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Impact of COVID-19 on gastrointestinal endoscopy practice in India: a cross-sectional study

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ABSTRACT

Background and study aims Gastrointestinal endoscopy, being an aerosol-generating procedure, has the potential to transmit Severe Acute Respiratory Distress Syndrome Corona Virus-2 (SARS-CoV-2) during the current pandemic. Adequate knowledge is the key to prevention. A survey, perhaps the first, was conducted among Indian endoscopists to assess the impact of Coronavirus Disease (COVID)-19 on gastroinestinal endoscopy practice in the country.

Methods From April 24 to 28, 2020, an electronic survey (using Google Form) was conducted with 23 questions (single or multiple answers) on: (1) endoscopy practice before the pandemic; (2) knowledge about COVID-19; and (3) its impact on endoscopy practice.

Results Responses were received from 375 of 1205 (31.1 %) endoscopists. Most (35.7 %) were young (31–40 years), practicing in corporate multi-speciality hospitals (44.6 %) or independent practice set-up (17.7 %) in metropolitan cities (55.6 %) and urban areas (42.3 %). In most units (75.4 %), fewer than 10 % of procedures performed are endoscopies, as compared to before the pandemic. A reduction in volume of endoscopy related to restriction of the routine procedures by the latest guideline was reported by 86.9 % of respondents. Most are using N95 masks (74.7 %) and/or complete personal protective equipment (PPE, 49.2 %) during endoscopic procedures. Only 18.3 % of respondents had access to negative pressure rooms either within (5.4 %) or outside (12.9 %) the usual endoscopy suite.

Conclusion Endoscopy units in India are performing fewer than 10 % of their usual volumes due to current restrictions. Resources to follow current international guidelines, including use of negative pressure rooms and PPE, are limited. Alternate measures are needed to keep up the services.

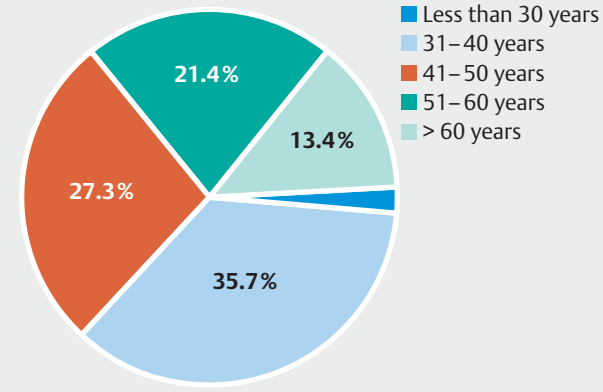
Introduction

Severe Acute Respiratory Distress Syndrome Corona Virus-2 (SARS-CoV-2) causing the coronavirus disease (COVID-19), which began in Wuhan, China, has caused a global disruption in everyday life. As of now, there are over 3 million infected with over 200,000 deaths. The infection is transmitted through contact and droplets. Endoscopic procedures (esophagogastroduodenoscopy, and bronchoscopy), being aerosol-generating, pose a risk of transmission of SARS-CoV-2. Other reasons for endoscopy-associated transmission of the virus are related to the high viral load in pulmonary and gastric secretions. Gastrointestinal symptoms and shedding of the virus in the stool have raised concerns for a feco-oral route of transmission [1, 2].

Risk of transmission potentially can be reduced by properly triaging patients and having health care workers take appropri-

ate personal protective measures while performing the procedure. Recent data show that there is a low risk of SARS-CoV-2 transmission during gastrointestinal endoscopy when adequate protective measures are taken and contact and workload are reduced [3].

Although SARS-CoV-2 infection affects primarily the respiratory tract, there are several gastrointestinal manifestations of this disease. Adequate knowledge on the part of gastroenterologists and endoscopists is essential for their personal protection and the protection of their fellow health care workers. Several endoscopy and gastroenterology societies and organizations have outlined the protocols and recommendations for practicing endoscopists and gastroenterologists all over the world. This survey was conducted to specifically study the impact of COVID-19 on gastrointestinal endoscopy practice in India and also to assess the attitude of the endoscopists towards this pandemic.



▶ **Fig. 1** Distribution of age groups among the study population (373 responses).

Materials and methods

Study population

Email addresses of gastrointestinal endoscopists across India who attended previous national and international meetings organized by authors and subscribers of national endoscopy journal (Journal of Digestive Endoscopy) were available in the database. A questionnaire containing 23 questions with multiple options, either requiring a single answer or multiple answers, was circulated through emails between April 24 and 28, 2020. The purpose of the study was explained to the participants at the time of enrollment. Responding to the survey questions was considered consent to participate. The authors were allowed to participate in the survey only once. Each link was specific to the respondent, and the results were kept anonymous. No personal data or identifiers linked to any endoscopist or unit was obtained.

Survey

The survey was designed based on the recent data available on SARS-CoV-2 infection and various guidelines from several societies on the care and management of patients with suspected or confirmed cases of COVID-19. It was circulated among registered endoscopists across the country through emails. The survey consisted of 23 questions divided into three categories: (1) details of the endoscopy practice of participants; (2) assessing the knowledge about COVID-19 and gastrointestinal endoscopy; (3) the impact of COVID-19 pandemic on gastrointestinal endoscopy practice. Most questions were close-ended, and participants were allowed to select one appropriate option. A few questions had the provision of choosing multiple options. All the questions were designed in Google Form, which was circulated via a link embedded in the email. Responses to the surveys were automatically collected in Forms, with real-time response information and charts. Answers to all the questions were automatically retrieved in the excel sheet and analyzed.

Results

Demographics

A total of 375 participants completed the survey. Most (35.7 %) were aged 31 to 40 years, while 27.3 %, 21.4 %, and 13.4 % were 41 to 50 years, 51 to 60 years, and >60 years, respectively (▶ **Fig. 1**). The main place of endoscopy practice was a corporate multi-speciality hospital for 44.6 % of participants, followed by privately owned endoscopy units (17.7 %). Endoscopists managing independent endoscopy units accounted for only 9.7 % in this study. Geographic area of endoscopy practice was a metropolitan city for 55.6 % and urban area for 42.3 % of endoscopists. Only 2.1 % of endoscopy units were in rural areas. ▶ **Table 1** shows the essential characteristics of endoscopists who participated in the survey.

Endoscopy practice

The daily average number of endoscopy procedures done in 2019 by the participants in their respective units varied from <10 for 23.4 %, to 10 to 25 for 35.8 %, 26 to 50 for 23.1 %, 51 to 100 for 8.3 %, and more than 100 for 9.4 % of respondents (▶ **Fig. 1**). All the endoscopists had facilities for upper gastrointestinal endoscopy in their units, and most had facilities for performing colonoscopies (98.4 %) and endoscopic retrograde cholangiopancreatography (84.4 %). Third space endoscopy and endoscopic mucosal resection (EMR)/endoscopic submucosal dissection (ESD) were done in 25.5 % and 32.8 % of units in addition to routine endoscopic procedures (▶ **Fig. 2**). Training in gastroenterology/hepatology was reported to be carried out in 54.5 % of the participating units. For cleaning, disinfecting/sterilizing endoscopes and accessories, the majority of endoscopy units (46.6 %) used the manual method, while 13.9 % used automated disinfection devices and 39.4 % used both manual and automated methods.

COVID-19 and gastroinestinal endoscopy

Eighty-two percent of endoscopists believed that gastrointestinal endoscopy is an aerosol-generating procedure. While 15.5 % believed that colonoscopy does not generate aerosol, 1.6 %

▶ **Table 1** Basic clinical characteristics of endoscopists who participated in this survey.

Parameter	Responses	Percentage
Age (373 responses)		
▪ <30 years	8	2.1%
▪ 31–40 years	133	35.7%
▪ 41–50 years	102	27.3%
▪ 51–60 years	80	21.4%
▪ >60 years	50	13.4%
Set-up of endoscopy practice (372 responses)		
▪ Corporate multi-speciality hospital	166	44.6%
▪ Private gastroenterology set-up	66	17.7%
▪ Government medical college/teaching institution	60	16.1%
▪ Independent endoscopy unit	36	9.7%
▪ Private medical college and teaching hospital	32	8.6%
▪ Government hospital	12	3.2%
Location of endoscopy unit (369 responses)		
▪ Metropolitan city	205	55.6%
▪ Urban area	156	42.3%
▪ Rural area	8	2.1%

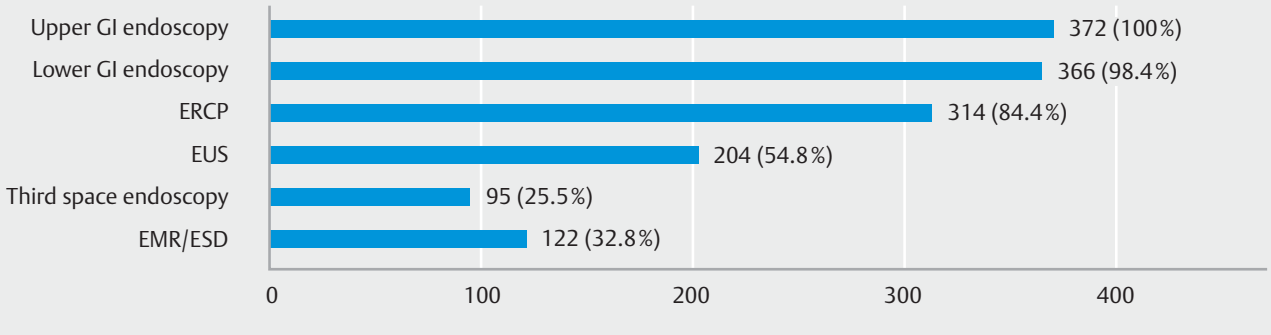
were not sure. Fifty-five percent of participants believed that a fecal-oral route of transmission of COVID-19 infection is possible and 9.7% believed the fecal-oral route is not possible, and the remainder (35.4%) were unsure. Surprisingly, 12.8% believed that transmission of COVID-19 during endoscopy can be due to aerosol only, while 86.4% believed both aerosol and fomites can cause transmission. In contrast, three participants believed that it is transmitted only by fomites. There was a mixed response regarding performing endoscopy and the percentage risk of getting SARS-CoV-2 infection among endoscopy personnel. It is assessed as <5%,5% to 10%, 10% to 20% and >20% by 27.4%, 35.6%, 20.1%, and 16.8% of participants, respectively.

Impact of COVID-19 pandemic on GI endoscopy practice

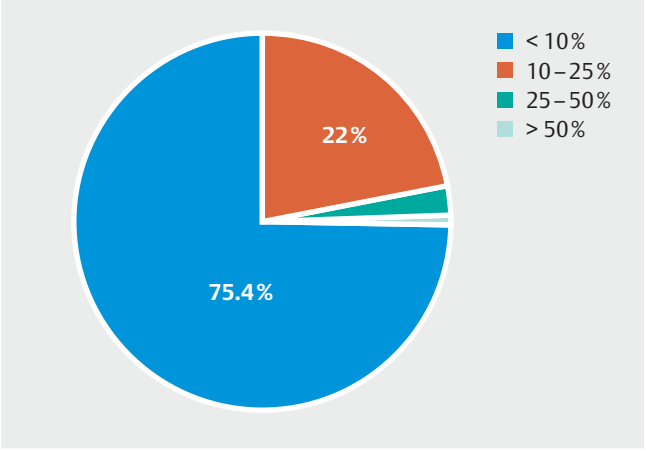
This pandemic has affected gastrointestinal endoscopy practice across India to a vast extent. As compared to usual practice, 75.4% of units were performing <10% endoscopy procedures only. The number of procedures performed was 10% to 25% and 25% to 50% of usual in 22% and 2.4% of units, respectively (▶ **Fig. 3**). The major reasons for the decrease in endoscopy procedures during the COVID-19 pandemic were fewer patients coming to the hospital due to government-mandated national lock-down (227 responses), endoscopists themselves limiting the number of procedures due to the latest guideline recommendations for avoiding routine endoscopies (324 responses), limiting contact with patients due to the fear of getting exposed (127 responses), difficulty in managing usual patient volumes due to reduced availability of staff due to lockdown (57 responses), and in at least one-third (108 responses), reduction in endoscopic procedures was due to advice from hospital management to avoid routine endoscopy procedures, which were in a stand-by mode for the potential surge and hence were limiting any elective procedures. The participants reported that currently the main indications for performing endoscopies in their respective units are gastrointestinal bleeding (311 responses), cholangitis (302 responses), suspected malignancy (229 responses), obstructive jaundice (128 responses) and common bile duct (CBD) calculi (106 responses). Endoscopies for non-emergency indications like dyspepsia and gastroesophageal reflux disease were still performed in 7% of centers.

Endoscopist attitudes towards COVID-19 pandemic and opinions on gastointestinal endoscopy practice

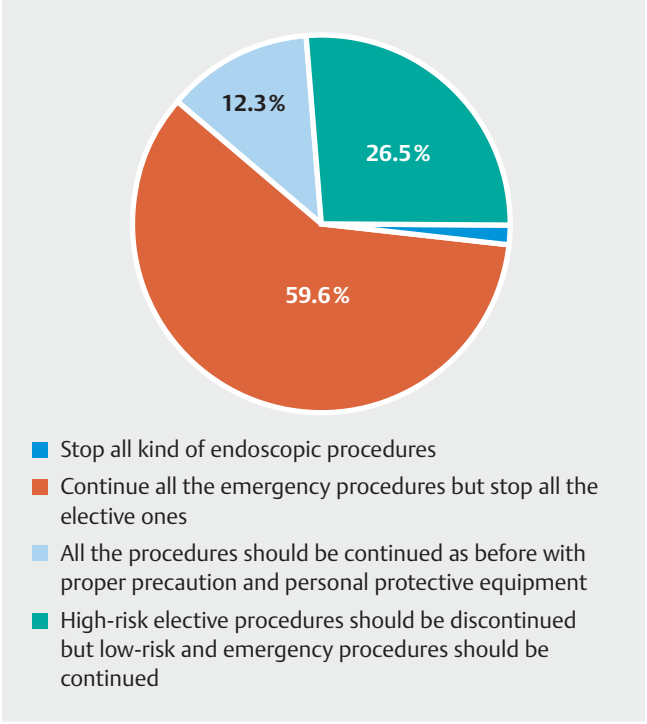
Most respondents (59.6%) believed that all emergency procedures should be continued and that elective procedures should be discontinued. Meanwhile, 26.5% opined that high-risk elective procedures should be discontinued, but low-risk and emergency procedures should be continued. A few endoscopists (12.3%) were also of the opinion that all procedures should be continued as earlier with proper precautions and use of personal protective equipment, while the remainder (1.6%) opined to stop all kinds of endoscopy procedures (▶ **Fig. 4**). While per-



▶ **Fig. 2** Types of procedures performed by the endoscopists in their centers (372 responses).



▶ **Fig. 3** Comparison between percentage of endoscopic procedures peformed during usual practice and in the COVID-19 era in India (373 responses).



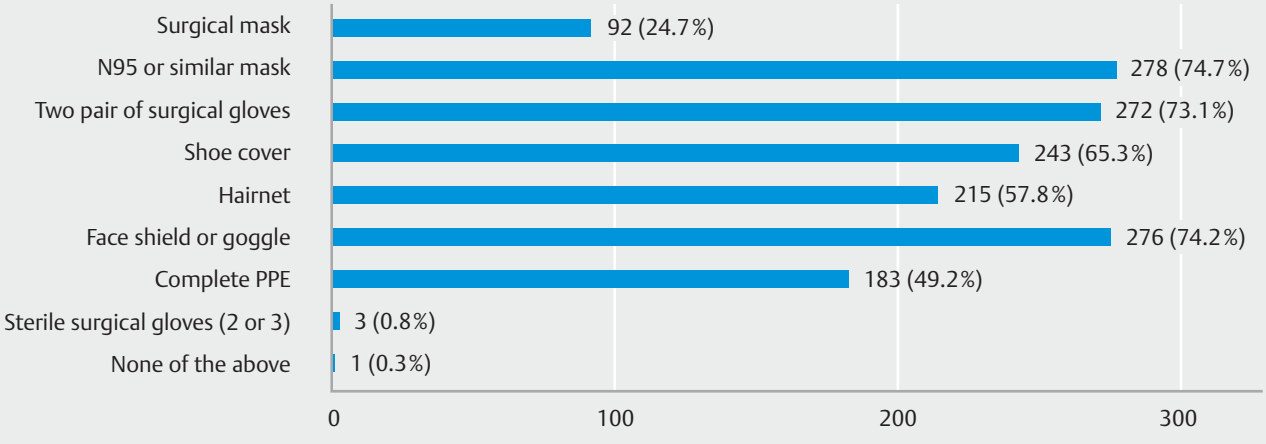
▶ **Fig. 4** Opinion of endoscopists about endoscopy practice during the pandemic (374 responses).

forming endoscopy procedures, 74.7% of endoscopists used N95 or similar masks, 74.2% used a face shield or other protective eyewear, 49.2% used complete PPE, and only 24.7% used simple surgical masks (▶ **Fig. 5**). The major precaution(s) being taken by endoscopists in the endoscopy room during the procedure were reducing the workforce (334 responses), increasing the time gap between endoscopic procedures (300 responses), and more aggressive disinfection of endoscopes (240 responses). A few also reported that they do not reuse endoscopic accessories (165 responses) and have increased their use of sedation/anesthesia (139 responses).

Discussion

All endoscopic procedures, including upper gastrointestinal endoscopy, endoscopic ultrasound, and endoscopic retrograde cholangiopancreatography (ERCP) are aerosol-generating procedures, making them high risk during the COVID era [4]. Johnston et al. reported that during endoscopy, the endoscopist's face has significant exposure to potentially infectious biologic samples [5]. Studies performed in 2003 during the SARS outbreak confirmed that during endoscopic procedures, droplets from infected individuals could reach up to 6 feet from the source [6].

Knowledge of transmission of COVID-19 and willingness to take essential preventive measures while performing endoscopic procedures are necessary to reduce the disease burden among health care workers, especially endoscopists. The



▶ **Fig. 5** Personal protective equipment (PPE) used during endoscopy (372 responses).

cross-sectional survey conducted by us studied the impact of COVID-19 on gastrointestinal endoscopy practice and also knowledge regarding COVID-19 among endoscopists in India.

In our survey, we found that as compared to usual practice, only <10% endoscopy procedures were performed in 75.4% units (▶ **Fig. 3**). A recent electronic survey conducted in the New York metropolitan area by Mahadev S et al. showed that COVID-19 has drastically impacted endoscopy practice and procedure volumes. Since the onset of COVID-19, 71% of gastroenterologists in New York reported that they are no longer regularly performing endoscopy, and 62% reported zero cases over the 7 days preceding the survey [7].

The major reasons for performing fewer endoscopy procedures during the COVID-19 pandemic in India were decreased patient volume in the hospital due to lock-down as reported by 60.9% and 86.9% of endoscopists themselves limiting the number of procedures due to the latest guidelines recommending avoidance of routine endoscopies. Thirty-four percent limited the number of patients because endoscopy is a high-risk procedure, and 29% of endoscopists were advised by the administrators of their centers to limit the number of endoscopies to avoid exposure to health care personnel and to conserve resources.

Recent guidelines published by various societies recommend categorizing endoscopic procedures into emergency, urgent, and routine endoscopies based on indications, with cancellation and/or postponement of routine endoscopies for at least the next few weeks or months or until the current threat due to COVID-19 is reduced [8–13]. Despite these recommendations and endoscopy being a high-risk procedure, a few centers (7%) reported doing endoscopies for non-emergency indications like dyspepsia and gastroesophageal reflux disease. Opinion among the endoscopists involved in our study was mixed regarding the practice of endoscopy during this pandemic. The majority (59.6%) of them opined to discontinue high-risk elective procedures and continue only low-risk and emergency procedures. A few endoscopists (12.3%) were also of the opinion that all procedures should be continued as before with proper precautions and use of PPE.

COVID-19 is thought to be more than three times as contagious as influenza, and as many as 44% of transmissions were reported to occur through asymptomatic carriers in China [14]. This raises the question of whether N95 masks and other PPE should be worn by all personal involved in endoscopy while performing these procedures. In our survey, we observed that most respondents are using N95 masks (74.7%) and/or complete PPE (49.2%) while performing endoscopic procedures. In the study by Mahadev S et al. [7], only 65% of endoscopists used N95 respiratory masks for all cases universally since the onset of COVID-19 in New York. The main reason for this was limited availability (17%) or no available of the masks at all (9%). Other precautions taken by our endoscopists were reducing the workforce (89.8%) and increasing the time gap between endoscopic procedures (80.6%).

Endoscope reprocessing, handling, and storage is also essential to curtail transmission among patients undergoing endoscopies during this pandemic. The American Gastroenterological Society has stated that for eradication of SARS-CoV-2, standard manual cleaning followed by high-level disinfection could be effective [15]. Reprocessing units should have a limited number of staff and adequate PPE, which includes gowns, gloves, masks, and face shields. For performing endoscopy in SARS-CoV-2-positive or suspected patients, it is desirable to have at least one negative pressure endoscopy room or to perform endoscopy outside the department, which has the facility of negative pressure room [16]. In our study, we found that there is no availability of a negative pressure room for endoscopy in COVID patients in 81.5% of the units. Only in 5.4% and 12.9% of endoscopy units is a negative pressure room inside or outside the endoscopy suite, respectively, available. Manual cleaning of endoscopes is being carried out in 46.6%, and the automatic mode of cleaning in 13.9% of endoscopy units, with the remainer (39.4%) using both the methods. A similar practice also was reported in a survey from southern India that was done long before this pandemic [17].

There are a few limitations to this study. The survey was only available online, and we could not circulate it to all endoscopists across the country due to unavailability and/or incorrect email addresses. Most of our respondents were from urban areas. Hence, this survey cannot be generalized among all the endoscopists. There is also a possibility that more than one endoscopist from a single center/endoscopy unit may have participated in this study. Hence, the percentage of endoscopy procedures performed in a center may not be accurate.

Despite these limitations, our study is valuable because it is the first one conducted among endoscopists across India. The study was also sent during the height of the current pandemic and results were collected and analyzed in real time, which minimized the risk of recall bias. The results of this survey will help improve practice of gastrointestinal endoscopy in India, especially when there centers are reopened so that appropriate guidelines can be formulated that are specific to this population based on the resources cited in this study.

Conclusion

In conclusion, COVID-19 has significantly impacted endoscopic practice in India, as it has in the rest of the world. International guidelines are hard to follow in a country like India with limited resources, including limited PPE, lack of negative pressure units, overcrowding of centers, and limited resources in privately owned or smaller endoscopy units. Current recommendations to avoid endoscopy in elective cases are being followed by endoscopists. Adoption of international guidelines to tailor to the specific practice environment in India is desirable, especially when endoscopy units are reopened or should we have another surge in the SARS-CoV-2 infection.

Competing interests

The authors declare that they have no conflict of interest.

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