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COVID-19 Outbreak and Surgical Practice: Unexpected Fatality in Perioperative Period

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Abstract

Little is known about surgical practice in the initial phase of coronavirus disease 2019 (COVID-19) global crisis. This is a retrospective case series of 4 surgical patients (cholecystectomy, hernia repair, gastric bypass, and hysterectomy) who developed perioperative complications in the first few weeks of COVID-19 outbreak in Tehran, Iran in the month of February 2020. COVID-19 can complicate the perioperative course with diagnostic challenge and a high potential fatality rate. In locations with widespread infections and limited resources, the risk of elective surgical procedures for index patient and community may outweigh the benefit.

The global incidence of novel coronavirus disease 2019 (COVID-19) that involves the lower respiratory tract (pneumonia) continues to rise since December 2019. The disease is caused by severe acute respiratory virus coronavirus 2 (SARS-CoV-2) that simultaneously has high transmission and fatality rates. Little is known about surgical practice in the initial phase of the COVID-19 pandemic. The aim of this report is to describe the clinical presentation and outcomes of elective surgical patients during the COVID-19 outbreak.

A retrospective case series of 4 patients who developed perioperative complications in the first few weeks of the COVID-19 outbreak in Iran in the month of February 2020. The first case of COVID-19 in Iran, the epicenter of infection in the Middle East, was officially reported on February 19, 2020 from the city of Qom.

Three patients developed postoperative fever and pulmonary complications after uneventful elective operations. Two operations were performed before the official announcement of outbreak in Iran. Correct diagnosis and management in the postoperative setting were challenging. Two patients died [Table 1, Figure 1].

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The fourth case was a patient with severe obesity from Qom who had been scheduled for bariatric surgery on February 22. One day before the scheduled surgery he was taken to the emergency department with severe acute respiratory distress which rapidly progressed to cardiopulmonary arrest [Table 1].

This case series show the challenges facing surgical practice in the initial phase of COVID-19 outbreak. The effects of surgical and anesthesia stress, perioperative medications, and postoperative change (e.g. occurrence of lung atelectasis) on predisposition to new COVID-19 infection or exacerbation of current infection are not known. Based on current evidence, while it is believed that the fatality of COVID-19 is between 1-3%, most fatalities have occurred in elderly patients with underlying cardiopulmonary conditions, diabetes, and obesity [1-3]. Although the current series may bias reporting toward more severe outcomes, postoperative patients might be another group of patients in which COVID-19 would have a high fatality rate. A complicated postoperative course may especially be seen more in elderly patients with underlying health conditions.

In the postoperative period, development of fever or pulmonary complications can lead to a diagnostic challenge and can complicate the recovery of patients from elective surgery. In patients with postoperative fever, several diagnostic tests are usually necessary to determine the source. Other forms of infectious pneumonia, aspiration pneumonia, pulmonary embolism, pulmonary edema and other conditions are among the differential diagnoses in patients with postoperative pulmonary symptoms. During the current progressive outbreak, a high index of suspicious for COVID-19 is necessary to make a correct diagnosis and to take correct actions to treat the index patient and to prevent the spread of virus.

The diagnostic accuracy of RT-PCR in the postoperative setting needs to be determined. Notably, in a recent series from China of over 1000 patients to assess the diagnostic accuracy of different tests, chest CT scan had sensitivity of 98% compared with RT-PCR sensitivity of only

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71% [4]. Furthermore, identification of biomarkers and development of clinical prediction models that predict severity and outcomes of COVID-19 in postoperative period would be extremely helpful. Some preliminary data suggest that severe lymphopenia and elevated levels of C-reactive protein (CRP), interleukin-6, cardiac troponin I, and D-dimer correlate with the severity of hypoxemia and may predict hospital mortality [5,6]. Case 1 with elevated D-dimer, and Case 2 with lymphopenia, elevated CRP and ESR, and biomarkers of cardiac injury (elevated CKMB and troponin) died. However, Case 3 with a normal lymphocyte count and CRP survived.

These cases raise the possibility that performing elective operative interventions on patients with undetected hidden or mild form of COVID-19 may lead to contamination of operative room and equipment, with risk of transmission of the infection to operative team and other healthcare providers in hospitals. Secondary transmission of COVID-19 in the hospital setting in not uncommon [3]. Case 3, who developed fever on postoperative day 2, probably had hidden or mild form of disease at the time of surgery with a real risk of spreading to others during hospital admission. It is not clear if Case 1 and Case 2, who were readmitted about 2 weeks after surgery, got the infection at the time of surgery or after hospital discharge in community. Obviously if Case 4 was not presenting with pulmonary manifestations (e.g. if he was only in the incubation period of infection with minimal symptoms), he would have had the bariatric procedure the next day.

In conclusion, COVID-19 can complicate the perioperative course with diagnostic challenge and a high potential fatality rate. Depending on the severity of an epidemic and availability of resources, the risk and benefits of performing elective surgical procedures should be carefully assessed in this setting. In locations with widespread infections and limited resources, the risk of elective surgical procedures for index patient and community may outweigh the benefit. In some situations, postponing elective surgical procedures might be the right decision which can also preserve the resources including the personal protective equipment and maintain treatment space for critical patients. Another option would be routine or selective screening of patients for

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COVID-19 before elective surgical procedures, which we feel is the minimum acceptable baseline. Utilizing telemedicine and virtual visits using a smartphone for perioperative visits can also be an option to decrease the risk of spreading the infection during the outbreaks. Although many questions remain unanswered about COVID-19 and surgical practice, the surgical and perioperative communities should appropriately respond to this worldwide public health crisis to improve patient outcomes and minimize the burden on the health care systems and global society.

Article Information

Author Contributions:

Dr Safari and Dr Razeghian-Jahromi had full access to all of the data in the study and takes responsibility for the integrity of the data.

Concept and design: All authors

Acquisition and interpretation of data: Safari, Razeghian-Jahromi, Ghorbani

Drafting of the manuscript: Aminian

Critical revision of the manuscript: All authors

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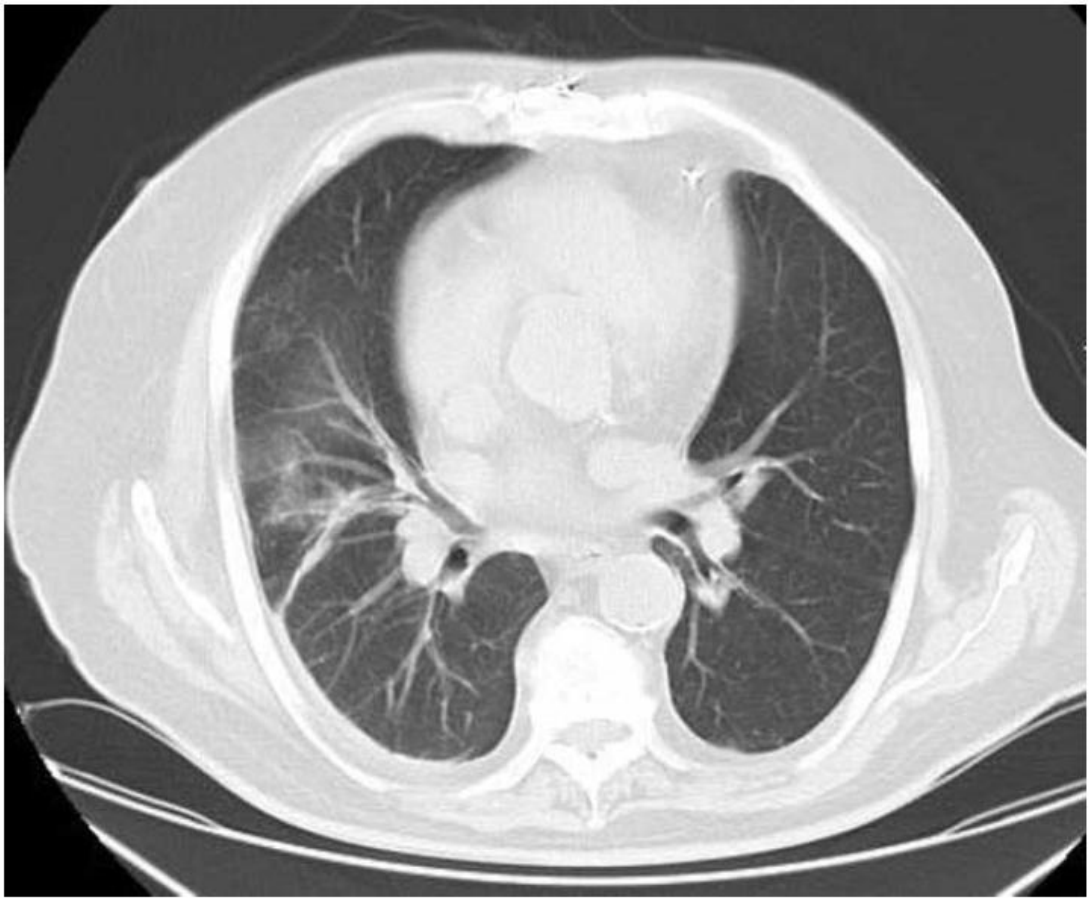

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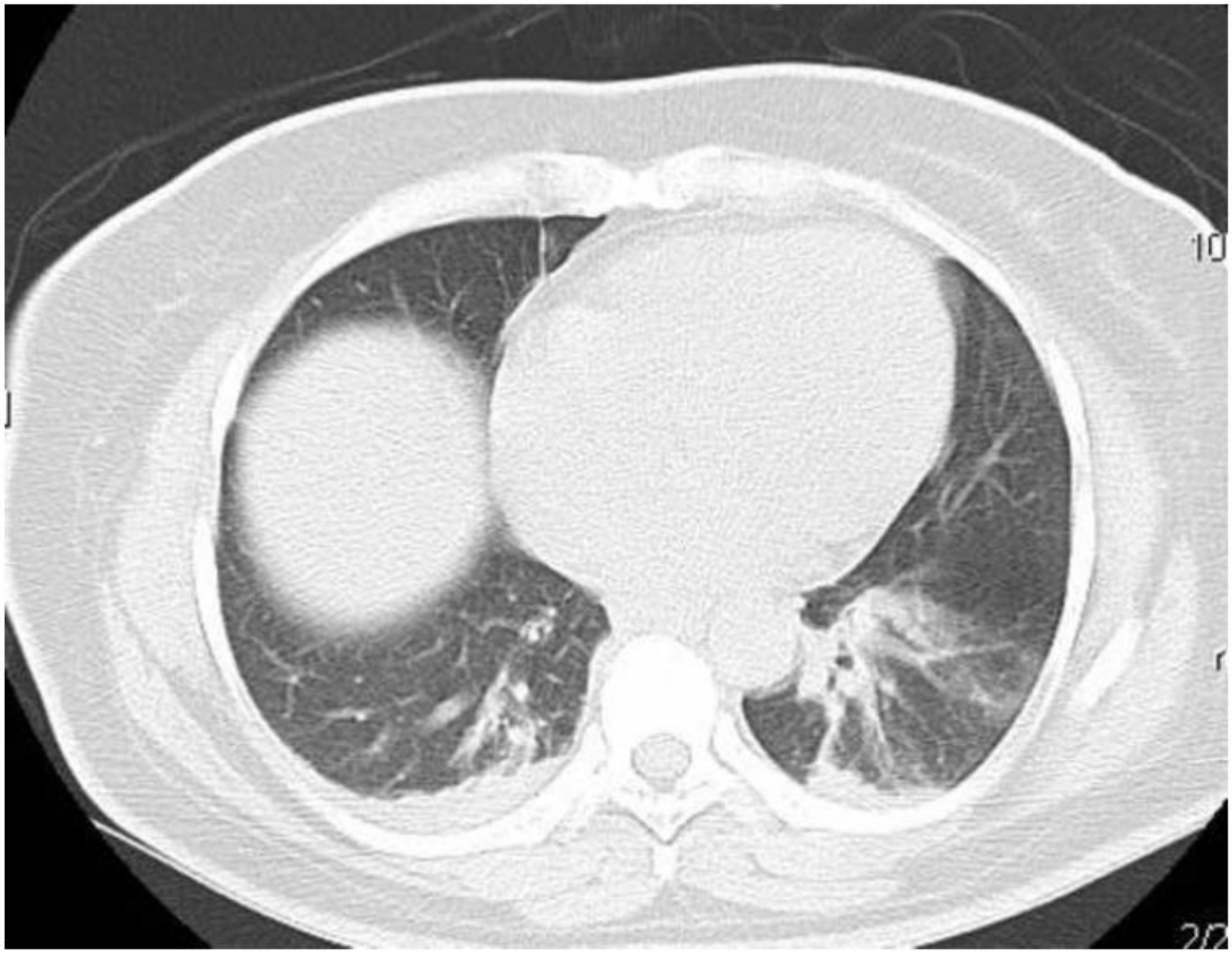

Figure 1. Chest CT Scan of COVID-19 pneumonia. (A) Case 1: Bilateral large areas of ground-glass opacities and consolidations, giving a white lung appearance, 19-days after an elective incisional hernia repair. (B) Case 2: Unilateral peripheral ground-glass opacities 16-days after laparoscopic cholecystectomy. (C) Case 3: Bilateral dependent consolidations in lung bases with minimal pleural effusion 3-days after hysterectomy and cholecystectomy.

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Table 1. Clinical Characteristics of 4 patients who developed perioperative complications in the first few weeks of COVID-19 outbreak in Iran

N	Age (sex)	Planned surgery	Date of Surgery	Date of symptoms	Presentation	Chest CT	RT-PCR[1]	Other work-ups	Hospital Course	Outcome
1	75 (F)	Incisional hernia repair	2/9/2020	2/27/2020	Fever, cough, dyspnea	Figure 1A	Positive[2]	On 2/28/2020: elevated D-dimer[3]	Progressed to ARDS and MOF	Died (3/1/2020)
2	81 (M)	Cholecystectomy	2/8/2020	2/22/2020	Initial: abdominal pain, anorexia, N/V After 2 days: fever, dyspnea, diarrhea	Figure 1B	Negative[4]	On 2/27/2020: bilateral diffuse patchy infiltrations on CXR, lymphopenia, elevated CRP, ESR, CKMB, and Troponin I[5]	ARDS, sepsis, acute cardiac injury	Died (3/4/2020)

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3	54 (F)	Cholecystectomy and hysterectomy	2/24/2020	2/26/2020	In-hospital fever on POD 2 and dyspnea on POD 3	Figure 1C	Positive[6]	CBC, ESR, CRP, CXR, U/A, and abdominal ultrasound were normal.	Symptoms resolved on POD 5	Alive in good condition (3/2/2020)
4	44 (M)	Gastric bypass[7]	2/22/2020	Unknown[8]	Admitted in a local ED in Qom with severe acute respiratory distress[9]	Not done	Not done[10]	Not done	Rapidly progressed to cardiopulmonary arrest in few hours	Died (2/21/2020)

[1] Reverse transcriptase–polymerase chain reaction (RT-PCR) test for COVID-19 nucleic acid of nasopharyngeal swab specimen.

[2] Resulted postmortem.

[3] 2992 µg/L (normal range <500 µg/L)

[4] Due to progressive course of disease which led to death before resulting the first RT-PCR, repeat assay was not performed. Although not laboratory confirmed with the single RT-PCR test, clinical picture, chest imaging findings consistent with coronavirus pneumonia, and occurrence

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at the time of progressive outbreak in Iran made the clinical diagnosis of critical COVID-19 infection.

[5] During the ICU admission, he developed lymphopenia (984 per µL, normal range: 1000-4000), CRP (+3), elevated ESR (58 mm/hr, normal range: 2-20) and biomarkers of cardiac injury including CKMB (63, normal range 6-25 IU/L) and Troponin I (>50 ng/ml, normal range <0.06).

[6] Resulted postdischarge.

[7] For severe obesity (weight=198 kg, body mass index=69 kg/m^2).

[8] On the last preoperative phone conversation on February 19, patient did not mention any problems.

[9] Occurred on February 21, 2 days after official announcement of first case in Iran which started from the city of Qom and 1 day before the scheduled bariatric surgery.

[10] RT-PCR was not performed due to rapid progressive course of disease, and insufficient testing capacity in initial phase of epidemic.

ARDS: acute respiratory distress syndrome, CKMB: creatine kinase-MB, CRP: c-reactive protein, CXR: chest x-ray, ED: emergency department, ESR: erythrocyte sedimentation rate, F: female, M: male, MOF: multiple organ failure, N/V: nausea and vomiting, POD: postoperative day, U/A: urinalysis

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