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TANAFFOS

Bronchoscopy Procedures Implemented During the Pandemic Period in a University Hospital

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Background: Our objective was to review the bronchoscopy procedures conducted at our hospital during the pandemic, with a focus on the potential risks of COVID-19 transmission associated with these interventions.

Materials and Methods: This comprehensive study included all patients who underwent bronchoscopy in the Department of Pulmonology at Akdeniz University from March 15 to December 31, 2020. A retrospective review of medical records covered demographic information, procedure indications, urgency, procedure type, diagnostic results, and the patient's COVID-19 history. Data collection also recorded the number of personnel involved in bronchoscopy during the pandemic, along with their COVID-19 history.

Results: A total of 250 bronchoscopy procedures were performed during the study period. The majority of patients were male (74.8%), with a mean age of 58 ± 13.5 years. The most common indication for bronchoscopy was lung cancer (39.2%), followed by other causes like interstitial lung diseases and sarcoidosis. No patients with a positive pre-procedural COVID-19 PCR test were included in the procedure. All patients who underwent the procedure had a negative PCR test result. No post-procedural COVID-19 cases were observed among healthcare workers or patients following the procedures. All procedures were conducted with appropriate personal protective equipment (PPE), and SARS-CoV-2 RT-PCR testing was performed on 76.8% of patients before the procedure. No complications, other than minor hemorrhages, were reported.

Conclusion: Bronchoscopy performed with appropriate PPE, in a negative pressure room, and with pre-procedural SARS-CoV-2 RT-PCR testing, is a safe and effective diagnostic and therapeutic procedure during the COVID-19 pandemic. The safety protocols implemented in this study successfully minimized the risk of COVID-19 transmission to healthcare workers and patients.

Keywords: Pandemic; COVID-19; Bronchoscopy; Transmission; Outbreak

INTRODUCTION

Coronavirus Disease 2019 (COVID-19) emerged as an unknown pneumonia in Wuhan in December 2019 and was soon declared a pandemic by the World Health Organization (WHO). Millions of people have been infected, and thousands have succumbed to the disease since its initial outbreak. During this period, elective surgical procedures were postponed in many places, and pandemic hospitals were tasked with exclusively attending to COVID-19 patients.

Bronchoscopy, a specialized device developed for examining the respiratory tract and diagnosing and

treating respiratory diseases, holds a significant place in pulmonary disease practice. It plays a crucial role not only in emergencies such as treating massive hemoptysis and relieving obstruction in central airways but also in diagnosing and treating various common diseases, primarily lung cancer, within the community (1–3).

Given that the virus primarily spreads through droplets and microdroplets produced by an infected person, aerosol-generating procedures like bronchoscopy pose a significant risk to healthcare workers. Several associations have published bronchoscopy guidelines during the pandemic, but these recommendations are mostly expert opinions, lacking sufficient scientific research (4–6). Although a few studies were conducted towards the end of the pandemic, data from Turkey are insufficient (7–10). Therefore, we aimed to investigate the bronchoscopy procedures conducted during the pandemic at our hospital and the potential risks of COVID- 19 transmission associated with these procedures.

MATERIALS AND METHODS

In this study, all patients who underwent bronchoscopy at the Department of Chest Diseases, Akdeniz University, between March 15 and December 31, 2020, were included. The bronchoscopy unit of the Department of Chest Diseases is located on a separate floor from other units performing endoscopic procedures. The unit comprises five rooms, including the procedure room, sterilization unit, patient preparation, post-procedure patient observation, and disposable material storage. In the patient preparation room, patients are welcomed by a chest diseases research assistant, a bronchoscopy nurse, and an anesthesia technician. The research assistant provides information about the procedure and obtains written consent. After obtaining consent, a vascular access is established for the patient, and protective attire is worn for the procedure. The prepared patient is then taken to the procedure room. In the procedure room, six individuals are present, including the bronchoscopy nurse, anesthesia technician, auxiliary personnel, chest diseases research assistant, anesthesia and resuscitation research assistant, and the chest diseases faculty member who will perform the procedure.

Due to the pandemic, in addition to central ventilation in the bronchoscopy unit, a special motorized air purification device (Teknomar®) was installed, which created a negative-pressure environment. Throughout the pandemic, all health care workers used standard personal protective equipment (PPE), including a powered air-purifying respirator or N95 mask, eye protection (goggles/face shield), coveralls, and gloves. Standard disinfection protocols were applied to durable, reusable video monitors, and high-level disinfection was performed for reusable bronchoscopes. All patients underwent reverse transcription-polymerase chain reaction (RT-PCR) testing for COVID-19 before bronchoscopy, and a clinical inquiry was conducted to assess for COVID-19 symptoms. Bronchoscopy procedures for patients with a positive PCR test or clinical symptoms of COVID-19, who required acute, subacute, or elective bronchoscopy, were deferred until the isolation period (average 14 days) was completed. Endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) using the oral route, and fiberoptic bronchoscopy using the nasal route were performed.

During the procedure, maneuvers that could trigger coughing were avoided.

The files of patients who underwent bronchoscopy during this period were retrospectively reviewed. Demographic data of patients, indication for the procedure, urgency of the procedure, type of procedure performed, diagnostic outcomes, and whether the patient had a history of COVID-19 were recorded. Additionally, the number of personnel involved in bronchoscopy procedures during the pandemic and whether they had a history of COVID-19 during this period were documented on the data collection form.

The urgency of the procedure was determined based on the joint consensus guidelines of the American College of

Chest Physicians (Chest) and the American Association for Bronchology and Interventional Pulmonology (AABIP) (11). According to these guidelines, bronchoscopy needs were categorized into four main groups: urgent, acute, subacute, and elective cases. Urgent bronchoscopy needs included massive hemoptysis, obstruction due to a central tumor, foreign body aspiration, and febrile neutropenic patients. Acute bronchoscopy needs included lung malignancy diagnosis, staging of malignancy, and symptomatic sarcoidosis. Subacute bronchoscopy needs included minor hemoptysis and chronic lobar atelectasis. Elective bronchoscopy needs included chronic interstitial lung diseases and chronic cough etiology.

Ethical considerations

The study received ethical approval from the Ethics Committee for Clinical Research of Akdeniz University Faculty of Medicine on January 13, 2021, with the decision number KAEK-25.

Statistical analysis

Statistical analyses of the data were performed using SPSS 19.0 software. Categorical variables were defined as frequencies and percentages, while continuous variables were defined as mean and standard deviation. The normal distribution of the data was assessed using the Kolmogorov-Smirnov test.

RESULTS

During the 9 months covering the pandemic, 250 bronchoscopy procedures were performed at the Department of Chest Diseases, Akdeniz University Faculty of Medicine Hospital. Of the patients, 187 (74.8%) were male, and the mean age of all patients was 58±13.5 years. The most common reason for the procedure was a diagnosis of lung cancer, with bronchoalveolar lavage (BAL) and EBUS-TBNA being the most frequently performed procedures. The basic characteristics of the patients are provided in Table 1.

Pre-procedural COVID-19 PCR testing was conducted for 76.8% of the patients. Among the patients who underwent COVID-19 PCR testing, the test was performed 1.95±0.3 days before the bronchoscopy procedure. No patients with a positive pre-procedural COVID-19 PCR test were included in the procedure. All patients who underwent the procedure had a negative PCR test result. No post-procedural COVID-19 cases were observed among healthcare workers or patients following the procedures. Apart from minor hemorrhages associated with the procedure, no complications were reported. The three most common diagnoses obtained as a result of the procedure were lung cancer in 98 (39.2%) of cases, other causes (interstitial lung diseases, non-specific lung infection, aspergillus) in 48 (19.2%), and sarcoidosis in 11 (4.4%). For 86 (34.4%) of the patients, the pathology result was either benign or non-diagnostic. Among patients diagnosed with lung cancer, the three most common types were small cell lung cancer in 33.6%, squamous cell lung cancer in 32.6%, and adenocarcinoma in 27.5%. For patients with non-diagnostic results requiring further investigation (51 patients), the most commonly performed procedures were thoracotomy (10 cases), mediastinoscopy (7 cases), transthoracic biopsy (6 cases), and video-assisted thoracic surgery (VATS) (5 cases). Other diagnostic procedures, such as neck lymph node dissection, brain surgery operation, axillary lymph node excision, etc., were performed on 23 patients.

Table 1. Baseline characteristics of the patients

Characteristics	Features	n	%
Sex	Male	187	74,8
Preliminary diagnosis	Lung Cancer	194	77,6
	Tuberculosis	14	5,6
	Interstitial lung disease	20	8,0
	Others	22	8,8
Procedure	Bronchial lavage	62	24,8
	Bronchoalveolar Lavage	62	24,8
	Punch biopsy	45	18,0
	Transbronchial biopsy	3	1,2
	EBUS-TBNA	77	30,8
	Argon	1	0,4
Urgency	Urgent	3	1,2
	Acute	177	70,8
	Subacute	27	10,8
	Elective	43	17,2
History of COVID-19		2	0,8
COVID-19 test (before the procedure)		192	76,8

These findings underscore the successful management of bronchoscopy procedures during the pandemic, with a low incidence of COVID-19 among healthcare personnel and no positive test results among patients. The most frequent diagnoses obtained highlight the importance of bronchoscopy in identifying and addressing various respiratory conditions, including lung cancer and interstitial lung diseases.

DISCUSSION

Bronchoscopy holds a crucial role in the diagnosis and treatment of various lung diseases, whether or not there is suspicion of COVID-19. National and international guidelines regarding bronchoscopy procedures have been published after the declaration of the COVID-19 pandemic, displaying both similarities and differences (4,5,12). In our study evaluating bronchoscopy procedures during the pandemic, it was observed that bronchoscopy performed in a unit with appropriate ventilation using PPE is a reliable procedure. Additionally, during the pandemic, the most frequently performed procedures were acute cases, with lung cancer being the leading indication for bronchoscopy.

During the initial period when COVID-19 diagnostic tests were not widely available, reports suggested that bronchoscopy for the diagnosis of lung cancer could be temporarily delayed, and patients were advised to self-quarantine for two weeks before bronchoscopy, with procedures performed using PPE for cases remaining asymptomatic after quarantine (13). In the early stages of the pandemic, when an adequate number of tests was not available, urgent and acute bronchoscopy procedures continued at our hospital. The procedure was performed by a team wearing PPE, and the room where the procedure took place was ventilated using a special negative-pressure device (Teknomar®). Unfortunately, SARS-CoV-2 RT-PCR testing could not be conducted, except for symptom inquiry and temperature measurement, before the procedure.

Subsequent guidelines from the AABIP recommended SARS-CoV-2 RT-PCR testing before the procedure, taking local conditions into account, and advised the procedural team to wear protective equipment, including face masks, gloves, and N95 masks. The same report also suggested that procedures for patients with a positive SARS-CoV-2 RT-PCR test could be postponed (11). The APSR guidelines recommended limiting the number of personnel, performing the procedure in a negative-pressure room, and using PPE while avoiding triggering the cough reflex in selected non-COVID-19 cases (4). When an adequate number of tests became available at our hospital, SARS-CoV-2 RT-PCR testing started two days before the procedure. During this process, no cases of COVID-19 were detected in patients or in the bronchoscopy team. Similar studies in the literature have demonstrated that bronchoscopy can be a safe procedure in terms of COVID-19 transmission risk for both patients and healthcare providers. This is achievable when appropriate personal protective equipment is used, and the devices undergo a two-step cleaning protocol. Additionally, performing the procedure in a negative-pressure room further enhances safety during pandemics like COVID-19 (14,15).

In a meta-analysis related to influenza, it was reported that the use of N95 masks did not result in lower influenza transmission compared to surgical masks (16). Another study emphasized that for procedures not generating aerosols, surgical masks and N95 masks have similar levels of protection, but for aerosol-generating procedures, the use of N95 masks was highlighted. In our study, during bronchoscopy, a surgical mask was used along with an N95 mask.

In the study by Mondoni et al. (17), bronchoscopies performed during the pandemic were primarily due to causes such as tracheal stenosis, hemoptysis, and atelectasis. In contrast, our study found that bronchoscopies during the pandemic were more frequently performed for conditions like lung cancer, tuberculosis, and interstitial lung diseases.

Another noteworthy finding of our study is that all pre-procedural COVID-19 tests were negative. This outcome may be attributed to the protocol of placing patients with clinical suspicion of COVID-19 in self-quarantine before the procedure. COVID-19 testing was performed at the end of the quarantine period. As a result, the tests conducted an average of 1.9 days before the procedure might have yielded negative results for COVID-19 due to the timing of the testing.

Limitations

The main limitations of our study are its single-center nature and the absence of a control group. However, considering the limited number of studies on this topic during the pandemic, we believe that our study could contribute to the literature.

CONCLUSION

In conclusion, bronchoscopy performed with protective personal equipment, in a negative-pressure room, and with pre-procedural SARS-CoV-2 RT-PCR testing is a safe diagnostic and therapeutic method, despite being an aerosol-generating procedure. We recommend performing bronchoscopy procedures in appropriate indications.

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