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COMMENTARY

Recommendations for Essential Esophageal Physiologic Testing During the COVID-19 Pandemic

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The first human case of coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was reported in Wuhan, China, in December 2019.¹ As of April 17, 2020, the World Health Organization estimated that more than 2 million people had been infected in 184 countries around the globe, with 145,000 deaths, with the United States currently most affected. In this unprecedented COVID-19 pandemic, routine clinical services are severely disrupted, with as much healthcare personnel and resources as possible deployed to the frontlines.

As countries, regions, and cities have imposed lockdown measures, gastrointestinal motility laboratories have been ordered by hospital authorities to close their services for an indeterminate period of time. Esophageal physiologic testing is among the many clinical procedures that are considered nonemergent, as high-resolution manometry (HRM), pH, and pH impedance studies are performed for non-life-threatening indications. Many physicians, including the authors, are struggling with patients who suffer from refractory undiagnosed gastrointestinal symptoms, who could benefit from esophageal physiologic testing to triage management. How are gastroenterologists managing esophageal symptoms to function under these extraordinary circumstances? Clearly, accepted indications for esophageal physiologic testing^{2,3} cannot be implemented because guidelines for social distancing impact elective interactions between patients and healthcare providers. In the absence of guidance regarding emergent indications for esophageal physiologic testing in the COVID-19 era, we have developed practical guidelines for triaging patients for safe performance of some of these tests, in settings in which management decisions could be expedited to relieve patient symptoms and prevent complications, while simultaneously shortening hospital stay.

Aerosolizing procedures in settings in which the patient's infectious status is unknown can impact healthcare providers performing aerodigestive and gastrointestinal procedures.⁴ While endotracheal intubation, bronchoscopy, and upper endoscopy are anticipated to aerosolize

the most, one can anticipate that nasal intubation of manometry and pH/pH impedance catheters will generate coughing, retching, and aerosolization. While there is no conclusive evidence that endoscopy and esophageal physiologic testing transmit viruses such as SARS-CoV-2,⁵ these procedures are being severely limited out of an abundance of caution in absence of evidence to the contrary. However, some patients with esophageal symptoms may have obstructive motor disease needing urgent management, while others may be regurgitating in the context of severe reflux and pulmonary disease, and both are at risk for aspiration. In modern healthcare systems in which clinical practice needs exist in a continuum, there is often difficulty in separating what is elective from what is emergent. We have developed a scheme for identifying patients at highest risk for adverse consequences if esophageal physiologic testing is not performed, those that need testing within weeks and cannot wait months, and others that have purely elective indications (Table 1). These recommendations could be useful in triaging patients during the current lockdown but will also be useful in prioritizing testing on the backlog of patients once clinical activities resume. We emphasize that the alternatives offered are not equivalent to the optimal physiologic test indicated (eg, barium esophagogram may overlook spastic achalasia, in contrast to HRM). The use of the listed inferior alternatives should therefore always be balanced against delaying the diagnostic esophageal physiologic test until this can be safely performed.

Before considering even emergent or urgent motility testing during the pandemic, it is essential to establish that operating procedures in the motility laboratory ensure safe practice for both patients and staff. The

Abbreviations used in this paper: COVID-19, coronavirus disease 2019; HRM, high-resolution manometry; PPE, personal protective equipment; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.

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Table 1. Triageing Patients for Esophageal Physiologic Testing

| | Clinical Qualifiers | Alternative |
|--|--|---|
| Emergent/urgent procedures | | |
| HRM in suspected achalasia | Significant dysphagia, weight loss, regurgitation | Endoscopy with intubation and FLIP Barium esophagography |
| HRM prior to achalasia management | Plans for urgent management (PD or myotomy) | Endoscopy with intubation and FLIP/ botulinum toxin injection Barium esophagography |
| HRM prior to antireflux surgery | Large hiatus hernia, risk for aspiration, pulmonary disease requiring lung transplantation | Barium esophagography |
| Semiurgent procedures | | |
| Dysphagia with weight loss (transition to an urgent HRM procedure if nutrition is compromised over 2–4 wk) | Frequent/daily symptoms Impacting quality of life Negative endoscopy/barium | Empiric management with PPI, soft/liquid diet |
| Dysphagia without weight loss | Frequent/daily symptoms Impacting quality of life Negative endoscopy/barium | Empiric management with PPI, soft/liquid diet |
| Chest pain | Frequent/daily symptoms Impacting quality of life Negative endoscopy/barium | Empiric management with PPI, pain modulators |
| Elective procedures | | |
| HRM/reflux monitoring for reflux symptoms prior to antireflux surgery or with incomplete PPI response | Elective, can be postponed | Medical reflux management, pain modulators, lifestyle measures |
| HRM in behavioral symptoms/suspected supragastric belching/rumination | Elective, can be postponed | Remote cognitive and behavioral therapy, diaphragmatic breathing |

FLIP, functional lumen imaging probe; HRM, high resolution manometry; PD, pneumatic dilation; PPI, proton pump inhibitor.

SARS-CoV-2 virus remains viable in aerosols for hours and on surfaces for days but is easily killed due to its porous lipid shell.⁶ Despite viral shedding in stool, risk of fecal transmission remains unclear.^{7,8} These viral properties should guide the adjustments made to the structure and function of motility laboratories. Ideally, during the outbreak, the laboratory should have characteristics typical of an airborne infection isolation room (ie, single patient at a time, closed door at all times except during entry or exit, negatively pressured with air exhausted to outside or filtered with a high-efficiency particulate air filter).

At the outset, patients need to be triaged as suspected, probable, or confirmed COVID-19, as defined by the World Health Organization.⁹ The waiting area should have safe distancing measures in place, with a recommended distance between patients of 1 m. Procedure rooms should be cleaned and disinfected regularly before and after routine use. Reusable laboratory inventory such as HRM catheters should be promptly cleaned and disinfected after use as per manufacturer recommendations and institution guidelines. All disposable items (eg, pH/pH impedance catheters) should not be reused and must be promptly and safely disposed after the procedure.

Personal protective equipment (PPE) similar to that recommended for upper endoscopy is reasonable for esophageal physiologic testing.¹⁰ While this may vary by region, appropriate PPE consists at least of a fluid

repellent surgical or N95 mask, full arm-length disposable apron, eye protection, and nonsterile single or double gloves for patients not suspected to have COVID-19, but recommendations have potential to change as insights into disease spread further develop.¹¹ Esophageal manometry should not be performed in highly suspect symptomatic or COVID-19–positive patients. Both donning and doffing of PPE should be carried out in a proper manner.⁴ Optimally, only 1 staff member should interact with the patient and perform the procedure. Prior to nasal intubation, additional protective measures may be applicable including the use of virucidal povidone-iodine 7% gargle or mouthwash.⁷ After the procedure, the procedure area should be thoroughly cleaned and disinfected before the next patient is brought in.

Many of the previous recommendations are not evidence-based, but rather are solely reliant on limited available data related to endoscopy, interpreted within the framework of our experience. While we have not specifically discussed anorectal motility studies, these recommendations would also apply, especially because fecal transmission remains a risk.⁸ As the acute crisis resolves and motility laboratories open back up for business, we suggest that emergent and urgent procedures are given priority, followed by semiurgent procedures, and finally elective procedures. Of course, how and when reopening will occur remains unknown, and must be adapted to the local context. We hope that more detailed

recommendations will become available in the near future from respective specialty societies to guide practitioners not only during, but also following the pandemic.

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Reprint requests

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Conflicts of interest

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