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## Perspective

## COVID 19 and laparoscopic surgeons, the Indian scenario - Perspective

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## ABSTRACT

Coronavirus Disease 2019 (COVID 19) had emerged as a global pandemic in recent times. The healthcare sector is at the epicentre of this unprecedented global pandemic challenge. Hospitals all over the world have reduced the number of non-emergency surgeries in order to utilise the staff and resources in a more efficient way. Severe acute respiratory syndrome coronavirus (SARS-CoV-2) is most transmitted via respiratory droplets, but risk of transmission is hugely increased while doing aerosol generating procedures (AGPs). Laparoscopy remains the preferred surgical approach for most surgical indications. There is theoretical possibility of generation of aerosols contaminated with COVID-19 from leaked CO<sub>2</sub> and smoke generation after energy device use. The aim of this paper is to review available evidence evaluating the risk of spread of COVID-19 during necessary laparoscopic procedures and to compile guidelines from relevant professional organizations to minimize this risk.

## 1. Background

Coronavirus Disease 2019 (COVID 19) had emerged as a global pandemic in recent times. It has impacted each sector of the community. India with a current population of 1,387,297,452 is currently in early stage 3 of the disease spread. The community spread has just started. Total number of cases till date in India are about 1,18,447 and the death toll has reached up to 3583. The healthcare sector is at the epicentre of this unprecedented global pandemic challenge. Health care workers (HCW) on the front line are most at risk, not simply of catching the virus, but of getting its most severe form. India has around 81150 surgical specialists which includes 31560 surgeons (25 per million population) and 20280 anaesthetists (16 per million population) [1]. With each passing day, a greater number of health care workers are being affected. Hospitals have reduced the number of non-emergency surgeries in order to utilise the staff and resources in a more efficient way. This also protects the patients and the doctor to unnecessary viral exposure. Since emergency surgeries are continuing, it is imperative to take all measures to reduce virus transmission from asymptomatic, suspected or confirmed case of COVID-19.

Severe acute respiratory syndrome coronavirus (SARS-CoV-2) is most transmitted via respiratory droplets, but risk of transmission is hugely increased while doing aerosol generating procedures (AGPs) like laryngoscopy, bronchoscopy and endoscopy. Since, viral load is very high in respiratory secretions, intubation and extubation poses the maximum risk. In laparoscopic surgery, there have been concerns raised about the possible generation of aerosols contaminated with COVID-19

from leaked CO<sub>2</sub> and smoke generation after energy device use [2]. This concern has arisen from not only the discovery that COVID-19 virus RNA can be found in the stool of infected cases but also the suggestion that the virus can be found in the gastrointestinal mucosa [3,4]. These theoretical risks may be guessed from previous evidence where Human papilloma virus (HPV), Hepatitis B Virus (HBV), Human immunodeficiency virus (HIV) have been detected in smoke produced in surgeries [5–10]. There is only one study regarding virus transmission in smoke generated during laparoscopy. Kwak et al., in that study, detected HBV in smoke generated during laparoscopy from 10 out of 11 hepatitis B patients undergoing laparoscopic procedures [11]. However, no further studies were performed to determine if these particles were capable of transmitting disease or if they even have viral infectivity. These pathogens are not an absolute contraindication for laparoscopic surgeries provided adequate universal precautions are taken [12,13]. There is no evidence till date to suggest that laparoscopy can lead to aerosolization of COVID-19 virus. Nevertheless, erring on the side of safety would warrant treating the coronavirus as exhibiting similar aerosolization properties.

SARS-CoV-2 is an RNA virus and molecular studies have found its presence in many body fluids including respiratory tract samples, whole of gastrointestinal tract, blood (1–15%) and faeces (29%) [14–18].

It can be concluded that anaesthetists and laparoscopic surgeons are at-risk health care workers in operation room (OR) [19]. Despite reduction in number of surgeries conducted, many emergency and semi emergency laparoscopic surgeries will need to be done.

The aim of this paper is to review available evidence evaluating the

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risk of spread of COVID-19 during necessary laparoscopic procedures and to compile guidelines from relevant professional organizations to minimize this risk.

## 2. Problems

### 2.1. General

Since Corona Virus Disease 2019 is caused by SARS-CoV-2 which is a new variant of coronavirus family, the information about the exact mechanism of transmission and its pathophysiology remains limited and many of the COVID 19 patients can be asymptomatic.

During the pandemic, there can be a backlog of elective surgeries for up to 3 months. It can have an impact on patient health outcome, hospital resources. Training and research programs will also be affected. Moreover, surgeries labelled as non-emergency at this time may become an emergency in future. So, elective surgeries may be a non-emergency, but they cannot be optional.

The reverse transcriptase-polymerase chain reaction (RT-PCR) test has a high false negative rate (around 15%). This implies that even if test comes out to be negative than there are chances that the patient might still be positive.

Laparoscopic procedures have a theoretical risk of generating aerosols particularly during creation of pneumoperitoneum, and while using energy devices due to smoke generation. Virus if present in these particles ( $< 5 \mu\text{m}$ ) can be inhaled and may cause infection [20].

### 2.2. Specific to India

Testing criterion for COVID 19 in India remains very limited with no scope for testing asymptomatic individuals. Also, the testing kits are costly and not widely available, so testing everyone may not be possible.

There is a scarcity of personal protective equipment (PPE) kits and N95 masks. Even if available, their quality may not match the standards.

North India is a Gall Stone disease belt. It is one of the most commonly performed elective laparoscopic procedures in north India. Postponing these surgeries will create a significant backlog.

Indian population caters around 269 million below poverty line people. That amounts to around 21.9% of population [21]. Many of these people live in rural areas and are far from a healthcare facility. As said earlier, elective surgery can convert into emergency at any time and if any emergency arises, it will be very difficult for them to reach on time to hospitals.

Furthermore, monetary burden for most of surgeries in India is borne either by government funded hospitals or by patients in private hospitals. Insurance companies have minimal role at it in India. So, testing every preoperative patient, and use of Personal Protective Equipment by all healthcare workers just increases the cost of surgery.

## 3. Guidelines

### 3.1. General recommendations

Since COVID 19 continues to be a threat, it is imperative to design some guidelines for the surgical community so that there is minimal hazard involved both for patients and surgeons. These guidelines will need to be flexible as we continue to grow knowledge about the viral transmission.

There is a consensus among all national and international surgical societies [The Society of American Gastrointestinal and Endoscopic Surgeons (SAGES), The European Association for Endoscopic Surgeons (EAES), Association of Minimal Access Surgeons of India (AMASI),

Indian Association of Gastrointestinal Endoscopic Surgeons (IAGES)] that all elective surgeries to be avoided. Only emergency life threatening, and selected semi emergency cases should be posted for surgery [22–24].

Whenever possible, a non-operative management should be considered [22].

All patients posted for surgery should have a thorough clinical examination done with detailed history, any history of foreign travels, any contact with a confirmed COVID 19 patient, any symptom which suspects a COVID 19 infection [24].

The Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) and The European Association for Endoscopic Surgeons (EAES), in their joint recommendations, have advised that RT-PCR test should be done in every patient before surgery [23]. We should keep in mind the high false negative rate of the test and therefore every patient should be considered potentially infected and adequate preventive measures should be taken.

A chest x ray or preferably a contrast enhanced computed tomogram (CECT) chest should be done in emergency patients [23].

Alternate management should be considered whenever possible. Neoadjuvant chemotherapy or radiotherapy should be given in cancer cases whenever possible.

Most operation theatres (OT) have positive pressure ventilation which prevents nonsterile air to enter the sterile zone. But this makes the spread of aerosols faster. Therefore, a negative pressure ventilation is required to prevent this from happening [20]. Moreover, the air conditioners should be started after the induction of anaesthesia and should be stopped 20 min before extubation [22].

Minimal personnel should be present inside the operation theatre and they should be made aware of the possibility of viral contamination [22–24].

All HCW in OT should wear adequate PPE and they should be taught about the correct method of donning and removing and safe disposal of it [22,23].

Intubation is an AGP, hence it poses a risk for health care workers. Therefore, regional anaesthesia should be preferred over general anaesthesia. Anaesthesia and Airway societies have laid down the guidelines for intubation and should be followed [22].

Surgical team should enter after 15 min of intubation. All consumables should be there in the OT and no one should move out of the OT. Duration of surgery should be kept to minimum and complex procedures are to be avoided. Between two cases, a minimum of 1 h should be there [22].

1% hypochlorite solution should be used for cleaning OT tables and anaesthesia instruments [22].

Health care workers should follow a well-defined exit sequence from the operation theatre. Firstly, Surgical team should leave, then the patient after extubation. Thirdly, the anaesthesia team, and lastly the cleaning and sterilization crew [22].

### 3.2. Recommendations specific for laparoscopic surgery

Pneumoperitoneum and smoke produced with energy devices can be a cause for viral transmission. So, every effort should be made to decrease the transmission by taking below listed precautionary measures.

Port site incisions should be made to just allow the port to pass. There should not be any gap for pneumoperitoneum leak. The insufflation pressure for CO<sub>2</sub> should be kept to minimum [23].

Ports after placement should not be used for evacuation of gases and for desufflation. If done, should be with adequate precautions. Movement of insufflating port if required should be done with great caution. There should be no gas leak while doing so. The port should be closed before disconnecting the tube and while connecting the tube to another port, the port should be closed. It should only be opened once the tube is fixed properly [24].

At the time of desufflation, patient should lie flat with least dependent post used for desufflation. All escaping gas and smoke should pass through an ultrafiltration system and if available, desufflation mode should be used on the insufflator. Controlled evacuation should be done by designated team member for evacuation of smoke and fumes using the side channel of the port as suggested by IAGES [24].

As far as surgical drains are considered, their use should be very limited. Specimen removal, either hand assisted or with wound protection device should be used only after desufflation. Fascial closure is necessary post desufflation. Any suture closure devices which allow gas leak should not be used [24].

Current wall suction devices do not use ultrafiltration. So, appropriate filters are required for suction devices as they can be a potential source of infection [22–24].

All surgical societies (SAGES, EAES, AMASI, IAGES) agree that there should be a minimum use of energy devices and cold haemostasis should be used whenever possible. Lowest power setting, short bursts should be used while charring of tissues should be avoided [22–26].

### 3.3. Post-surgery

Transport of a patient with or suspected COVID-19 infection to recovery area or intensive care unit is done by a minimum number of transport personnel who are waiting outside the operating room. They should wear personal protective equipment as recommended and it should be not be the same as worn during the procedure [25].

Surgeons, after separating from the patient should remove scrub clothes and consider having a shower before changing into home clothes. They should Wash hands frequently and maintain safe social distancing [25].

## 4. Conclusion

We agree that there is a theoretical risk of transmission of virus from the abdomen of an infected case during laparoscopy but we didn't find any scientific evidence to support it. We hope that more data comes to light in near future, and we can have a streamlined decision making. Additionally, if future studies show a lack of infectivity of smoke and pneumoperitoneum generated aerosols, then the discussion above may just become invalid. We should remember, “The Unknown is not what to be afraid of, it's only when the unknown becomes known that one can decide whether to be afraid or not”—Markus Peterson. Until then considering the above discussion, it is wise to use adequate preventive measures in the operating room while performing a laparoscopic surgery. This virus is going to stay with us for quite some time and we will have to learn to live in harmony with it.

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## CRedit authorship contribution statement

**Nikhil Gupta:** Conceptualization, Supervision, Writing - review & editing. **Himanshu Agrawal:** Writing - original draft, Resources, Formal analysis.

## Declaration of competing interest

None.

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