

## Importance of pre-operative COVID-19 screening test in elective surgeries

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### ABSTRACT

**Background and Objectives:** Since the COVID-19 pandemic initiation, more than 28 million elective surgeries were postponed with a cancellation rate of 72.3%. However, studies suggested that the patient treatment should be conducted within 12 weeks of diagnosis because delay in treatment might have had adverse impacts on patients' health status, prognosis, and pathologic stage. Hence, the current study aimed to assess the importance of a pre-operative COVID-19 screening test for the patients were candidates for elective surgery.

**Materials and Methods:** This cross-sectional study was conducted on 141 patients who were candidates for any type of elective surgeries or cesarean section at a tertiary university-based hospital, between June 2020, and September 2020.

**Results:** The mean age of participants was  $41.38 \pm 11.66$  years. Of them, 91.5% were women and 8.5% were men. The COVID-19 polymerase chain reaction (PCR) screening tests were positive in 12 (8.5%) patients. From whose PCR tests were positive, only five people (less than half) had symptoms of COVID-19 such as fever (three patients), a distinctive smell (two patients), and cough (one patient). Suspected exposure to COVID-19 was reported in four of them.

**Conclusion:** In this study, we found that more than half of PCR positive COVID-19 patients were asymptomatic. Therefore, to have a safe hospital environment, and improve patient health outcomes, the COVID-19 screening test should be applied before any interventions.

**Keywords:** COVID-19 testing; Asymptomatic infections; Mass screening; Surgery; Morbidity; Mortality

### INTRODUCTION

Since the onset of the coronavirus disease of 2019 (COVID-19) in Wuhan, China; it has spread to many countries and resulted in high rates of morbidity and mortality. The COVID-19 infected patient presentations may differ from asymptomatic disease to severe pneumonia with acute respiratory failure, sepsis, and even death. Older age, male gender, and the underlying disease presence are related to the intensive infection (1-4).

Not surprisingly, from the initiation time of the COVID-19 pandemic, all elective procedures were

cancelled. For instance, only during the first 12 weeks of this pandemic, it was estimated that more than 28 million elective surgeries were postponed with a cancellation rate of 72.3% (5).

Surgical interventions of patients with neoplastic diseases were widely declined based on the stage of disease, the patient's age, and comorbidities, as well as the number of available beds. Emergency surgeries only were performed with the minimum number of surgical staff with self-protection wearing and proper ventilation of the operating room (6).

However, studies suggested that the patient treatment should be conducted within 12 weeks of di-

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agnosis because delay in treatment might have had adverse impacts on patients' health status, prognosis, and pathologic stage (7-9). On the other hand, there was concern about the rapid spread of SARS-CoV-2 to other people such as hospital staff (10, 11). In fact, the novel COVID-19 pandemic is considered a major challenge in surgical interventions.

To counter this problem, the pre-operative COVID-19 screening test with PCR has been used routinely in some countries. COVID-19 infected patient detection has some considerable advantages such as reducing post-operative complications, virus transition, and health worker infections, as well as improvement in hospital performance (12, 13).

In contrast, because of the high cost, the small window of diagnostic application and high false positive and negative of PCR test, its broad usage remains controversial (12). Hence, the current study aimed to assess the importance of a pre-operative COVID-19 screening test for the patients were candidates for elective surgery.

## MATERIALS AND METHODS

This single-center, cross-sectional study included patients who were candidates for any type of elective operation or cesarean section at a tertiary university-based hospital, Yas Hospital, between June 21, 2020, and September 21, 2020.

The sampling method was census and all the patients with study inclusion criteria enrolled in the study. Inclusion criteria were age more than 18 years, candidate for any type of elective operation including gynecological, orthopedic, neurosurgery, otolaryngology, and any general surgery at the time of our study. Patients who withdrew to participate at any time during the study were excluded from the study.

A detailed history of medical information and the initial vital sign of all the participants were recorded. Also for all patients, 48 to 72 hours before the surgery, complete blood count (CBC), blood group, c-reactive protein test (CRP), and nasopharyngeal PCR test were requested. In some cases, a chest x-ray was requested by the anesthesiologists.

Nasopharyngeal swab specimen was tested using kit based (Modular DxKit, Wuhan CoV E & RdRP genes) real-time reverse transcription PCR (RT-PCR) and conventional RT-PCR (for the N region using N1F and N3R primers). The sensitivity of the test was

95% (14).

In patients with positive PCR or abnormal chest x-ray, the surgery was canceled and they were referred to our COVID-19 center for complementary diagnostic and treatment actions. In symptom-free negative PCR patients, the surgery was done at the planned time.

This study was done in compliance with the Helsinki Declaration and was approved by the Tehran University of Medical Sciences ethics committee (IR.TUMS.MEDICINE.REC.1399.493). All the participants signed an informed agreement.

All the statistical analyses were done using a statistical package for the social sciences (SPSS) version 24.0. A P-value of less than 0.05 was considered as the level of statistical significance. We used Independent T-test and Non-parametric Mann-Whitney U-test to assess differences in means. A Chi-square and Fisher's exact test were applied to evaluate differences in proportions.

## RESULTS

At the time of the study, 720 patients were admitted to our hospital, 450 patients were candidates for emergency or elective surgeries. For all elective surgeries (200 people), the PCR test was requested, 141 patients referred again with the test result (in 30 patients the surgeries were cancelled and 29 patients refused to perform the test). Finally, 141 patients participated in the study.

The mean age of participants was  $41.38 \pm 11.66$  with a range of 19 to 74 years. Of the participants, 91.5% were women and 8.5% were men. Nine of the patients were candidates for cesarean section and the other for different elective surgeries including gynecological, orthopedic, neurosurgery, otolaryngology, and general surgeries.

The average basal temperature was  $36.87 \pm 0.49$  with a range of 35.7 to 39 Centigrade. Notably, five of the patients had a temperature greater than 38 in the preoperative visit. The baseline information according to the PCR result is summarized in Table 1.

Hypothyroidism was the most common comorbidity reported in 20 (14.1%) patients. The other common underlying disease was HTN (11.3%), DM (8.5%), cancer (7.7%), asthma (1.4%), and lupus (1.4%), respectively.

The PCR screening tests were positive in 12 (8.5%)

**Table 1.** The baseline information according COVID-19 polymerase chain reaction results

Variables	COVID-19 PCR results		P-value
	Negative (n=126)	Positive (n=12)	
Age, years	41.34 ± 11.52	38.66 ± 8.74	0.434
Pulse rate, n	81.95 ± 11.31	92.08 ± 14.98	0.014
Temperature, centigrade	36.84 ± 0.43	37.25 ± 0.75	0.105
Respiratory rate, n	17.67 ± 6.69	18.00 ± 2.95	0.425
O2 saturation, %	96.23 ± 2.31	95.95 ± 1.65	0.365

COVID-19: coronavirus 2019; PCR: polymerase chain reaction

patients. From whose PCR tests were positive, only five people (less than half) had symptoms of COVID-19 such as fever (three patients), a distinctive smell (two patients), and cough (one patient). Suspected exposure to COVID-19 was reported in four of them. Furthermore, no one had a history of vaccination and a recent history of COVID-19 disease.

Abnormal CXR was detected in five patients, of them, two had positive PCR and in three, this screening test was negative. In addition, positive CRP ( $\geq 5$ ) was reported in 35 (24.6%) participants, of them, two patients had positive PCR. The other lab test results are illustrated in Table 2.

## DISCUSSION

Asymptomatic COVID-19 patients are the biggest barrier in preventing this pandemic. Our study, which was done on 141 patients who were candidates for elective surgery, showed that COVID-19 PCR screening tests were positive in 12 (8.5%) patients and more than half of them were asymptomatic.

In the of study Sutton et al. (15) that was taken on 215 laboring women in New York, 33 (15%) women had COVID-19 positive test, but only four of them

had clinical symptoms. More than half of positive COVID-19 women were asymptomatic, which was confirmed our findings and this provides an unsafe environment for perioperative staff.

On the other hand, patients with positive PCR are significantly at higher risk for surgery complications. COVID Surg Collaborative (16) estimated that post-operative adverse outcomes occur at least in 50% of COVID-19 positive patients.

Furthermore, Lee et al. showed that 40 percent of COVID-19 positive patients who underwent surgery, admitted to ICU, and 21 percent of them expired after their surgeries. While the mortality rate for COVID-19 is estimated at 4.3 to 15 percent, which is so lower than the proportion of death of COVID-19 positive patients who underwent surgery (17, 18).

At the beginning of the COVID-19 pandemic, it was recommended to postpone non-urgent and elective surgeries. The reasons for this suggestion included ICU bed saving for COVID-19 patients, decrease the virus spreading and decline the surgery complications, in some patients, postponing the surgery has not any extra beneficial and in contrast, causes health deteriorated and increases disability-adjusted life years (19, 20).

It seems the best choice for reducing surgery com-

**Table 2.** The baseline lab test finding according COVID-19 polymerase chain reaction results

Variables	COVID-19 PCR results		P value
	Negative (n=126)	Positive (n=12)	
White Blood Cell Count	8551.61 ± 6540.2	7633.33 ± 3181.86	0.555
Hemoglobin (g/dl)	12.49 ± 1.91	11.74 ± 1.70	0.113
Platelet (*10 <sup>3</sup> /microliter)	245.62 ± 72.03	234.91 ± 42.95	0.614
Lymphocyte (%)	27.98 ± 10.61	30.33 ± 12.41	0.327
Neutrophil (%)	66.48 ± 12.08	67.16 ± 14.32	0.900

COVID-19: coronavirus 2019; PCR: polymerase chain reaction

plications is preoperative COVID-19 case detection. For this purpose, there are some strategies; self-quarantine for 14 days before the patient's surgery, is considered as a certain option but in many countries, it is impossible, because it may increase social and economic stressors. Antibody testing is another case detection method but because of the long-lasting time of post-infection antibody development, non-detectable antibodies in some patients, and high false-positive results, it is not recommended. Hence giving a RT-PCR test which is the gold standard for the RNA virus infection, has been suggested (8, 21).

The COVID-19 PCR test as a screening test has its limitations; one of the important ones is false-negative results in some conditions such as in the first few days after exposure due to low probability of detecting viral RNA, and in high-risk population because of their high pre-test probability (22, 23). However, it seems preoperative PCR testing should be performed as one of the available, easy, and proper strategies to minimize patient/health worker risk in elective surgeries (24).

The limitations of our study were the small sample size, single-centric, as well as the lack of follow-up of the participants for their adverse outcomes. Future studies are recommended to evaluate the morbidity and mortality rate of COVID-19 positive patients, who underwent emergency or elective surgeries. In addition, further evidence and guidance are needed to manage both false positive and false negative results of COVID-19 RT-PCR.

## CONCLUSION

In this study, we found that more than half of PCR positive COVID-19 patients were asymptomatic. In addition, the other synchronous positive tests in these patients were abnormal CXR, and positive CRP ( $\geq 5$ ). Therefore, to have a safe hospital environment, and improve patient health outcomes, it seems the COVID-19 screening test should be applied before any interventions, and only symptom and sign evaluation are not enough.

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