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Because of these imaging characteristics, a few studies have found that CT scans had greater sensitivity (86-98%) and lower false negative rates than RT-PCR. [17] The main caution in using CT for COVID-19 is that the specificity (25%) is low since the imaging characteristics encompass other viral pneumonia. [45] The next two photos, which depict CT scans and graphs of two virus-infected patients, reveal disease-related abnormalities, including GGO, and reflect the level of pulmonary system involvement in these individuals.) Figure 6, 7)

Figure 6. A 55-year-old man with dynamic respiratory trouble, with a history of close contact with an individual tainted with COVID-19, related to the nearness of fever, anosmia, and dysgeusia. Understanding with a positive nasopharyngeal swab report for COVID-19 illness. The foremost visit characteristics of the CT check of COVID-19 pneumonia are ground-glass mistiness, with reticular and interlobular septal thickening (crazy-paving design) and related combination. This case outlines a persistent research facility that affirmed SARS-CoV-2 and the CT characteristics of COVID-19 pneumonia. The understanding recuperated from the infection and was released well. This CT check case appears to show huge zones of ground-glass opacities with thickening of the interlobular and intralobular septa, speaking to the loco asphalt design, with different covering airspace unions, in both lung flaps. There are, moreover, discrete two-sided ground-glass opacities with circular morphology. There are no mediastinal, hilar, or axillary lymphadenopathies, or pleural effusion. [37][49][50][51][52][53] (Creus, 2021)

4.4. Comparison of CXR and CT scan in SARS-COV2

Typical chest imaging features are different, sketchy, sub-segmental, or segmental ground glass thickness shadows inside the two lungs. [65] Even yet, ordinary findings are becoming more customary. In any event, we feel compelled to point out that CT radiation is associated with a non-insignificant carcinogenic risk. [66,67] The CXR (Chest X-Ray) will be used to determine if the metabolic lesions are moving or declining. [68] There's a probability that CXR can help with early visual confirmation of critical cases, such as imaging alternatives for the corresponding or multi-projection entry, or rapid growth of circumstances over a short period. [65] For the first illness detection, it should be expected that chest CT will be negative in around one-quarter of Covid-19 cases. A single negative chest CT does not address all of Covid-19's issues. One or two patients with less critical ground-glass opacities may be missed by CXR. Regardless, with this management well-known, a negative CXR does not manage everything out by the conclusion of Covid-19, and the agreement is also examined ahead of time. The seriousness of the indisputable on imaging respiratory organ modifications is primarily known with the reality of the particular illness. [69] If a CT scan is performed and sores are detected in these CXR ambiguous lesser instances, the clinical medical care organization would remain the same, since all potential patients should be isolated and identified. [68] A CXR provides a radiation estimate of roughly 0.05 mSv, whereas a normal chest CT may provide 4-7 mSv. One CT output was shown to be associated with a 0.05-0.7% oncogenic risk. The risk can be as high as >2.7 percent for people who have undergone numerous CT exams. [40] According to the case study from the United States, CXR is the best option for imaging, particularly for sequential verification. [54]

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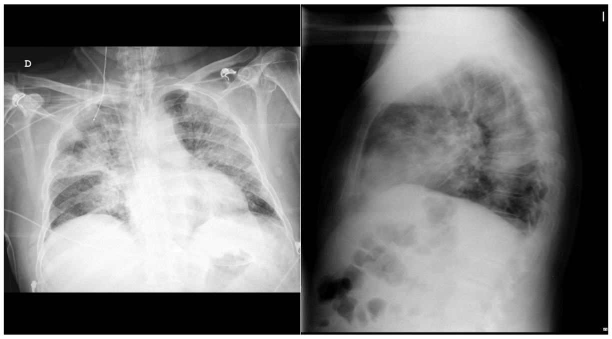

Figure 7. A 75-year-old man displayed cough, fever, and shortness of breath. After a day of hospitalization, his side effects declined, and the persistent was exchanged to the ICU, and required orotracheal intubation. He was positive for COVID-19 on PCR testing. In AP-CXR, reciprocal ground-glass opacities appear more unmistakable within the right upper projection and right paramediastinal region. In Lateral-CXR, dynamic two-sided ground-glass opacities are influencing both lungs, more conspicuous within the upper flaps and paramediastinal parenchyma. (Creus, 2021)

4.5. The disadvantage of CT Scan in SARS-COV2

During the SARS-COV-2 pandemic, CT is also being employed as a comprehensive, non-invasive imaging technology that enables the assessment of respiratory organ parenchyma, pneumonic patency, coronary supply pathways, and cardiac muscle injury. The "quadruple rule-out" period has officially begun. [52] However, radiation measurements are a hindrance to CT inspection, and COVID-19 is self-limiting. [70] Bernheim et al. explain that CT was common in 56 percent of patients during 0-2 days after symptoms appeared, suggesting that CT was not a reliable full means to run the show out COVID-19 infection later. [55] Wáng stated that among essential persons, the number of patients with no or few results would be higher, and the positive CT rate would be lower; however, such a rate among symptomless patients is unknown at this time. The use of CT in screening and the development of symptomless COVID-19 patients is thus debatable. [71] Even though CT is a common tool for assessing the health of patients, the finished job for CT does not appear to be obvious until later. The examples persuaded the US that seclusion and antiviral medical help could be given to symptomless people. The use of a CT scan is not required to increase the patient's physical and financial load. [70] Furthermore, CT poses a danger of infection, and there is a potential for cross-contamination between ruined and clean individuals. CT examination may not be necessary as a screening tool for symptomless suspects with SARS-CoV-2 tainting, nor as a follow-up tool for symptomless confirmed patients. [70] Low radiation mensuration mode and tactics to reduce radiation mensuration should be continuously connected for CT exams. [72,73]

5. Comparison of interventional radiology and CT scan in SARS-COV2

As previously stated, imaging methods, in addition to the gold standard RT-PCR approach for identifying the SARS-COV2 virus, play an important role in diagnosing the disease. The RT-PCR approach has a sensitivity of 83.3 percent for viral detection, compared to 85.9% for imaging methods. Although the RT-PCR approach is more reliable for testing for the virus, it requires imaging methods to identify people with the illness due to the long time it takes and the huge amount of RNA required. A CT scan is one of the diagnostic imaging procedures. Physicians and radiologists can be supported in quickly detecting infected patients and stopping the viral transmission cycle using a short-term CT scan by examining verified virus-related abnormalities at each stage of infection. Due to the great sensitivity of CT scans (97.2 percent), GGO findings can be seen in the early stages of illness in the lungs of patients. Despite the benefits of utilizing CT scans to diagnose the virus, it should be cautioned that doing so is not without risk. The procedure will raise the risk of cancer in the future due to the high ionization and high radiation dosage (4-7MSV). On the other hand, the possibility of transferring the virus in the CT room is one of the method's downsides, posing harm to the expert's health. Patients who visit these centers for radiology and asymptomatic care. Interventional Radiology (IR) is an exciting and rapidly growing clinical specialty that allows doctors to perform minimally invasive operations to diagnose, treat, and repair a variety of ailments. To regulate needles, tiny catheter tubes, and wires within the body, clinical imaging such as radiography, ultrasound, MRI, and CT is used. Clinical imaging innovation provides radiologists with high visibility throughout the technique, enhancing the precision of the findings and improving patient outcomes through targeted therapy.

In comparison to traditional medical procedures, IR has a decreased risk of blood loss, illness, and other common side effects associated with open surgery.

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Additionally, those who are more vulnerable to sedation benefit since only local anesthesia and mild sedation are used. Finally, because the direction is precise, the risk of injury to encircling solid bodily components is reduced. In addition, because interventional radiology treatments are conducted through tiny incisions, no bulky stitches or bandages are required. They also take less time to recuperate than standard operations since they are non-invasive. One of the image guidance approaches is interventional radiology. It treats issues of the lungs, kidneys, intestines, gallbladder, and arteries with the SARS-COV2 virus and can also address the infection's challenges.

6. Conclusion

In this article, we have examined the methods of diagnosing coronavirus with emphasis on CT scan and interventional radiology methods and the irreplaceable role of imaging methods, along with the standard RT-PCR method. Future studies and research should look into the impacts, according to the authors, of overuse of CT scans in SARS-COV2 patients and evaluate the genuine benefit of minimally invasive interventional radiology in COVID-19 patients and a lower risk of viral transmission compared to surgery. CT scans and interventional radiology can be thought of as complementary. CT scans can be used to identify lung illnesses and infections, whereas interventional radiology can be utilized to treat SARS-COV2 complications.

Conflict of Interest

Authors declare no conflict of interest.

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