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Original Article

Incidence of COVID-19 Pneumonia on Abdominal Computed Tomography Images of Patients Applied to the Urology Outpatient Clinic

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ABSTRACT

Objective: The novel coronavirus disease 2019 (COVID-19) has spread all over the world from the first case. Although some criteria used in diagnosis, the diagnosis of COVID-19 in asymptomatic patients and patients with non-respiratory symptoms remains a big concern. The patients with COVID-19 could apply to the hospital with non-specific symptoms. Therefore, we aimed to evaluate the incidence of missed diagnosed COVID-19 pneumonia on abdominal computed tomography (CT) performed in patients admitted to our urology outpatient clinic in this study.

Methods: The files of patients admitted to the urology outpatient clinic were evaluated retrospectively from April 1 to November 1, 2020. The patients with pulmonary symptoms and previously diagnosed with COVID-19 were excluded from the study. The patients who underwent abdominal CT at the urology outpatient clinic for any reason were included in this study. The demographic data and CT findings of these patients were recorded. The rates of missed diagnosed COVID-19 pneumonia detection on the lung base images of abdominal CT were evaluated. In addition, the patients without abdominal CT were excluded from this study.

Results: One thousand and twenty-four patients were included in this study. We observed that 99 (9.7%) of these patients had findings related to COVID-19 pneumonia on the lung base images of abdominal CT. Although 885 (86.4%) patients had no pathological pulmonary findings, 40 (3.9%) patients had other pathological pulmonary findings.

Conclusion: COVID-19 disease has become a pandemic worldwide and continues to exist as a significant problem. All health-care professionals, including urologists, play an active role in the diagnosing and treating this disease. Therefore, it should be kept in mind that COVID-19 pneumonia should be evaluated in patients admitted to the urology outpatient clinic with renal colic or abdominal pain.

INTRODUCTION

The novel coronavirus disease 2019 (COVID-19) has spread all over the world.[1] The pathogen has been named novel severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), an enveloped RNA virus.[2] The number of confirmed COVID-19 cases is proliferating.[3] There have been nearly 263 million confirmed cases globally and over 5 million deaths at the time of this manuscript submission (December 2021), according to the data of the World Health Organization (https://covid19.who.int/).

COVID-19 could cause various symptoms such as dyspnea, headache, myalgia, fever, cough, and altered smell or taste.[4-7] The most of morbidity and mortality from this disease have originated from pulmonary.[8] This disease also may sometimes be asymptomatic. Besides, many pieces of research supported that this disease can also present with non-respiratory symptoms such as abdominal pain, skin findings, and diarrhea.[9-11]

The presence of these non-specific symptoms may cause delaying the diagnosis of the disease. Early diagnosis plays an important role in preventing the spread of the dis-

ease and avoiding the rapidly deteriorating patients with COVID-19.[12] The standard method for a confirmed diagnosis of the disease is a real-time polymerase chain reaction (RT-PCR). There are some shortcomings related to this diagnostic test (RT-PCR; typically, nasopharyngeal swab). These shortcomings include false-positive results, false-negative results, and late diagnosis.[13] Chest computed tomography (CT) is not recommended as the first diagnostic tool, but it can be used as an important complementary diagnostic tool in addition to RT-PCR.[12] The most common imaging findings on chest CT are ground-glass opacities without lung cavitation, discrete pulmonary nodules, and bilateral patchy shadowing. In addition, some patterns can be seen, such as bronchial wall thickening and linear opacities.[1]

However, diagnosis in asymptomatic patients or non-respiratory symptoms remain a big concern. Many patients with COVID-19 pneumonia can be admitted to the clinic with abdominal pain and renal colic symptoms. These abnormal symptoms can have resulted in requests for abdominal CT. Therefore, we aimed to evaluate the incidence of missed diagnosed COVID-19 pneumonia on abdominal CT performed in patients admitted to our urology outpatient clinic in this study.

MATERIALS AND METHODS

We reviewed the files of patients admitted to the urology outpatient clinic from April 1 to November 1. We selected this date as an origin. Because, in our country, it was announced that COVID-19 was spread all over Turkey on April 1 (https://tr.wikipedia.org/wiki/T%C3%BCrkiye%27de_COVID-19_pandemisi).

We included the patients who performed abdominal CT at the urology outpatient clinic for any reason. We recorded demographic data of these patients such as age, sex, complaints of admission, and abdominal CT findings. In addition, we examined the lung bases findings on abdominal CT imaging of these patients.

The lung base findings on these abdominal CT were accepted with COVID-19 pneumonia and were classified as incidental (Figures 1 and 2).

- Bilateral ground-glass opacity
- Patchy consolidation
- Bronchial wall thickening
- Fibrous stripes
- Irregular solid nodules.[12,14]

We excluded patients with pulmonary symptoms and previously diagnosed with COVID-19. In addition, patients without abdominal CT were excluded from the study.

We evaluated the missed diagnosed COVID-19 pneumonia detection rates on the lung base images of abdominal CT. The pulmonary findings on the abdominal CT associated with COVID-19 are reviewed with the lung window settings due to findings not visible on abdominal window settings.

These CT imaging, each of the patients, were evaluated by three authors (MSO, MBH, and BY) to increase the reliability of the analysis. These authors have been actively involved in diagnosing and treating COVID-19 since the outbreak began. Therefore, they are sufficiently familiar with lung findings in diagnosing this disease. The author, a specialist in Infectious Diseases and Clinical Microbiology, and another author, a radiologist, confirmed the evaluated CT findings.

Each study was reviewed with the lung, abdominal, and mediastinal window settings. All CT studies were performed by high-resolution thin section datasets (slice thickness of 2 mm and an increment of 1 mm were used).

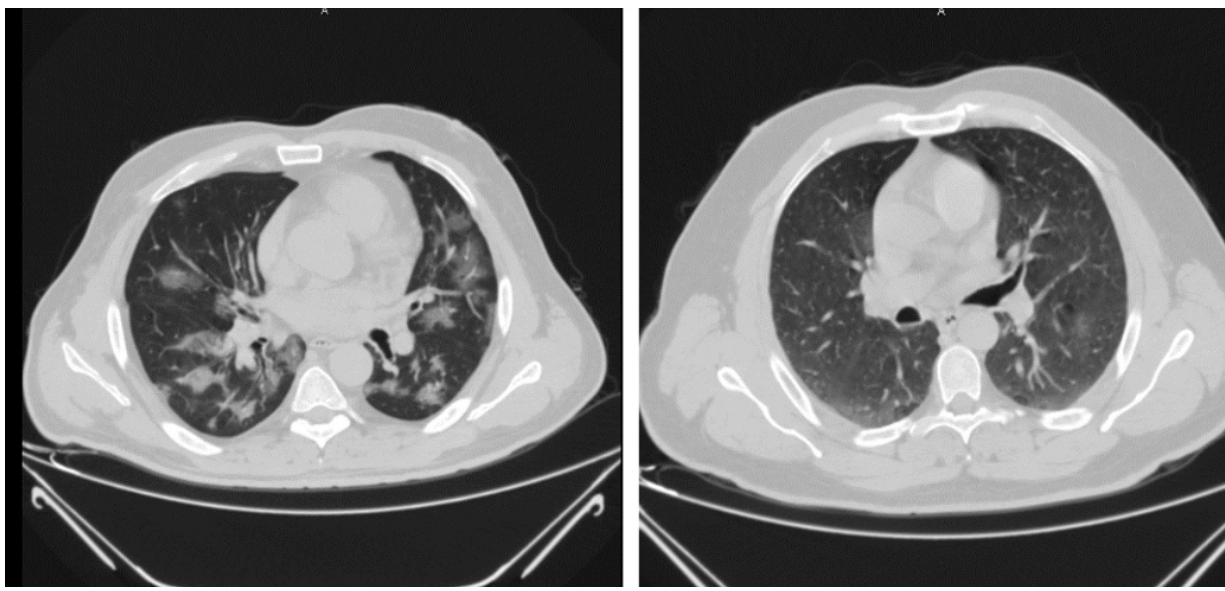

Figure 1.

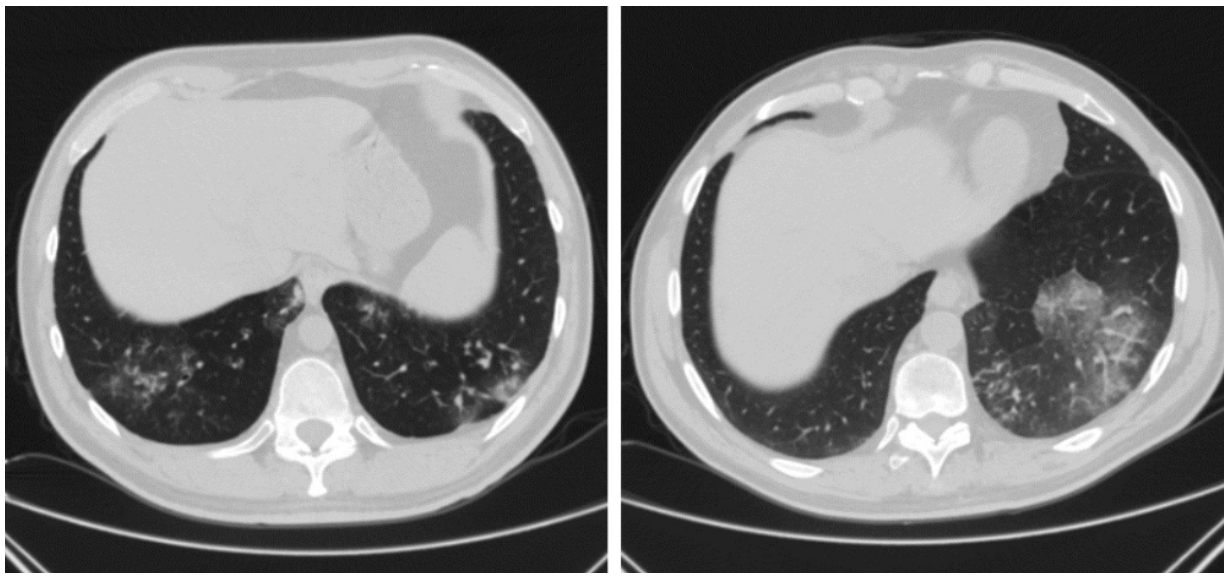

Figure 2. COVID-19 pneumonia findings on abdominal CT of one patient.

The institutional human research ethics committee approved the protocol 20/483. The analysis and data collection were performed after written informed consent was obtained from all patients according to the Helsinki Declaration. The study approval was obtained from the "Republic of Turkey Ministiry of Health" for the study.

Statistical Analysis

All statistical analyses were performed using Statistical Package for the Social Sciences volume 22.0 (IBM Corp.; IL, Chicago, USA). Non-parametric tests were used for parameters that have been shown to differ from the normal distribution. The parameters with normal distribution were analyzed by parametric tests. The variables with continuous normally distributed were expressed as mean±SD. The categorical variables were presented as percentages, and the variables without normally distributed were expressed as median and interquartile ranges.

RESULTS

In this present study, the files of 1081 patients were reviewed. Fifty-seven of these patients were excluded from the study due to their CT not containing any pulmonary images. After the criteria were applied, 1024 patients were included in this study. The mean age of patients was 44.3±14.9 years (3–101 years). Three hundred and fifty-seven (34.9%) patients were female and 667 (65.1%) were male.

We observed that 99 (9.7%) of these patients had findings related to missed diagnosed COVID-19 pneumonia on the lung base images of abdominal CT. Although 885 (86.4%) of patients had no pathological pulmonary findings, 40 (3.9%) patients had other pathological pulmonary findings (non-related COVID-19) (atelectasis, pulmonary fibrosis, pleural effusion, etc.) (Figure 3).

The mean age of patients who had findings COVID-19 was 56.4±14.7 years (22–92 years). Thirty-five (35.4%) of these 99 patients were female and 64 (64.6%) were male; these findings were similar to the patients without abnormal pulmonary imaging (Chi-square; p: 0.930). In addition, there were no abnormal urinary system findings on abdominal CT imaging 39 of these 99 patients. These patients had only pulmonary findings related to COVID-19 (Figure 4).

We observed that 688 (67.2%) of these patients had ab-

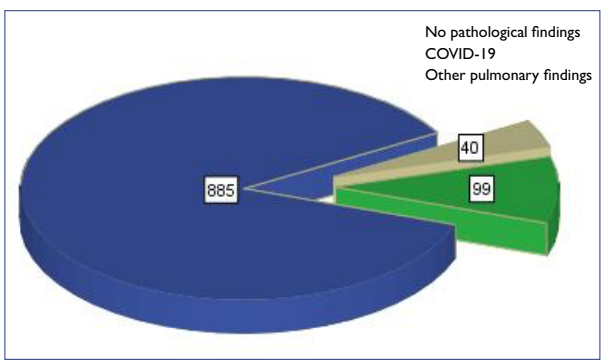

Figure 3. The pulmonary findings on abdominal CT.

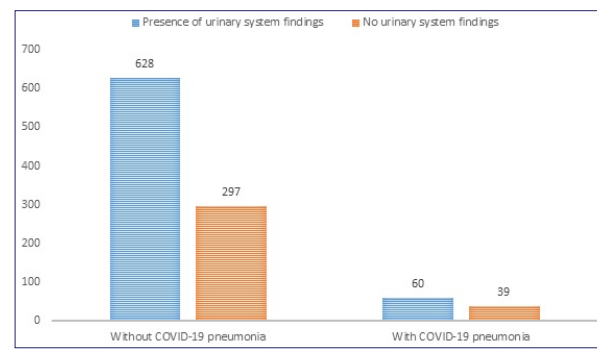

Figure 4. Urinary system findings of patients with and without COVID-19.

normal urinary system findings (such as ureteral stones, renal stones, renal cell carcinoma, and simple renal cyst). There were 288 patients with ureteral stones, 261 patients with renal calculi, 44 patients with simple renal cyst, eight patients with angiomyolipoma, and 86 patients with other urinary tract pathologies (renal malignancies, hydronephrosis, ureteropelvic junction obstruction, etc.).

In the retrospective analysis of the patients' data, in the next period after the applied to the urology outpatient clinic, we found that 34 of these 99 patients were treated in hospital and others were treated without hospitalization for COVID-19.

DISCUSSION

This study depictured that a significant part (9.7%) of the patients who underwent abdominal CT in the urology outpatient clinic had COVID-19 pneumonia. These patients had no specific symptoms for COVID-19. Therefore, it should be taken care of when evaluating the abdominal CT images of patients admitted to the urology outpatient clinic.

The symptoms of COVID-19 vary widely. Most infected patients can be asymptomatic. It can lead to only self-limiting respiratory illness in symptomatic patients. The most common medical conditions requiring hospitalization are related to diseases of pulmonary such as pneumonia and hypoxia. However, in some patients, it could cause severe multisystem disease that can be fatal.[1,4,8] Therefore, the quick and correct diagnosis is a substantial entity. RT-PCR is the standard diagnostic method.[15] However, using these tools could be impractical for clinical management due to concerns such as delaying the diagnosis or false-negative results. Thus, using supportive diagnostic methods such as laboratory findings or imaging methods may be necessary.[15]

The chest radiographs commonly have no diagnostic value in the early stages of the disease. Thus, they are not helpful clinically for diagnosis. However, pulmonary CT may include many findings even before symptom onset.[14] Even if routine CT imaging is not recommended for diagnosis of COVID-19 pneumonia,[16] for its contributions to the diagnosis, the rapid advice guideline recommended the pulmonary CT as strongly for patients with suspected COVID-19.[17] The patients who are not yet suspected COVID-19 may have been characteristic pulmonary findings of COVID-19 pneumonia. In addition, CT findings could be support COVID-19 in patients who are investigated to novel viral pneumonia infection.[18] The commonly characteristic CT patterns for COVID are bilateral ground-glass opacity, patchy consolidation, cavitation, bronchial wall thickening, fibrous stripes, linear opacities, irregular solid nodules, etc.[12,14,19,20] Most of cases with confirmed COVID-19 have initial abnormal CT manifestations. Some of these patients do not have any symptoms related to COVID-19 and were imaged only for screening.[21] Similarly, none of the patients in our study has any pulmonary symptoms. These patients were asymptomatic or had non-pulmonary symptoms.

The radiologic modalities in urology practice have been used widely in recent years.[22] This widespread use of these tools, such as ultrasonography or abdominal CT, enables incidental detection and early diagnosis of diseases such as renal cell carcinoma.[23] Although there were some exceptions, most abdominal CT studies include a consistent portion, especially lung bases, of the pulmonary component.[24] In the study by Vu et al., it was presented that three patients without respiratory symptoms had doubtful imaging findings for COVID-19.[25] None of these patients had pulmonary CT. Abnormal imaging findings were seen on the pulmonary component of abdominal CT in two of these patients. Similarly, other studies examining this issue consisted of case series.[26-29] Moreover, in their study, Barkmeier et al. stated that 42 patients with COVID-19 have abdominal CT that visualized lung bases.[18] They also stated that 79% of these patients have abnormal CT findings on lung bases. In this present study, we found that 9.7% of the patients had abnormal CT findings consistent with COVID-19 pneumonia. These findings were supported by another study which showed that the screening of the lung base images might benefit the diagnosis of COVID-19 for patients with abdominal CT.[30]

COVID-19 has no direct pathological effect on the urinary tract. However, this disease, which takes hold worldwide, significantly affects daily clinical practice.[31] In this pandemic time, many hospitals have served only patients with COVID-19, and the hospitals' workload has increased considerably. This statement has led to an increase in the requirement for healthcare.[32] Therefore, a pragmatic approach must be necessary to manage this disease. All medical doctors, including urologists, should increase their awareness of this disease. They play a significant role in the fight against COVID-19 during this pandemic. They also must be aware of the potential signs of illness.[33] Based on these findings, we evaluated the lung base findings of the patients' abdominal CT. We found that a significant part of the patients has typical findings of COVID-19 pneumonia. This rate is a portion of the patients; we encounter in our daily outpatient clinic, which cannot be ignored. Hence, it is too important to assess imaging hallmarks for effective patient treatment and management with increasing concerns about the SARS-CoV-2 outbreak.

This present study has some limitations. First, we evaluated the patients admitted only to the urology outpatient clinic. Therefore, the study population may not be enough for generalization. Second, we could not correlate all of these patients with RT-PCR. Despite these limitations, this present study has significant findings of COVID-19 management.

Conclusion

COVID-19 disease has become a pandemic all over the world. All health-care professionals, including urologists, play an active role in diagnosing and treating this disease.

Hence, it should be kept in mind that COVID-19 pneumonia should be evaluated in patients admitted to the urology outpatient clinic with renal colic or abdominal pain.

Ethics Committee Approval

This study approved by the Health Sciences University Clinical Research Ethics Committee (Date: 08.01.2020, Decision No: E-46418926-050.01.04-3072).

Informed Consent

Retrospective study.

Peer-review

Externally peer-reviewed.

Authorship Contributions

Concept: M.S.Ö., B.Y., M.B.H.; Design: M.S.Ö., E.E.; Supervision: M.S.Ö., B.Y., M.B.H.; Materials: M.S.Ö., E.E., B.T.; Data: M.B.H. B.Y., B.T.; Analysis: .S.Ö., B.Y., ; Literature search: E.E., B.T.; Writing: M.S.Ö., B.Y., M.B.H.; Critical revision: E.E., B.T.

Conflict of Interest

None declared.

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Üroloji Polikliniğine Başvuran Hastaların Abdominal Bilgisayarlı Tomografi Görüntülerinde COVID-19 Pnömoni İnsidansı

Amaç: COVID-19 ilk görüldüğü andan itibaren yayılarak tüm dünyayı etkisi altına aldı. Tanı ile ilgili tanımlanmış çeşitli kriterler olsa da asemptomatik hastalar ve solunumla ilgili semptomları olmayan hastalarda COVID-19 tanısı büyük bir endişe kaynağı olmaya devam etmektedir. Bu hastalar spesifik olmayan semptomlarla hastaneye başvurabilmektedir. Bu nedenle bu çalışmada, üroloji polikliniğimize başvuran pulmoner semptomları olmayan hastalarda çekilen abdominal bilgisayarlı tomografilerde (BT) izlenen COVID-19 pnömoni bulgularını değerlendirmeyi amaçladık.

Gereç ve Yöntem: 1 Nisan 2020 – 1 Kasım 2020 tarihleri arasında üroloji polikliniğine başvuran hastaların dosyaları geriye dönük olarak incelendi. Pulmoner semptomları olan ve daha önce COVID-19 tanısı almış hastalar çalışma dışında bırakıldı. Üroloji polikliniğinde herhangi bir nedenle abdominal BT yapılan hastalar çalışmaya dahil edildi. Bu hastaların demografik verileri ve BT bulguları kaydedildi. Abdominal BT'nin akciğer taban görüntülerinde COVID-19 pnömoni bulguları araştırıldı. Ek olarak abdominal BT'si olmayan hastalar çalışma dışında bırakıldı.

Bulgular: Bu çalışmaya 1024 hasta dahil edildi. Bu hastaların 99'unun (%9.7) abdominal BT akciğer taban görüntülerinde COVID-19 pnömonisi ile ilgili bulgulara sahip olduğunu gözlemledik. Hastaların 885'inde (%86.4) patolojik pulmoner bulgu bulunmazken, 40'unda (3.9%) başka patolojik pulmoner bulgular vardı.

Sonuç: COVID-19 hastalığı tüm dünyada bir pandemi haline gelmiş ve önemli bir sorun olarak varlığını sürdürmektedir. Üroloğlar dahil tüm sağlık profesyonelleri bu hastalığın tanı ve tedavisinde aktif rol oynamaktadır. Bu nedenle üroloji polikliniğine renal kolik veya karın ağrısı şikayeti ile başvuran hastalarda COVID-19 pnömonisinin değerlendirilmesi gerektiği akılda tutulmalıdır.

Anahtar Sözcükler: Bilgisayarlı tomografi; COVID-19; pnömoni; üroloji.