Radiological findings from 200 patients with COVID-19 pneumonia- A descriptive study

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DOI: http://dx.doi.org/10.33545/26644436.2021.v4.i3a.221

Abstract

Background: The pathogen responsible for the respiratory illness was a novel strain of the family Corona viridae, which is similar to two previous epidemics, namely Middle Eastern Respiratory Syndrome (MERS) and severe acute respiratory syndrome (SARS). The present study was conducted to assess radiological findings in COVID-19 patients.

Materials and Methods: 200 COVID-19 patients were enrolled. Based on the time interval between onset of symptoms and the CT scan, 4 groups of 50 patients were created. Group I (subclinical cases, in which CT scans were done before onset of symptoms); group 2 (CT scans done ≤1 week after symptom onset); group 3 (CT scans done >1 to 2 weeks after symptom onset); and group 4 (CT scans done >2 weeks to 3 weeks after symptom onset). All patients underwent CT scans.

Results: Group I had 30 males and 20 females, group II had 22 males and 28 females, group III had 25 males and 25 females and group IV had 24 males and 26 females. Common clinical features were cough seen in 76%, 48% and 31%, dyspnoea in 62%, 72% and 45%, chest tightness in 80%, 55% and 25%, diarrhoea in 34%, 25% and 6%, vomiting in 54%, 15% and 14% and fever in 95%, 82% and 30% in group II, III and IV respectively. The difference was significant (P<0.05). The mean lung segments involved were 3.4 in group I, 10.2 in group II, 13.1 in group III and 12.7 in group IV. Pattern involved was Bilateral seen in 40%, 25%, 2% and 5% peripheral in 20%, 20%, 25% and 5%, ill-defined in 25%, 15%, 28% and 30% and ground-glass opacification in 15%, 30%, 45% and 60% respectively. The difference was significant (P<0.05).

Conclusion: Most common radiological feature found in COVID-19 affected patients was ground-glass opacification.

Keywords: COVID-19, MERS, opacification

Introduction

During 2020, the COVID-19/SARS-CoV2 (COVID-19), sometimes referred to as the “coronavirus,” has been the cause of a major viral respiratory infection global pandemic [1]. At the time of this publication, the US Centers for Disease Control and Prevention (CDC) had listed the following symptoms associated with COVID-19 infections: fever, chills, cough, shortness of breath, fatigue, body aches, headache, new onset of loss of taste or smell, sore throat, congestion, runny nose, nausea/vomiting, and diarrhea [2]. Patients with moderate or severe symptoms should generally be hospitalized. Moderate COVID-19 infection has been defined as having dyspnea (i.e., shortness of breath) but having a blood oxygen saturation level of <94% on room air. Severe COVID-19 infection have been defined as someone with marked tachypnea with need of invasive/ non-invasive ventilation, hypoxemia (SPO2 <90% on room air), and lung infiltrates. Unfortunately, there has yet to be any validated treatments for COVID-19 at the time of this publication [3]. Patients who are hospitalized generally need to be frequently monitored and provided supportive respiratory therapy. Until there is an approved COVID-19 treatment, individuals are advised to continue to self-isolate, wash their hands frequently, and wear the appropriate personal protective equipment (PPE) when around those infected with COVID-19. The radiological changes in the lungs of people with COVID-19 pneumonia have not been fully characterised. CT is important in the diagnosis and treatment of lung diseases [4]. Imaging features of COVID-19 pneumonia are diverse, ranging from normal appearance to diffuse changes in the lungs. In addition, different radiological patterns are observed at different times throughout the disease course.
Because the time between onset of symptoms and the development of acute respiratory distress syndrome (ARDS) was as short as 9 days among the initial patients with COVID-19 pneumonia, early recognition of the disease is essential for the management of these patients [5]. The present study was conducted to assess radiological findings in COVID-19 patients.

Materials and Methods
The present study comprised of 200 COVID-19 patients. All were informed and their written consent was obtained. Demographic data such as name, age, gender etc. was recorded. All cases were confirmed by real-time RT-PCR analysis of throat swab specimens. Based on the time interval between onset of symptoms and the CT scan, 4 groups of 50 patients were created based on duration of symptoms. Group 1 (subclinical cases, in which CT scans were done before onset of symptoms); group 2 (CT scans done ≤ 1 week after symptom onset); group 3 (CT scans done > 1 to 2 weeks after symptom onset); and group 4 (CT scans done > 2 weeks to 3 weeks after symptom onset).

All patients underwent CT scans were obtained with patients in the supine position, using one of the following scanners SOMATOM Definition AS+ with following parameters were used: detector collimation widths 64 × 0.6 mm, 128 × 0.6 mm, 64 × 0.6 mm, and 64 × 0.6 mm; and tube voltage 120 kV. Scans were read by experienced radiologists. Results were clubbed and analysed using appropriate statistical test with p value less than 0.05 as significant.

Results

| Groups | Group I | Group II | Group III | Group IV |
|--------|---------|----------|-----------|----------|
| CT scan | Before symptoms onset | ≤1 week | >1 to 2 weeks after symptom onset | >2 weeks to 3 weeks |
| M:F | 30:20 | 22:28 | 25:25 | 24:26 |

Table I shows that group I had 30 males and 20 females, group II had 22 males and 28 females, group III had 25 males and 25 females and group IV had 24 males and 26 females.

| Features | Group I | Group II | Group III | Group IV | P value |
|----------|---------|----------|-----------|----------|---------|
| Cough | 0 | 76% | 48% | 31% | 0.02 |
| Dyspnoea | 0 | 62% | 72% | 45% | 0.01 |
| Chest tightness | 0 | 80% | 55% | 25% | 0.04 |
| Diarrhoea | 0 | 34% | 25% | 6% | 0.03 |
| Vomiting | 0 | 54% | 15% | 14% | 0.01 |
| Fever | 0 | 95% | 82% | 30% | 0.05 |

Table II, graph I shows that common clinical features were cough seen in 76%, 48% and 31%, dyspnoea in 62%, 72% and 45%, chest tightness in 80%, 55% and 25%, diarrhoea in 34%, 25% and 6%, vomiting in 54%, 15% and 14% and fever in 95%, 82% and 30% in group II, III and IV respectively. The difference was significant (P< 0.05).
Discussion

The coronavirus related pandemic is one of the deadliest known epidemics in recent times. These numbers are increasing exponentially and, with no definitive treatment or available vaccine in sight, creating havoc for the health and financial systems of the world. The earliest reported cases were in Wuhan, the capital city of Hubei province in China. These cases were treated as pneumonia of an unknown origin. As the disease spread, China alarmed the World Health Organization (WHO) of the presence in Wuhan of several cases of an unusual type of pneumonia [6]. Researchers discovered that the pathogen responsible for the respiratory illness was a novel strain of the family Coro

Table II shows that mean lung segments involved were 3.4 in group I, 10.2 in group II, 13.1 in group III and 12.7 in group IV. Pattern involved was Bilateral seen in 40%, 25%, 2% and 5%, peripheral in 20%, 20%, 25% and 5%, ill-defined in 25%, 15%, 28% and 30% and ground-glass opacification in 15%, 30%, 45% and 60% respectively. The difference was significant (P< 0.05).

Table 2: Radiological findings

| Variables | Parameters | Group I | Group II | Group III | Group IV | P value |
|-----------|------------|---------|----------|-----------|----------|---------|
| Mean lung segments | 3.4 | 10.2 | 13.1 | 12.7 | 0.01 |
| Pattern | | | | | | 0.05 |
| Bilateral | 40% | 20% | 25% | 5% | | |
| Peripheral | 20% | 20% | 25% | 5% | | |
| Il defined | 25% | 15% | 28% | 30% | | |
| Ground-glass opacification | 15% | 30% | 45% | 60% | | |

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