

COVID-19 AND COLORECTAL SURGERY: LESSONS LEARNED FROM FIRST CASES

COVID-19 VE KOLOREKTAL CERRAHİ: İLK VAKALARDAN ÖĞRENİLEN DERSLER

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ABSTRACT

Objective: This study aimed to examine the preoperative, perioperative, and postoperative colorectal surgery experience during the initial stage of the pandemic outbreak of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) later named COVID-19 disease in Turkey and to assess conditions and needs.

Material and Method: Seven early cases of colorectal disease patients are described and lessons learned from these cases are reported. All patients' preoperative workup included two nasopharyngeal polymerase chain reaction (PCR) swabs for SARS-CoV-2 taken at a three-day interval preoperatively and a thorax computerized tomography scan taken on a preoperative day.

Results: COVID-19 infection occurred before and after surgery despite all measures taken, including isolation. It became complicated to manage surgical complications such as stoma complication, surgical site infection, and small bowel obstruction. Nonetheless, while patients with underlying health conditions have a high mortality rate from COVID-19 infection, no death was observed in this small case series.

Conclusion: Medical centers must be well organized to perform colorectal surgery under pandemic conditions. Patients may initially test negative or become positive for COVID-19 at any stage during this disease outbreak. Multidisciplinary teamwork with the infectious disease department and anesthesiologists can prevent mortality from COVID-19 infection during colorectal surgery and subsequent hospitalization.

Keywords: Colorectal surgery, COVID-19 pandemic, laparoscopic surgery

ÖZET

Amaç: Bu çalışmanın amacı, sonralarda COVID-19 pandemisi olarak adlandırılan, şiddetli akut solunum sendromu koronavirüs 2 (SARS-CoV-2) pandemi salgınının ilk yayılım aşamasında ameliyat süreçlerinde kolorektal cerrahi deneyimini incelemek, koşulları ve ihtiyaçları değerlendirmektir.

Gereç ve Yöntem: Salgının erken döneminde ameliyat edilen yedi kolorektal hastalık vakası tanımlandı ve öğrenilen dersler rapor edildi. Tüm hastalarda ameliyat öncesi tarama, SARS-CoV-2 için üç gün arayla alınan iki nazofaringeal sürüntü polimeraz zincir reaksiyonu (PCR) testi ve toraks bilgisayarlı tomografi ile yapıldı.

Bulgular: İzolasyon dâhil alınan tüm önlemlere rağmen, COVID-19 enfeksiyonu ameliyattan önce de, sonra da gelişti. Hastalarda ameliyat sonrası gelişen stoma komplikasyonu, cerrahi yara yeri enfeksiyonu ve ileus gibi komplikasyonları yönetmek karmaşık hale geldi. Bununla birlikte, COVID-19 enfeksiyonu varlığında altta yatan sağlık sorunu olan hastalar için bildirilen yüksek ölüm oranına rağmen, bu küçük vaka serisinde herhangi bir hasta kaybı olmadı.

Sonuç: Pandemi koşullarında kolorektal cerrahi yapan ve sağlık hizmeti veren merkezler iyi organize edilmelidir. Hastaların COVID-19 testleri ameliyat öncesi dönemde negatif olmasına rağmen, ameliyat sürecinin herhangi bir aşamasında pozitif dönüşebilir. Multidisipliner ekip çalışması, başlıca enfeksiyon hastalıkları, anestezi ve reanimasyon ekibi ve kolorektal cerrahlar ile COVID-19 enfeksiyonundan ölümler önenebilir.

Anahtar Kelimeler: Kolorektal cerrahi, COVID-19 pandemisi, laparoskopik cerrahi

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INTRODUCTION

A severe respiratory disease caused by a new coronavirus was first identified in Wuhan, China, and reported on December 31, 2019 (1). The virus was subsequently named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and the resulting disease was named COVID-19. After a rapid spread all over the world, the World Health Organization (WHO) declared the disease a pandemic (2). As health systems became overloaded due to pandemic disease conditions, governments and hospitals all over the world, as well as in Turkey, declared a state of emergency and postponed all non-emergency surgeries to maximize health and intensive care unit capacity. Various centers and several surgical boards and societies published preliminary guidelines on the management of patients based on the possibility of COVID-19 infection (2-6). Surgeons were obliged to adapt to new hospital conditions and find the means to perform colorectal surgeries that couldn't be delayed when the pandemic lasted longer than initially expected.

MATERIAL AND METHOD

The index case of COVID-19 in Turkey was reported on March 11, 2020 (7), and on March 17, 2020, the Dean's Office of the Istanbul University, Istanbul Faculty of Medicine issued recommendations for pandemic disease conditions and postponed all elective surgeries. Patients who tested both negative and positive for COVID-19 were localized in a separate building with accessibility to a separate CT, endoscopy unit, intensive care unit, and operating rooms. A pandemic ward was organized in the main surgery building, and the emergency services building was reorganized as a virus-free location. Once it became clear that the pandemic would be of long duration, the Dean's Office decided to slowly restart elective cancer surgeries on April 21, 2020. Regardless of patient symptoms, all were tested twice for SARS-CoV-2 with polymerase chain reaction (PCR) testing and a chest CT scan before surgery.

This article describes the initial experience with seven consecutive cases of patients who underwent surgery during the COVID-19 pandemic. All of the surgeries were conducted under the recommendations for aerosol-generating procedures, such as operating rooms equipped with negative-pressure systems. This article was written following the ethical standards of the institutional review board and the principles outlined in the Helsinki Declaration and was approved. Informed consent was obtained from the patients for surgery and COVID-19 disease.

Patients

First case

A 68-year-old man who was diagnosed with proximal rectum cancer (cT2N0) underwent lower anterior resection with a diverting ileostomy on March 16, 2020. The patient's histo-

ry revealed hypertension, previous segmental small bowel resection due to emboli in the 1980s, and a prostatectomy after radiotherapy for prostate cancer in 2009. The patient developed subileus after surgery and was followed clinically with 600-1100 cc stoma discharge. He had fever on the 25th postoperative day and computerized tomography (CT) was performed to determine the cause. Though there were no symptoms of lung infection, the CT scan revealed stoma torsion related ileus and concomitant typical findings of COVID-19 pneumonia (Figure 1). The patient had a low arterial oxygen saturation rate (85-90%), which resulted in a recommendation for surgery under local anesthesia due to the low rate of extubation of COVID-19 pneumonia patients, particularly the elderly. A stoma revision was performed under local anesthesia using personal protective equipment (PPE) to avoid intubation (Figure 2). The patient was sent to the pandemic ward after surgery. Pneumonia treatment for COVID-19, consisting of hydroxychloroquine, oseltamivir, and azithromycin, was administered. The newly formed stoma had retracted from the skin but not the abdomen on the third postoperative day, and it was decided to observe the patient conservatively as an enterocutaneous fistula had formed (Figure 3). Since the general condition of the patient was not good and the nurses of the pandemic ward did not have experience in stoma care, it was too difficult to manage the stoma-related complications in the initial location. The patient was transferred to another pandemic service where nurses were familiar with stoma care. He also developed bilateral pleural effusions due to a low mobilization status at the pandemic wards and unwillingness to do pulmonary exercises. His pulmonary effusions regressed and he was discharged on the 9th postoperative day following the second surgery after 2 negative PCR test results for SARS-CoV-2.

Second case

A 54-year-old female diagnosed with ulcerative colitis and in follow-up for 18 years with the Gastroenterohepatology Unit of the Department of Internal Medicine was admitted with acute exacerbation of the condition on



Figure 1: Chest tomography of the first patient with ground-glass opacities and parenchymal consolidation bilaterally

April 7, 2020. She reported the passage of bloody diarrhea 15 to 20 times per day. A colonoscopy revealed moderate disease with a disease activity index score of 10. Following the colonoscopy, there was a positive PCR test result for the cytomegalovirus (CMV). Her CT scan had typical COVID-19 findings. She was hospitalized in the pandemic ward and treatment for ulcerative colitis, CMV colitis, and COVID-19 pneumonia was initiated. Her general condition improved after resuscitative therapy and surgery were delayed. Her second COVID-19 PCR test was negative on day 10 after admission and she was transferred to the gastroenterohepatology inpatient clinic. Despite treatment for severe colitis, her signs and symptoms flared up again and she couldn't be discharged. A total abdominal colectomy was recommended in a multidisciplinary meeting despite the COVID-19 pandemic. A total abdominal colectomy was performed using PPE. The postoperative period was uneventful, aside from pleural effusion on the right side and depletion of essential nutrients. Wernicke's encephalopathy developed, and vitamin B supplementation was administered. She was discharged on day 8 after the surgery.

Third case

The surgery of a 53-year-old man diagnosed with partially obstructing sigmoid colon cancer was initially postponed

for two months due to the pandemic. Once elective surgeries were permitted, preoperative preparation was conducted, which consisted of blood tests, a CT scan, and COVID-19 PCR testing. He had no obvious signs or symptoms of COVID-19 infection, and the CT scan was normal. The PCR test results were negative and he was admitted for laparoscopic anterior resection on May 5, 2020. The procedure was performed under the recommendations for laparoscopic surgery and was uneventful. A control COVID-19 PCR test taken the day of surgery yielded a positive result on the second postoperative day. Though his CT scan was negative for infection, he was transferred to the pandemic ward and COVID-19 treatment (hydroxychloroquine, azithromycin, and low-molecular-weight heparin) was administered. He was discharged on day five without any complications and continued COVID-19 treatment.

Uneventful four cases

The surgery of a 73-year-old man diagnosed with a partially obstructing middle rectal mass had been postponed for two weeks due to the pandemic until he was admitted with an ileus on April 7, 2020. He had no obvious signs or symptoms of COVID-19 infection, and a preoperative work-up thorax CT scan was normal. Although pelvic magnetic resonance imaging revealed a rectal



Figure 2: Surgeon worn droplet / airborne personal protective equipment



Figure 3: Stoma and wound appearance after ileostomy revision

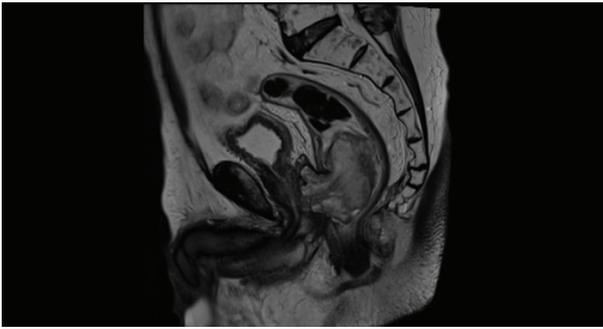


Figure 4: Pelvic magnetic resonance image of rectal mass

tumor with prostate invasion (T4bN+), the initial biopsy result was high-grade dysplasia of tubulovillous adenoma, which demonstrated an inadequate biopsy (Figure 4). A laparoscopic sigmoid colostomy with a trans-anal local biopsy was performed. Postoperative follow-up was uneventful and the patient was discharged the day after surgery. The biopsy result was confirmed as rectal cancer and neoadjuvant chemoradiotherapy was recommended. No COVID-19 infection occurred during the period of hospitalization.

The surgery of a 47-year-old woman diagnosed with middle rectal cancer (cT3N+) had been postponed due to the pandemic for one month after long-term neoadjuvant chemoradiotherapy had been completed in January. The developed stricture at the tumor site necessitated surgery. Laparoscopic low anterior resection with diverting ileostomy was performed and after an uneventful postoperative period, she was discharged on the 7th postoperative day.

The third uneventful case was a 24-year-old man diagnosed with familial adenomatous polyposis and distal rectum cancer (cT4N+). The patient completed long-term neoadjuvant chemoradiotherapy in January and surgery was delayed. A laparoscopic proctocolectomy was performed after the Deans' Office decision to restart surgeries. He was discharged on the 5th day post surgery without complications.

The last case was a 73-year-old woman diagnosed with distal rectum cancer (cT3N-) involving the anal sphincter. She had a history of pelvic irradiation due to cervix carcinoma in 1993. Laparoscopic Miles surgery was performed. She had an uneventful postoperative period and was discharged on the 9th day after surgery.

DISCUSSION

The emergence of SARS-CoV-2 in Wuhan, China, and the rapid spread of the COVID-19 disease in just a few weeks led to strain and deterioration in health systems all over the world. The WHO declared the disease a pandemic

and a public health problem of international concern (1). Governments had to implement extraordinary measures to control the outbreak. Hospitals had to suspend outpatient clinic activity and postpone all elective surgeries to reallocate healthcare providers, particularly anesthesiologists and nurses. Surgical services were gradually permitted and reserved for pandemic patients, and surgical ward staff members were employed in pandemic wards. Colorectal surgeons were unable to perform as many diagnostic and surgical procedures as normal due to staff and beds being reserved for potential COVID-19 patients. The outbreak created emergency conditions, but colorectal diseases have their priorities regardless of the patient's COVID-19 status. The recommendation of postponing treatment for early-stage rectal cancer seems appropriate, but there is a debate in cases of advanced-stage colorectal cancer. The high recurrence rate after the prolongation of chemotherapy and increased cost of delayed surgery has previously been reported (8, 9). Prolongation of chemotherapy may also impair the patient's immune system, increasing the risk for COVID-19 infection.

Adequate and appropriate healthcare should be provided with the necessary adaptation. Given the risk of spreading the disease, several surgical and anesthesiology societies announced recommendations for operating room staff (3-6, 10-14). A known infected patient is the main source; however, asymptomatic cases have also been described (15, 16). While some viruses have been isolated in evaporating body fluids, the current knowledge of SARS-CoV-2 is still incomplete. There is, as yet, no evidence of vertical transmission (17-22). Negative-pressure operating rooms and PPE are recommended. There is debate about whether laparoscopy should be avoided or can be performed with adequate precautions (23, 24). Yu et al. recommended the possibility of laparoscopy for colorectal disease patients during outbreak conditions (25). We experienced no case of an operating room staff member testing positive for COVID-19 after these surgeries.

Preoperative risk stratification and other appropriate measurements to minimize the possibility of the spread of infection must be taken. In our clinic, patients, as well as any accompanying person, were obliged to wear a surgical face mask, since they could be asymptomatic on admission. Patients were also recommended to isolate for a week before surgery (26). Healthcare providers took appropriate precautions and used PPE. Li et al. reported high negative real-time PCR test results in clinically positive patients (27). This is why they combined an additional chest CT scan as a more sensitive measure to evaluate the presence of COVID-19 (28). Patients were considered eligible for surgery after two negative PCR results and no positive sign on a chest CT scan. Despite having followed

all available barrier precautions for adaption, three of our seven patients became COVID-19 positive before, during the surgery, or in the postoperative period. In the case of infection before surgery, the circumstances are easier to predict. Once seroconversion of COVID-19 is detected, conventional methods and procedures are used. In the case of perioperative or postoperative infection, we introduced immediate eradication treatment even if the patient was clinically asymptomatic, according to the guidelines of the pandemic team of the Istanbul University, Istanbul Faculty of Medicine. Patients were transferred to the pandemic ward for follow-up. The question that needs to be answered is how they got the virus. Only our first case was followed up for a long period, with delayed surgery due to subileus because the stoma function tended to change. It was discovered during the follow-up period that the neighboring trauma patient in the ward was COVID-19 positive, and could therefore be the origin of infection for this patient. The preoperatively infected patient (case 3) was an asymptomatic carrier. Fecal virus tests may be integrated in the preoperative workup for asymptomatic carriers that may have negative nasopharyngeal PCR while being fecal test positive (29, 30).

Surgery patients require specialized postoperative care; however, adequate respiratory physiotherapy, early mobilization, and nursing after surgery became problematic as a result of the pandemic. Mobilization was restricted according to isolation guidelines, and bowel movement was delayed to a median of the third day, with the obvious late passage of gas or feces on the fifth day in the case series. The available nurses often had little experience with incentive spirometry and other exercises used in conditions of restricted pulmonary function. Despite precautions, 2 (28.6%) of our patients developed atelectasis with pleural effusion but fortunately did not require intervention. Superinfection of COVID-19 over postoperative atelectasis has been reported to lead to deterioration in the patient's condition and possibly cause death (31). We also experienced problems regarding stoma nursing because of the pandemic-related scheduling of the stoma therapy team. This naturally exacerbated the problem for patients in need of stoma nursing. Stoma therapy and care had to be conducted by surgeons instead of stoma therapy nurses. Also, patient isolation after a COVID-19 diagnosis disrupted continuity of proper stoma care. At present, it seems that the management of patients who already require more complex wound and stoma care will be more difficult during this pandemic.

CONCLUSIONS

Our short-term experiences revealed that despite observing all barrier precautions and isolation procedures, hospitals will be vulnerable to COVID-19 until the disease can be eradicated. Patient surgery and discharge may be

delayed. Some patients may become COVID-19 positive while in the hospital after surgery. Asymptomatic patients who are infected with COVID-19 in the perioperative period may only be detected after surgery as the disease signs coincide with the window period. Given the current conditions and expected second or third waves of the pandemic, we believe that colorectal surgery services will need to implement significant new planning and arrangements for the preoperative preparation, postoperative surgical care, and delivery of complicated wound and stoma care.

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REFERENCES

1. Lai CC, Shih TP, Ko WC, Tang HJ, Hsueh PR. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and coronavirus disease-2019 (COVID-19): The epidemic and the challenges. *Int J Antimicrob Agents* 2020;55(3):105924. [CrossRef]
2. Ghebreyesus T. WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020. <https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19-11-march-2020> (Last accessed March 29, 2020)

3. Pryor A. SAGES and EAES Recommendations Regarding Surgical Response to COVID-19 Crisis. Available from URL: <https://www.sages.org/recommendations-surgical-response-covid-19/> (Last accessed 21 January 2021)
4. Maintaining Trauma Center Access and Care during the COVID-19 Pandemic: Guidance Document for Trauma Medical Directors. Available from URL: <https://www.facs.org/quality-programs/trauma/maintaining-access> (Last accessed 21 January 2021)
5. U.S Department of Defense (DoD). COVID-19 Practice Management Guide V10. Available from URL: <https://health.mil/Reference-Center/Technical-Documents/2020/03/24/DoD-COVID-19-Practice-Management-Guide> (Last accessed 21 January 2020)
6. American College of Surgeons (ACS). COVID-19 Guidelines for Triage of Emergency General Surgery Patients. (Updated December 8, 2020) Available from URL: <https://www.facs.org/covid-19/clinical-guidance/elective-case/emergency-surgery>. Last accessed 21 January 2021
7. Republic of Turkey, Ministry of Health, Public Health General Directorate, COVID-19 Guide. Available from URL: https://hsgm.saglik.gov.tr/depo/covid19/Ingilizce/Rehber/COVID-19_Rehberi__Genel_bilgiler_epidemiyoji_ve_tani_8.06.2020_eng.pdf (Last accessed 8 May 2020)
8. Kucejko RJ, Holleran TJ, Stein DE, Poggio JL. How Soon Should Patients With Colon Cancer Undergo Definitive Resection? *Dis Colon Rectum* 2020;63(2):172-182. [CrossRef]
9. Delisle M, Helewa RM, Ward MAR, Hochman DJ, Park J, McKay A. The Association Between Wait Times for Colorectal Cancer Treatment and Health Care Costs: A Population-Based Analysis. *Dis Colon Rectum* 2020;63(2):160-171. [CrossRef]
10. Griffin SM, Alderson D, Taylor J, Mealy K. Updated Intercollegiate General Surgery Guidance on COVID-19. Available from: URL: <https://www.acpgbi.org.uk/content/uploads/2020/03/Updated-Intercollegiate-General-Surgery-Guidance-on-COVID-19-final-with-logos13.pdf> (Last accessed 21 January 2021)
11. Karaca AS, Ozmen MM, Uçar AD, Yasti AÇ, Demir S. General Surgery Operating Room Practice in Patients with COVID-19. *Turk J Surg* 2020;36(1):i-v. [CrossRef]
12. Kamer E, Çolak T. What to Do When A Patient Infected With COVID-19 Needs An Operation: A Pre-surgery, Peri-surgery and Postsurgery Guide. *Turk J Colorectal Dis* 2020;30:1-8. [CrossRef]
13. Coccolini F, Perrone G, Chiarugi M, Di Marzo F, Ansaloni L, Scandroglio I, et al. Surgery in COVID-19 patients: operational directives. *World J Emerg Surg* 2020;15(1):25. [CrossRef]
14. Wax RS, Christian MD. Practical recommendations for critical care and anesthesiology teams caring for novel coronavirus (2019-nCoV) patients. *Can J Anaesth* 2020;67(5):568-76. [CrossRef]
15. Bai Y, Yao L, Wei T, Tian F, Jin DY, Chen L, et al. Presumed Asymptomatic Carrier Transmission of COVID-19. *JAMA* 2020;323(14):1406-7. [CrossRef]
16. Wei WE, Li Z, Chiew CJ, Yong SE, Toh MP, Lee VJ. Presymptomatic Transmission of SARS-CoV-2 - Singapore, January 23-March 16, 2020. *MMWR Morb Mortal Wkly Rep* 2020;69(14):411-5. [CrossRef]
17. Chen H, Guo J, Wang C, Luo F, Yu X, Zhang W, et al. Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women: a retrospective review of medical records. *Lancet* 2020;395(10226):809-15. Erratum in: *Lancet* 2020;395(10229):1038. Erratum in: *Lancet* 2020;395(10229):1038. [CrossRef]
18. Kwak HD, Kim SH, Seo YS, Song KJ. Detecting hepatitis B virus in surgical smoke emitted during laparoscopic surgery. *Occup Environ Med* 2016;73(12):857-63. [CrossRef]
19. Gloster HM Jr, Roenigk RK. Risk of acquiring human papillomavirus from the plume produced by the carbon dioxide laser in the treatment of warts. *J Am Acad Dermatol* 1995;32(3):436-41. [CrossRef]
20. Hensman C, Baty D, Willis RG, Cuschieri A. Chemical composition of smoke produced by high-frequency electrosurgery in a closed gaseous environment. An in vitro study. *Surg Endosc* 1998;12(8):1017-9. [CrossRef]
21. Johnson GK, Robinson WS. Human immunodeficiency virus-1 (HIV-1) in the vapors of surgical power instruments. *J Med Virol* 1991;33(1):47-50. [CrossRef]
22. Mowbray NG, Ansell J, Horwood J, Cornish J, Rizkallah P, Parker A, et al. Safe management of surgical smoke in the age of COVID-19. *Br J Surg* 2020;107(11):1406-13. [CrossRef]
23. Wexner SD, Cortés-Guiral D, Gilshtein H, Kent I, Raymond MA. COVID-19: impact on colorectal surgery. *Colorectal Dis* 2020;22(6):635-40. [CrossRef]
24. Angelos G, Dockett AG, Gachabayov M, Latifi R, Bergamaschi R. Emergency Colorectal Surgery in a COVID-19 Pandemic Epicenter. *Surg Technol Int* 2020;36:18-21.
25. Yu GY, Lou Z, Zhang W. (Several suggestion of operation for colorectal cancer under the outbreak of Corona Virus Disease 19 in China). *Zhonghua Wei Chang Wai Ke Za Zhi* 2020;23(3):9-11.
26. Day M. Covid-19: identifying and isolating asymptomatic people helped eliminate virus in Italian village. *BMJ* 2020;368:m1165. [CrossRef]
27. Li Y, Yao L, Li J, Chen L, Song Y, Cai Z, et al. Stability issues of RT-PCR testing of SARS-CoV-2 for hospitalized patients clinically diagnosed with COVID-19. *J Med Virol* 2020;92(7):903-8. [CrossRef]
28. Bernheim A, Mei X, Huang M, Yang Y, Fayad ZA, Zhang N, et al. Chest CT Findings in Coronavirus Disease-19 (COVID-19): Relationship to Duration of Infection. *Radiology* 2020;295(3):200463. [CrossRef]
29. Li J, Feng J, Liu TH, Xu FC, Song GQ. An infant with a mild SARS-CoV-2 infection detected only by anal swabs: a case report. *Braz J Infect Dis* 2020;24(3):247-9. [CrossRef]
30. Chen L, Lou J, Bai Y, Wang M. COVID-19 Disease With Positive Fecal and Negative Pharyngeal and Sputum Viral Tests. *Am J Gastroenterol* 2020;115(5):790. [CrossRef]
31. Li YK, Peng S, Li LQ, Wang Q, Ping W, Zhang N, et al. Clinical and Transmission Characteristics of Covid-19 - A Retrospective Study of 25 Cases from a Single Thoracic Surgery Department. *Curr Med Sci* 2020;40(2):295-300. [CrossRef]