COVID-19 is a viral illness caused by a novel severe acute respiratory syndrome Coronavirus 2 (SARS-CoV-2). It is highly contagious virus with human-to-human transmission being primarily attributed to direct contact or air droplets. It is highly infectious and contagious due to high-viable viral loads in the upper respiratory tract secretions of infected patients and also similar viral load being detected in both asymptomatic and symptomatic patients. The virus stability characteristics and modes of transmission via fomites and air droplets make gastrointestinal (GI) endoscopy a high-risk procedure for COVID-19 transmission. This review discusses the currently available literature on risk of transmission of SARS-CoV-2 during GI endoscopy.

Introduction

In December 2019, Wuhan city of Hubei province, China, reported a cluster outbreak of viral pneumonia that was subsequently confirmed to be caused by a new coronavirus named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), and the disease caused by it was termed as Coronavirus disease 2019 (COVID-19) by World Health Organization (WHO).\(^1,^2\) Coronaviruses are a group of related medium-sized viruses that are enveloped, positive-sense, single-strand RNA viruses which cause respiratory illnesses in the humans.\(^3,^4\) The name Coronavirus is derived from the crown or halo-like appearance of virion on electron microscopy. This appearance is due to large bulbous projections of envelope glycoproteins on its surface.\(^5\) The human respiratory disease is usually caused by six species of Coronavirus, and a majority of them cause self-limiting mild respiratory illness. However, occasionally, they can cause fatal pneumonia, as was seen in 2002 with severe acute respiratory syndrome coronavirus (SARS-CoV), and in 2012 with Middle East Respiratory Syndrome (MERS) coronavirus.\(^1,^4\) The novel SARS-CoV-2 is also a highly infectious and contagious virus that has potential to cause severe and fatal disease in humans.

The most common symptoms of COVID-19 are fever, fatigueability and respiratory tract symptoms such as cough and shortness of breath. Gastrointestinal (GI) symptoms, mainly diarrhea and vomiting, have also been reported in some studies.\(^2,^6^-^8\) Minority of patients with COVID-19 develop acute respiratory distress syndrome (ARDS), and fatality rate of up to 3.5% has been reported consequent to septic shock, refractory metabolic acidosis, and coagulation dysfunction.\(^2,^6^-^8\) Older people and patients with underlying comorbidities like cardiovascular disease, diabetes, chronic lung diseases, and malignancies are more likely to develop serious illness as well as fatality.\(^1\) Currently, there is neither an effective treatment nor a vaccine for prevention of infection with SARS-CoV-2, although there are many ongoing clinical trials with potential drugs. The only effective preventive measure currently is effective infection control, personal hygiene, and isolation.

Modes of Transmission of SARS-CoV-2

Initial studies indicated that SARS-CoV-2 occurred because of animal-to-human transmission, as the authors found linkage between wild animal market and its occurrence.\(^9\) However, subsequently, human-to-human transmission...
Risk of SARS-CoV-2 Transmission During Endoscopy

Currently, there is no report of SARS-CoV-1 or SARS-CoV-2 transmission through endoscopy. However, the virus stability characteristics and modes of transmission, as described above, make GI endoscopy a high-risk procedure for COVID-19 transmission. The possible ways COVID-19 transmission can occur in an endoscopy suite include person-to-person via direct contact, as endoscopy involves close contact with the patients or respiratory droplets, generation of infected aerosols during endoscopy, and through contact with contaminated endoscopic equipment, accessories and body fluids. It is important to understand that both upper and lower GI endoscopy procedures carry the risk of transmission of COVID-19.

Why Staff in Endoscopy Units are at High-Risk of Acquiring COVID-19?

There are many factors that put the staff in endoscopy unit at high-risk of acquiring COVID-19 infection. First, endoscopy suites are relatively small and closed units with several people including endoscopists, nursing staff, technicians, anesthetists, hospital attendants, patients waiting for multiple procedures, and large number of small and big equipment. Both these factors are part of an ideal recipe for person-to-person as well as fomite transmission of SARS-CoV-2. Theoretically, a patient with high-viral load in the respiratory secretions can contaminate the endoscopy suite’s air as well as fomites with virus that can remain viable for a longer duration, thus putting uninfected patients as well as endoscopy staff at risk. Second, a variety of endoscopic procedures including gastroscopy, colonoscopy and endoscopic retrograde cholangio-pancreatoscopy are performed every day, wherein the endoscopists access the GI lumen from a close distance and therefore get exposed to a large number of respiratory, oropharyngeal and gastrointestinal flora. Also, many of these procedures are of significantly longer duration, and this further increases the risk of infection to the endoscopist. Johnston et al reported a significant unrecognized exposure to the endoscopist’s face of potentially infectious biologic samples during endoscopy. Also, unrecognized contamination was observed on the walls of endoscopy suites. Moreover, fecal shedding of SARS-CoV-2,
especially in asymptomatic patients, opens an altogether new dimension in its transmission. Although, currently there are no reports of feco–oral transmission of COVID-19, viral fecal shedding is a matter of concern because viable virion in the stool could increase the risk of transmission to endoscopy staff during colonoscopy.

Third, gastrointestinal endoscopy is a procedure than can generate aerosols. Although there are no studies that have systematically looked at the type and frequency of aerosol generation during endoscopy, endoscopy should be considered as an aerosol-generating procedure. It is known that coughing and retching can occur during upper endoscopy and this is known to generate aerosols. Similarly, while doing colonoscopy, passage of flatus may disseminate infective microorganisms into the surroundings. Moreover, routine maneuvers done while performing endoscopy, including suctioning and multiple exchanges of catheters/accessories, increases the risk of splashing and spread of infective material to the endoscopy staff.

Fourth, SARS-CoV-2 virus has been detected in the gastric, duodenal and rectal biopsies, and this is also a potential source of infection in an endoscopy setting. As SARS-CoV-2 can be transmitted via fomites also, there is a risk of transmission of virus to uninfected patients via contaminated endoscopes, as happened previously with hepatitis B and C and various multidrug resistant organisms. However, it appears that current disinfection and reprocessing guidelines as advocated by American Society for Gastrointestinal Endoscopy and European Society of Gastrointestinal Endoscopy are sufficient to disinfect the endoscopes from SARS-CoV-2 also.

Conclusion

The virus stability characteristics and modes of transmission of SARS-CoV-2 make GI endoscopy a high-risk procedure for COVID-19 transmission. There is an explosion of knowledge on various transmission kinetics of COVID-19, and several guidelines and recommendations for its prevention in endoscopy suites have been advocated. However, the screening protocols prior to endoscopy include the considerable challenges of identifying asymptomatic, minimally symptomatic patients shedding virus in their secretions, or patients shedding virus even after the resolution of symptoms. Despite these concerns, the results of recent study from Italy have demonstrated that the risk for both patients and health care workers to acquire clinically relevant COVID-19 infection during endoscopy appears to be low. The authors speculated that this low risk suggests that as relatively simple measures, such as use of double-surgical masks could prevent infection in endoscopy, airborne droplets rather than aerosol seem to be the dominant route of COVID-19 infection. They also felt that these results suggests that oro-faecal transmission during colonoscopy is unlikely. These results are reassuring but more studies with robust design are needed to ascertain the exact risk of COVID-19 transmission during GI endoscopy.

Conflict of Interest

There are no conflicts of interest or financial disclosures to be made.

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