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Original Research Article

Prevalence of SARS-CoV-2 infection in asymptomatic preoperative patients

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ABSTRACT

Background: Surgeries were performed on emergency and trauma patients as well as oncology patients in many centres during the pandemic period. Screening of asymptomatic preoperative patients is very important not only in protecting healthcare personnel but also in preventing nosocomial infections and in protecting patients with deficient or suppressed immune systems. The aim of the current study was to retrospectively evaluate the prevalence of SARS-CoV-2 infection in asymptomatic preoperative patients during the pandemic period.
Methods: A total of 3773 asymptomatic preoperative patients among the 23385 patients were evaluated retrospectively with Rt-qPCR test. The DS CORONEX COVID-19 PCR test (Ver.2.0, DS Bio and nano technology, Turkiye) kit used for the RT-qPCR. PCR test targets the N and Orf1ab gene region specific for SARS-CoV-2.
Results: SARS-CoV-2 positivity was significantly lower in the preoperative patient group than in COVID-19 positive patients whose routine test results were positive for other reasons (2.3% vs 23.1%; $p<0.0005$). Distribution of preoperative SARS-CoV-2 positive patients according to clinics were 7.1% thoracic surgery, 3.7% neurosurgery, 3.5% otolaryngology, 2.6% general surgery and 2.4% urology clinic, respectively.
Conclusions: SARS-CoV-2 positivity was lower in the preoperative patients but this rate never excludes pre-screening of asymptomatic preoperative patients. Applying pre-screening tests to asymptomatic preoperative patients is significant in protecting healthcare personnel and patients with deficient or suppressed immune systems and also preventing nosocomial infections.

Keywords: SARS-CoV-2, Preoperative, Asymptomatic, Thoracic surgery

INTRODUCTION

Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) infection still maintains its clinical importance. Emerging new variants threaten immunocompromised people and vulnerable populations. According to world health organization reports, more than 769 million cases and nearly seven million deaths have occurred in different age groups worldwide due to SARS-CoV-2 infection in the COVID-19 pandemic.[1]

Globally, various confinement measures have been implemented to stop the spread of SARS-CoV-2 infection during the pandemic. One of these restrictive measures applied in our country in March 2020 was the suspension of elective surgery.[2] However, surgeries that could not be postponed were performed on emergency and trauma patients as well as oncology patients in many centres during the pandemic period. The process and management of elective surgical operations differed between health centres.[3-6] Evaluation of preoperative diagnostic tests have been an important point in reducing

the risk of asymptomatic transmission to healthcare personnel during the COVID-19 pandemic period. In the early period of the pandemic, radiological tests (chest X-ray or chest computed tomography) and microbiological tests (SARS-CoV-2 reverse transcription polymerase chain reaction (RT-qPCR) and antigen tests) were performed by researchers in screening preoperative patients.[7-9] Among these diagnostic tests, the real-time polymerase chain reaction (RT-qPCR) test has been recommended by the World Health Organization as the primary diagnostic test in detecting asymptomatic and symptomatic patients with suspected COVID-19.[10] RT-qPCR test become a common diagnostic test used all over the world. Screening of asymptomatic preoperative patients is very important not only in protecting healthcare personnel but also in preventing nosocomial infections and in protecting patients with deficient or suppressed immune systems. It has been emphasized in many studies that the presence of this infection in preoperative patients should not be ignored to prevent the transmission of hospital-acquired SARS-CoV-2 infection during the pandemic period.[11-13]

The aim of current study was to retrospectively evaluate prevalence of SARS-CoV-2 infection in asymptomatic preoperative patients during the pandemic period.

METHODS

In this study, the results of Rt-qPCR assay for detection of SARS-CoV-2 infection in asymptomatic preoperative patients at Mersin university hospital were retrospectively evaluated. A total of 3773 asymptomatic preoperative patients among 23385 patients with suspected COVID-19 who underwent Rt-qPCR test between 25/02/2022 and 20/05/2022 were retrospectively included in the study.

RT-qPCR test

For COVID-19 laboratory diagnosis, nasopharyngeal and oropharyngeal swab specimens collected from preoperative patients were placed in tubes containing viral nucleic acid buffer (vNAT). RT-qPCR test of the viral RNAs isolated with vNAT solution was performed. The DS CORONEX COVID -19 PCR test (Ver.2.0, DS bio and nano technology, Turkiye) kit used for the RT-qPCR. PCR test targets the N and Orf1ab gene region specific for SARS-CoV-2. RT-qPCR assays were performed using Qiagen Rotor-Gene with manufacturer's recommended protocol. All PCR reactions were performed using the Q5plex real-time PCR instrument.

Statistical analysis

Statistical analyses were performed using the statistical software IBM SPSS (version 20, Armonk, NY: IBM Corp). The chi-square test and Fisher's exact test were used to analyse the categorical variables in the study. P cutoff value for statistical significance was taken as 0.05.

RESULTS

Of the 23385 COVID-19 suspected patients tested during the study period, 3773 were patients who underwent SARS-CoV-2 testing prior to surgery. As a result of RT -qPCR performed on 23385 COVID-19 patients suspected of having SARS-CoV-2 infection, 4593 (19.7%) of the patients were found to be positive. Among the SARS-CoV-2 positive patients, 86 (2.3%) were found to be preoperative. Of the 3773 asymptomatic preoperative patients included in the study, 1946 (51.6%) were women and 1827 (48.4%) were men. Statistical analysis showed that there was no significant difference between the genders (p=0.88). The mean age of the preoperative asymptomatic patients was 47.5±22.5. There was no statistically significant difference between patients over 18 years (89.7%) and under 18 years (10.3%) (p=0.163) (Table 1). Distribution of preoperative SARS-CoV-2 positive patients according to clinics were 7.1% (n=7) thoracic surgery, 3.7% (n=7) neurosurgery, 3.5% (n=16) otolaryngology, 2.6% (n=12) general surgery and 2.4% (n=11) urology clinic, respectively (Table 2). There was a statistically significant difference between the clinics (p=0.014) and the highest rate of SARS-CoV-2 positive preoperative patients was in the thoracic surgery clinic (7.1%, p=0.006). Of the asymptomatic preoperative patients, 30% were inpatients and 70% were outpatients. Among these patients, the rate of SARS-CoV-2 positive outpatients was 1.9%, while this rate was 3.2% inpatients, and a statistically significant difference was found between inpatients and outpatients (p=0.015), 98.2% of asymptomatic preoperative patients were elective surgery patients and 1.8% were emergency surgery patients. Among these patients, the rate of emergency surgery patients positive for SARS-CoV-2 infection was 10.1%, whereas the rate of elective surgery patients was 2.1%. There was a statistically significant difference between the two groups (p=0.001).

As a result of study, it was found that SARS-CoV-2 positivity was significantly lower in pre-op patient group than in COVID-19 patients whose routine test results were positive for other reasons (2.3%/ 23.1%; p<0.0005).

Table 1: Positivity rates of asymptomatic preoperative SARS-CoV-2 infection positive patients according to demographic data.

Factors	N (%)	SARS-CoV-2 RT-qPCR positivity		P value
		N	%	
Gender				
Female	1946 (51.6)	45	2.3	0.888
Male	1827 (48.4)	41	2.2	

Continued.

Factors	N (%)	SARS-CoV-2 RT-qPCR positivity		P value
		N	%	
Age (in years)				
<18	390 (10.3)	5	1.3	0.163
≥18	3383 (89.7)	81	2.4	
Admission				
Outpatient	2642 (70)	50	1.9	0.015
Inpatient	1131 (30)	36	3.2	
Test				
Emergency	69 (1.8)	7	10.1	0.001
Normal	3704 (98.2)	79	2.1	
Total	3773 (100)	86	2.3	

Table 2: Asymptomatic preoperative patients clinics and RT-qPCR results.

Clinics	Negative	Positive	Percentages (%)	Total
Thoracic surgery	91	7	7.1	98
Neurosurgery	183	7	3.7	190
Otolaryngology	445	16	3.5	461
General surgery	441	12	2.6	453
Urology	452	11	2.4	463
Gynecology	557	12	2.1	569
Orthopedics-traumatology	394	8	2.0	402
Plastic surgery	220	3	1.3	223
Ophthalmology	676	8	1.2	684
Pediatric surgery	103	1	1.0	104
Cardiovascular surgery	125	1	0.8	126
Total	3687	86	2.3	3773

DISCUSSION

In the early days of the pandemic, there was insufficient data on the prevalence and classification of SARS-CoV-2 infection in the preoperative patient group. In addition, it remained unclear whether non-urgent surgeries should be postponed in all patients with confirmed or suspected SARS-CoV-2 infection during pandemic period. Besides, researchers have also reported that risk of postoperative complications and mortality is high in preoperative patients with severe SARS-CoV-2 infection.[14]

The high contagiousness of SARS-CoV-2 infection, the long incubation period and the non-specific symptoms at the onset of the disease have led to difficulties in diagnosing COVID-19 in preoperative asymptomatic patients and patients in the incubation period. Since the non-existing of COVID-19 symptoms in the preoperative asymptomatic patient group does not exclude SARS-CoV-2 infection, routinely used RT-qPCR tests are important for both healthcare personnel and immunocompromised patients to prevent the transmission of SARS-CoV-2 infection.

In the later stages of the pandemic, the number of surgical operations performed declined due to the increasing demand for hospitalization for patients with COVID-19 in healthcare institutions.[5,15] Due to recurrent peaks in the pandemic, the decline in elective surgical procedures in particular continued, and long waiting times affected patient prognosis. Therefore, RT-qPCR testing was primarily used to detect SARS-CoV-2 infection when planning elective surgeries in many healthcare facilities during the pandemic.

The positivity rate in asymptomatic preoperative patients varies in different studies performed in the literature. Iglesias et al reported a positivity rate of the SARS-CoV-2 RT -qPCR test of 0.27% in 363 preoperative patients, whereas Al-Khersan et al reported 0.88% in 114 patients.[4,16] In one multicenter study researchers reported this rate as 7.8% in asymptomatic preoperative patients.[11] However, in another study, this rate was reported as 0.474%, and it was suggested that this was related to the low rate of COVID-19 positive patients in the region where the study was conducted.[17] In addition, several studies have reported RT -qPCR test positivity rates in the asymptomatic preoperative pediatric patient population ranging from 0.93% to 2.56%.[18-20] Moreover, in a meta-analysis study evaluating preoperative asymptomatic patients have been reported that the positivity for SARS-CoV-2 infection ranged from 0.00% to 9.49% and the overall percentage was 0.76%.[21] In our study, Rt-qPCR test positivity in the asymptomatic preoperative patient group was determined to be lower (2.3%) than the other patient group (23.1%) who were routinely Rt-qPCR positive for other reasons.

Islam et al reported a positivity rate of SARS-CoV-2 RT-qPCR test of 12.5% in 514 preoperative asymptomatic

orthopedic patients.[22] In addition to this, researchers detected that the age and gender ratios in the SARS-CoV-2 infection-positive asymptomatic preoperative patient group showed a statistically significant difference from the negative group. According to this, they reported that the higher positivity rates were determined in the younger age and female patients. In contrast to this study, no significant difference was found between SARS-CoV-2 infection positivity and age and gender in our study (p=0.88; p=0.163). Nevertheless, Muhammed et al reported positive SARS-CoV-2 infection in 14 (9.3%) of 150 asymptomatic preoperative ophthalmology patients.[23] Similar to our study, they did not find a statistically significant relationship between age groups and gender in the group of COVID-19 positive asymptomatic preoperative patients.

When the clinics where asymptomatic preoperative patients positive for SARS-CoV-2 infection were evaluated, it was determined that there was a statistically significant difference between the departments in the current study. The clinic with the highest rate of positive preoperative patients was determined to be thoracic surgery (7.1%, p=0.006). Similar to our study the rate of SARS-CoV-2 positive preoperative asymptomatic patients admitted to thoracic surgery was reported as 9.37%.[24] The researchers suggested that this could be due to exacerbation of a previous lung infection as a result of surgical trauma and general anesthesia, which increases susceptibility to SARS-CoV-2 infection. Another study reported that elderly lung cancer patients may be more likely to develop COVID-19 pneumonia before surgery due to weakened immune system and decreased physical resistance.[25] We supposed that the incidence of SARS-CoV-2 infection in patients from this department was high due to the routine control measures performed in thoracic surgery patients before surgery in the current study.

The prevalence of positive SARS-CoV-2 infection in asymptomatic preoperative patients varies in the different regions and health facilities of the studies conducted. This may be due to the practicability of routine pre-screening tests, demographic characteristics of the patients and co-morbid factors. In the case of a similar pandemic in asymptomatic preoperative patients, applying RT-qPCR pre-screening tests will help control the epidemic by minimizing the risk of transmission of SARS-CoV-2 infection, especially to healthcare personnel. Management of preoperative asymptomatic COVID-19 patients requires a multidisciplinary approach. In particular, the prevalence of preoperative asymptomatic COVID-19 cases has implications for patient safety, healthcare staff protection, and surgical planning. The wide range of reported prevalence rates demonstrates the importance of standardized testing protocols and patient screening. Accurate estimation of prevalence is critical for making informed decisions about resource allocation, infection control measures, and delays in operations.

Limitations

This study was single-centre and included patients over a short period of time.

CONCLUSION

Rt-qPCR test positivity in the asymptomatic preoperative patient group was determined as 2.3% in this study. Although SARS-CoV-2 positivity was lower in the preoperative patients, this rate never excludes pre-screening of asymptomatic preoperative patients. We suggest that applying pre-screening tests to asymptomatic preoperative patients is significant in protecting healthcare personnel and patients with deficient or suppressed immune systems and also preventing nosocomial infections.

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REFERENCES

1. World Health Organization. Available at: https://covid19.who.int. Accessed on 10 August 2023.
2. T.R. Ministry of Health General Directorate of Public Health. Covid-19 (SARS-CoV-2 Infection) Guide. Scientific Committee Study. 16 March 2020. Available at: https://covid19rehberi.com/t-c-saglik-bakanligi-saglik-kurumlarina-yonelik-alinacak-uygulamalarin-belirlenmesi-16-03-2020-20-03-2020-23-03-2020. Accessed on 10 August 2023.
3. Yasmin F, Bin Zafar MD, Salman A, Farooque U, Asghar MS, Khan AA, et al. Exploring the impact of the COVID-19 pandemic on pediatric surgical services. Minerva Pediatr (Torino). 2021;73(5):460-6.
4. Al-Khersan H, Kalavar MA, Tanenbaum R, Lazzarini TA, Patel NA, Yannuzzi NA, et al. Emergent Ophthalmic Surgical Care at a Tertiary Referral Center During the COVID-19 Pandemic. Am J Ophthalmol. 2021;222:368-372.
5. Pujol R, Rivas E, Gracia I, Caballero A, Matute P, Cuñat T, et al. Preoperative triage to detect SARS-CoV-2 infection in surgical patients: lessons learned for resuming surgery. Surg Today. 2023;53(6):709-17.
6. Lippi G, Sanchis-Gomar F, Henry BM. Negative preoperative RT-PCR screening is no guaranty of no SARS-CoV-2 infection. Rev Esp Anestesiol Reanim (Engl Ed). 2023;70(2):119-20.
7. Duś-Ilnicka I, Szymczak A, Małodobra-Mazur M, Tokarski M. Role of Laboratory Medicine in SARS-CoV-2 Diagnostics. Lessons Learned from a Pandemic. Healthcare (Basel). 2021;9(7):915.

8. Randriamahazo TR, Andrianarivelo AM, Rakotoarivo AT, Raheritiana TM, Rakotovao LA, Randriamanantany ZA, et al. Evaluation of antigen-based rapid detection test for the diagnosis of SARS CoV-2 in low-income countries. J Virol Methods. 2022;300:114409.
9. Puylaert CAJ, Scheijmans JCG, Borgstein ABJ, Andeweg CS, Bartels-Rutten A, Beets GL, et al. Yield of Screening for COVID-19 in Asymptomatic Patients Before Elective or Emergency Surgery Using Chest CT and RT-PCR (SCOUT): Multicenter Study. Ann Surg. 2020;272(6):919-24.
10. World health Organization. Laboratory testing for 2019 novel coronavirus (2019-nCoV) in suspected human cases. Available at: https://www.who.int/publications/i/item/10665-331501. Accessed on 22 August 2023.
11. Fiorelli S, Menna C, Piccioni F, Zuanetti G, Valenza F, Rispoli M, et al. Preoperative SARS-CoV-2 Infection Screening before Thoracic Surgery during COVID-19 Pandemic: A Multicenter Retrospective Study. Int J Clin Pract. 2023;2023:8993295.
12. Ota I, Asada Y. The impact of preoperative screening system on head and neck cancer surgery during the COVID-19 pandemic: Recommendations from the nationwide survey in Japan. Auris Nasus Larynx. 2020;47(4):687-91.
13. Arslanoğlu E, Işık ME, Kara KA, Yigit F, Çine N, Tunçer E, et al. Preoperative monocytosis is predictable at diagnosis for RT-PCR negative COVİD-19 paediatric cardiac surgery patients. Cardiol Young. 2022;32(6):883-7.
14. Aminian A, Safari S, Razeghian-Jahromi A, Ghorbani M, Delaney CP. COVID-19 Outbreak and Surgical Practice: Unexpected Fatality in Perioperative Period. Ann Surg. 2020;272(1):e27-9.
15. COVID Surg Collaborative. Elective surgery cancellations due to the COVID-19 pandemic: global predictive modelling to inform surgical recovery plans. Br J Surg. 2020;107(11):1440-49.
16. Albendín-Iglesias H, Mira-Bleda E, Roura-Piloto AE, Hernández-Torres A, Moral-Escudero E, Fuente-Mora C, et al. Usefulness of the epidemiological survey and RT-PCR test in pre-surgical patients for assessing the risk of COVID-19. J Hosp Infect. 2020;105(4):773-5.
17. Shoff HW, Huecker M, Davis H, Smith JW. Very Low Rate of Positive COVID Infections (<0.5%) on Preoperative Screening in the Elective Procedure Population. Am Surg. 2023;89(4):1216-7.
18. Colas AE, Azale M, Ayanmanesh F, Tran C, Papapanayotou L, Assaker R, et al. Mandatory preoperative SARS-CoV-2 infection screening policies for paediatric surgery. Br J Anaesth. 2021;126(5):e182-4.
19. Lin EE, Blumberg TJ, Adler AC, Fazal FZ, Talwar D, Ellingsen K, et al. Incidence of COVID-19 in Pediatric Surgical Patients Among 3 US Children's Hospitals. JAMA Surg. 2020;155(8):775-7.
20. Souza CDS, Saruhashi T, Lima MFN, Oliveira Junior FI, Cumino DO. A retrospective report on the preoperative mandatory SARS-COV-2 infection screening in a single pediatric center. Is it time to stop testing our patients? Rev Col Bras Cir. 2023;49:e20223433.
21. De Bock E, Filipe MD, Simmermacher RKJ, Kroese AC, Vriens MR, Richir MC. Meta-analysis of COVID-19 prevalence during preoperative COVID-19 screening in asymptomatic patients. BMJ Open. 2022;12(7):e058389.
22. Samiul Islam M, Parvin S, Mahbubur Rahman Khan M, Hossain GMJ, Zahiruddin AKM, Alam MJ, et al. Asymptomatic RT-PCR positive COVID-19 patients in orthopaedic pre-operative evaluation during the peak of the second wave. Clin Infect Pract. 2022;13:100131.
23. Muhammad RC, Bisiriyu OE. Prevalence of COVID-19 Infection Among Asymptomatic Ophthalmic Surgical Patients Undergoing Ophthalmic Procedures at University of Abuja Teaching Hospital, Gwagwalada, Abuja. J West Afr Coll Surg. 2021;11(2):14-8.
24. Hou J, Wan X, Shen Q, Zhu J, Leng Y, Zhao B, et al. COVID-19 infection, a potential threat to surgical patients and staff? A retrospective cohort study. Int J Surg. 2020;82:172-8.
25. Liang W, Guan W, Chen R, Wang W, Li J, Xu K, et al. Cancer patients in SARS-CoV-2 infection: a nationwide analysis in China. Lancet Oncol. 2020;21(3):335-7.

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