

Pancreaticobiliary Endoscopy in the COVID-19 Pandemic Era

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COVID-19 PANDEMIC

Since it was first reported in December 2019, the novel COVID-19 pandemic has infected 3,656,644 individuals worldwide and resulted in 256,736 deaths as of May 5, 2020.¹ In the United States, which is the current disease hotspot, 67,456 patients have died as of May 5, 2020, and it is projected that nearly 134,242 (range, 95,091–241,917) will die by August 1, 2020.² As the pandemic evolves globally, state and local governments, professional medical societies, and healthcare systems have developed strategies to prepare and respond to the surge of the pandemic. Despite these measures, healthcare personnel (HCP) carry a 3-fold greater risk of COVID-19 infection compared with the general population and represent 3% to 20% of all infections in hotspots.^{3–5}

To reduce transmissibility across patients and HCP, as well as to preserve critical healthcare resources, the Surgeon General, the Center for Medicare & Medicaid Services, and many professional medical societies, including those in gastroenterology, have recommended postponing all elective surgeries and procedures (at the time of writing this manuscript).⁶ In the absence of a proven vaccine, effective therapy, or widely available testing for early identification and isolation of new cases, social distancing has prevailed as the main public health intervention and may become a prolonged “new normal.” Therefore, HCP needs to adapt to these rapidly evolving policies in all medical subspecialties and be prepared for a surge of COVID-19 cases in their healthcare facilities. In this article, we will focus on the impact of COVID-19 in the endoscopic management of pancreaticobiliary disorders.

IMPACT ON ENDOSCOPIC PROCEDURES

About 350,000 endoscopic retrograde cholangiopancreatographies (ERCPs) and 200,000 endoscopic ultrasounds (EUS) are performed annually in the United States for a variety of pancreaticobiliary indications.^{7,8} Both procedures can lead to human-to-human airborne transmission by the generation of small droplet nuclei in high concentrations and are considered high-risk aerosol-generating procedures (AGPs).⁶ Aerosolization may occur at the time of endoscope insertion into the pharynx, during removal of instruments through the endoscope channel, from airway stimulation and unexpected coughing during the procedure, and by insertion or removal of the endotracheal tube when ventilatory support is used.^{9–12} Although all types of upper endoscopic procedures are currently considered in the same category of AGPs, it is possible that EUS and ERCP generate more respiratory droplets given the larger diameter of the endoscopes with a higher probability of cough, increased use of devices for interventions, longer procedural duration, and more leakage of body fluids through the working channel (eg, gastrointestinal secretion, bile) compared with other endoscopic procedures. Therefore, it is crucial for HCPs involved in pancreaticobiliary procedures to implement all approaches that may reduce the risk of COVID-19 transmission.

TRIAGE OF PANCREATOBILIARY ENDOSCOPIC PROCEDURES

Preprocedure questionnaire-based screening to detect infected individuals has limited value as viral transmission has been documented from mildly symptomatic and asymptomatic persons, especially when community spread has been established.¹³ When widely available, universal viral testing should

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The authors declare no conflict of interest.
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DOI: 10.1097/MPA.0000000000001580

TABLE 1. Prioritization of Potential Indications for Pancreatobiliary Procedures During the COVID-19 Pandemic

Urgent (Perform)	Semiurgent (Within 8 wk)	Elective (>8 wk)
-Acute cholangitis	- Asymptomatic Choledocholithiasis	-Symptomatic obstructive chronic pancreatitis (eg, main pancreatic duct stone or stricture)
-Symptomatic choledocholithiasis	-Indeterminate biliary stricture without jaundice	-Celiac plexus block
-Obstructive jaundice (malignant and benign strictures)	-Dilated bile duct with abnormal liver function tests	-Suspected biliary or pancreatic type pain without laboratory abnormalities
-Bile leak	-Ampullary adenoma without symptoms	-Evaluation and therapy of idiopathic or recurrent acute pancreatitis
-Sphincterotomy bleeding	-Pancreatic mass with evidence of probable metastasis	-Nonspecific radiologic findings (eg, dilated bile duct, pancreatic fullness) without laboratory abnormalities
-Infected or symptomatic pancreatic necrosis or pseudocyst	-Suspected metastatic lesion from other primary cancers	-Pancreatic cyst without high-risk features
-Suspected pancreatic cancer without known metastatic lesions	- Scheduled plastic stent change or removal	-Pancreatic cancer screening in high-risk individuals
-Pancreatic cyst with any high-risk feature	-Scheduled lumen apposing stent removal from peripancreatic fluid collections	-Surveillance after prior ampullectomy
		-Metal stent change or removal for benign biliary disease

be performed to detect infected individuals before they show up for outpatient endoscopic procedures and thus reduce transmissibility in endoscopy units.^{14,15} Serological assays to identify those already immunized may be a valuable option, but further data that correlate antibody titers with COVID-19 immunity are still needed.¹⁶ Until these strategies are implemented in clinical practice, a critical step in limiting viral propagation is proper procedural triage and postponement of elective procedures.

For this purpose, the endoscopist needs to answer the following questions in a stepwise manner: (a) is the procedure indicated?, (b) is the procedure time sensitive?, (c) if time sensitive, is the procedure urgent (within 2 weeks) or semiurgent (within 8 weeks)?, and (d) if not time sensitive, then the procedure can be delayed for more than 8 weeks.⁶ These steps require thoughtful review of medical records, laboratory data, cross-sectional images, and prior endoscopic reports. Virtual discussion with the patient, referring provider, subspecialty experts (eg, medical pancreatologist, radiologist, oncologist, surgeon), and multidisciplinary teams (eg, tumor boards, liver transplant committee) might further facilitate the decision about performing a procedure. If there is an alternative approach with less aerosol generation and similar efficacy or safety, then EUS or ERCP could be avoided. For example, in patients with a low or intermediate risk of choledocholithiasis, both magnetic resonance imaging/magnetic resonance cholangiopancreatography and EUS are accurate tests, but in the COVID-19 era, a magnetic resonance imaging/magnetic resonance cholangiopancreatography is the preferred first step in management.¹⁷ When the facility does not have the capability to provide highly effective and safe endoscopic care, referral to a tertiary care hospital should be considered (eg, hospital reaching full capacity, lack of adequate personal protective equipment [PPE], and limited experience of the endoscopist with the type of required procedure).

Criteria that can be applied in deciding the time-sensitive nature of a pancreaticobiliary endoscopy include (a) threat to the patient's life if the procedure is not performed, (b) threat of permanent dysfunction of an organ system; (c) risk of metastasis or disease progression, and (d) risk of rapid disease worsening.⁶ Procedures identified as time sensitive can be further stratified based on the potential harms of delaying the intervention—"urgent" when there is an immediate necessity for the procedure to reduce harm, and "semiurgent" if the procedure can be delayed but no more than 8 weeks.¹⁸ If none of these criteria is met, the procedure is deemed elective and can be delayed until all procedures are being locally ramped up. A nonexhaustive list of potential indications for pancreaticobiliary procedures and proposed urgency of the intervention is presented in Table 1.

In addition to the indication, careful assessment of individual variables (age, comorbidities [diabetes, cardiovascular or lung disease], immunosuppression, COVID-19 symptoms, or exposure) and environmental factors (availability of PPE, hospital beds, ventilators, staff health, and local situation of the pandemic) should be used to determine the timing of each patient's procedure.¹⁹ In patients with COVID-19 infection and nonurgent indications, the procedure may need deferral until resolution of symptoms and negative viral testing. For elective procedures, adopting a tiered allocation approach might facilitate prioritization and triage of patients during the ramp-up period (Table 2). All suggested algorithms for prioritization might change when point-of-care testing is widely available.

INFORMED CONSENT

Specifically, endoscopists must include a disclosure of possible nosocomial infection of COVID-19 within the facility and the careful consideration given to the urgency of the intervention. This could be obtained through telemedicine to ensure that the patient agrees with the risks of coming to the facility and is documented in the chart. The consent should also include all potential interventions that would be beneficial to maximize efficacy and reduce future procedures. For example, patients undergoing ERCP for any biliary indication should also consent for EUS-guided biliary drainage in case conventional ERCP fails.

INTRAPROCEDURAL CONSIDERATIONS

In patients with known or presumptive COVID-19, negative pressure operating rooms are preferred, whereas advanced endoscopy suites may be sufficient for those without suspected infection. The decision to pursue pancreaticobiliary endoscopy under monitored anesthesia care or general endotracheal anesthesia has been traditionally based on institutional protocols.²⁰ Anesthesia

TABLE 2. Tiered Approach for Stratification of Elective Endoscopy Procedures During the Ramp-up Period

Tiers	Period, mo*	Capacity Goal, %
Tier 1	2–3	25–50
Tier 2	3–5	50–75
Tier 3	>5	100

*Suggested period at which the procedure should be performed, or patient's chart should be reviewed for recurrent triage. This time is dependent on patient's factors, facility capacity, and local COVID-19 prevalence.

societies currently recommend the use of general endotracheal anesthesia to reduce aerosolization in patients with suspected or confirmed COVID-19 and in asymptomatic patients undergoing AGPs at areas of high-community transmission.¹² Institutional protocols specifying the type and number of HCP present in the endoscopy room during a procedure need to be reviewed with the goal of minimizing exposure to personnel, reduce nosocomial viral transmission, and preserve PPE. A recent guideline of the American Society of Gastrointestinal Endoscopy recommended that for ERCP or EUS assisted by an anesthesia provider, the minimum number of HCP should be one nurse or technician, in addition to the endoscopist.²¹ To prevent leakage of aerosol production outside the room, transition of nursing and anesthesia staff during the procedure should be eliminated if possible. Additional considerations to limit HCP in the endoscopy suite include the operation of fluoroscopy units by the endoscopist rather than a radiology technician, as well as onsite cytopathology evaluation and processing outside the procedure room.

Appropriate use of PPE as detailed by society guidelines is essential for pancreaticobiliary endoscopic procedures during the COVID-19 pandemic. This includes (a) adequate hand hygiene, (b) universal use of fit-tested respirators (N95 or N99 masks, or powered air-purifying respirators), (c) waterproof gowns, (d) double pair of gloves, with outer pair over the gown covering the wrists, (e) hairnet, (f) goggles or face shield for eyes protection, and (g) long-sleeve shoe covers.^{6,22,23} The generation of procedural aerosols can be reduced by applying air suctioning during the removal of instruments through the biopsy channel.¹⁰ For ERCPs, the use of urine bags attached to the biopsy port can be considered to reduce external fluid spillage.

There is lack of evidence for changing pancreaticobiliary endoscopy procedural practices during the COVID-19 pandemic. Necessary interventions must continue to be guided by high-quality data supporting efficacy and reduced harms. Anecdotal evidence limited to case reports and mechanistic pharmacology has suggested a possible link between ibuprofen and severity of COVID-19 infection.²⁴ This weak evidence should not preclude the use of rectal indomethacin for preventing post-ERCP pancreatitis, which has demonstrated high efficacy in randomized controlled trials.²⁵ Staff administering the medication rectally should be cautious and be aware that COVID-19 particles can be found in feces, which is still of unknown significance for potential fecal-oral transmission.²⁶

Cleaning and disinfection of the room should be promptly performed after adequate time for air change has elapsed. Decontamination of the lead apron, lead glasses, ultrasound processor, endoscopy boom, and C-arm should occur after every use. The ingredients used in current disinfection and reprocessing protocols of duodenoscopes and echoendoscopes are effective in inactivating all viruses including the coronavirus; hence, endoscope-related COVID-19 infections should not occur when these methods are perhaps for appropriately implemented.^{6,23}

RAMP-UP STRATEGY

As COVID-19 rates are reaching plateau, the focus of endoscopy units should be toward implementing exit strategies for an expected large backlog of elective procedures. The decision for ramping up procedures should be informed by a sustained reduction in local COVID-19 cases for at least 14 days, adequate hospital capacity to safely treat all potential patients requiring hospitalization, wide availability of testing for subjects with COVID-19 symptoms, and regional ability to conduct active monitoring of confirmed cases and their contacts.²⁷ Based on local diagnostic capabilities, universal testing policies need to

be developed for patients undergoing planned endoscopic procedures and for HCP. A pre-COVID era endoscopy case log can be envisioned if testing can be implemented for all patients and perhaps for HCPs (at each shift change).

A reliable supply chain of PPE, equipment, devices, anesthesia medications, and cleaning products must be in place before escalating endoscopic procedures. Potential adjustments to endoscopy unit schedules are anticipated, including assignment of longer blocks to ensure cleaning and adequate air circulation between procedures, and extension of hours of daily operation and weekend sessions to accommodate the high procedure demands.²⁸ Preemptive discussion and coordination with anesthesia, nursing, housekeeping, and endoscopy supply team are necessary for expanded hours of operation. To avoid a rapid influx of procedures that can overwhelm the local facility, the endoscopy workforce should continue using a thoughtful prioritization approach with tiers for elective indications and should consider assigning a capacity goal for each tier before resuming elective procedures (Table 2).

FINAL REMARKS

Although the medical community faces an unprecedented situation and as the pandemic progresses, additional challenges will arise that will require innovation and flexibility to overcome this global health crisis. Pancreaticobiliary endoscopists should follow local regulations, use clinical judgment to prioritize procedures, and perform interventions guided by high-quality data. Moreover, we cannot be effective clinicians and endoscopists, unless we take care of our physical and mental well-being, care for our families, and coordinate effectively with colleagues at work. Together, the pancreaticobiliary community will need to support each other, continue to adapt, and provide the best possible care to the patients.

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