

Characteristics of the endoscopic procedures performed in a hybrid tertiary-level hospital during the first year of the COVID-19 pandemic

Héctor Adrián Díaz Hernández, José Elihú Cuevas Castillejos, Godolfino Miranda Zazueta, Adriana Fabiola Romano Munive, Francisco Valdovinos Andraca

National Institute of Medical Sciences and Nutrition Salvador Zubirán, Belisario Domínguez Sección XVI, Tlalpan, Ciudad de México, Mexico

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Address for correspondence: Héctor Adrián Díaz Hernández, National Institute of Medical Sciences and Nutrition Salvador Zubirán, Vasco de Quiroga 15, Belisario Domínguez Sección XVI, Tlalpan, Ciudad de México, 14080, e-mail: hectroyano@hotmail.com

Abstract

Introduction: The COVID-19 pandemic caused many changes in gastrointestinal endoscopy units.

Aim: To describe the changes that occurred in a gastrointestinal endoscopy unit of a hybrid hospital during the COVID-19 pandemic.

Material and methods: We performed a retrospective study of endoscopies performed in the first year of the COVID-19 pandemic. We collected and described the data of interest to the study, which is presented with numbers and percentages or measures of central tendency and dispersion as appropriate. Fisher's exact test or the χ^2 test were used as appropriate.

Results: A total of 507 procedures were performed. There was a 92.5% reduction in the performance of endoscopic procedures. In all, 77 (15%) procedures were performed on patients with COVID-19. The most frequent procedures were esophagogastroduodenoscopy (EGD), colonoscopy, and endoscopic retrograde cholangiopancreatography (ERCP). The main indications were gastrointestinal bleeding, placement of enteral accesses, and alterations in the biliary and pancreatic ducts. Of these, 37 (48%) were therapeutic. Patients with COVID-19 were more susceptible to the development of complications.

Conclusions: During the first year of the COVID-19 pandemic, the number of endoscopic procedures performed decreased significantly. The procedures most often required were EGD, colonoscopy, and ERCP, mainly indicated by gastrointestinal bleeding, placement of enteral accesses, and alterations of the bile and pancreatic ducts.

Introduction

The pandemic caused by the coronavirus disease 2019 (COVID-19) took everyone by surprise. Since the first cases of atypical pneumonia were reported in Wuhan, China on 17 November 2019, the disease rapidly spread around the world, with the first case reported in Mexico on 27 February 2020 [1, 2]. By 15 October 2021, more than 240 million cases and 4.9 million deaths had been reported in the world, of which 3.7 million cases and 284,381 deaths were reported in Mexico [3]. To face the great hospital burden caused by this disease, measures were taken throughout the world and in Mexico to reconvert multiple hospitals, prioritizing critically ill patients with COVID-19, according to the characteristics and possibilities of each region [4, 5]. In Mexico,

an increase from 2446 to 11,634 intensive care beds was achieved between March and July 2020 [6]. This hospital reconversion, as well as the high risk to health personnel of transmission of the disease by droplets or through the respiratory and faecal–oral routes caused a significant decrease in the number of procedures performed in all medical areas, including the services of gastrointestinal endoscopy, and forced the implementation of multiple personal protective measures for health personnel, as well as the need to prioritize the endoscopic procedures performed during the pandemic [7–12]. The decrease in the number of endoscopic procedures mainly occurred in those of an elective nature, which caused an average reduction of 83% in the number of endoscopies around the world [13, 14]. This reduction started to reverse during the following

months; however, to date, the volume of endoscopic procedures has not yet recovered to its pre-pandemic level [15]. This reduction also had a direct impact on the training of endoscopists, reducing the involvement of residents in 'hands-on' procedures, because some endoscopy societies published guidelines that explicitly limited the participation of endoscopists in training during the COVID-19 pandemic [16–18]. Additionally, many hospitals re-organized their medical staff and relocated physicians in training to critical areas, which further contributed to the decrease in their participation in endoscopic procedures [19]. Currently, there are few studies that evaluate endoscopic procedures performed in patients with COVID-19; in addition, all these studies are heterogeneous in terms of how they group the indications for endoscopic procedures.

Aim

The aim of this study was to describe the changes that occurred in a gastrointestinal endoscopy unit of a hybrid tertiary-level hospital in Mexico because of the COVID-19 pandemic during a period of 1 year in a real-life setting.

Material and methods

We conducted a retrospective, descriptive study of the patients who attended the Gastrointestinal Endoscopy Unit of the National Institute of Medical Sciences and Nutrition Salvador Zubirán in Mexico in the period from 16 March 2020 to 15 March 2021. We included all adult patients of both sexes who underwent a gastrointestinal endoscopy procedure during this period. From the beginning of the attendance of patients with COVID-19, the endoscopy department adhered to the current endoscopic triage recommendations to prioritize the performance of endoscopic procedures into time-sensitive and non-time-sensitive [9]. From then on, the recommendations that emerged over time for the performance of endoscopic procedures during the pandemic were followed [11]. All patients who underwent a gastrointestinal endoscopy study underwent a reverse transcription polymerase chain reaction (RT-PCR) for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) at least 72 h before the procedure and a simple computed tomography of the chest at least 24 h before the procedure to classify them as patients with or without COVID-19, as per hospital protocol. In the case of hospitalized patients, the procedure was performed on both groups of patients with the pertinent precautionary measures. In the case of outpatients, procedures were only performed on patients without COVID-19; procedures on patients with COVID-19 were deferred, and such patients were

referred to the emergency room for evaluation and pertinent management of COVID-19. We generated a registry of all patients who underwent a gastrointestinal endoscopy procedure during the study period. The patients' general characteristics, such as sex, age, and region of origin, were recorded in a database, as well as the characteristics of interest to the study, such as the number and types of procedures performed, the indications for the procedures performed according to international practice guidelines [20], if they were performed and, if not, the reason for cancelation, if a biopsy was performed, if the procedures were diagnostic or therapeutic (endoscopic procedures in which an intervention other than biopsy was performed; for example, application of an endoscopic clip for haemostasis, polypectomy, mechanical dilation, etc.), if the patient was positive or negative for COVID-19, if the indication was related to COVID-19 or not, and if any complications presented in the procedures performed.

Statistical analysis

For the statistical analysis, categorical variables are presented with numbers and percentages, and numerical variables are presented with the appropriate measures of central tendency and dispersion. To evaluate differences between categorical variables, Fisher's exact test or the chi-square test was used, as appropriate. To collect the information in a database, Microsoft® Excel for Mac V.16.53 was used, and IBM® SPSS® Statistics V.25 was used for their analysis.

Results

Number of gastrointestinal endoscopy procedures

For reference, in 2019, the year immediately prior to the year in which the first case of COVID-19 was reported in Mexico, 6771 procedures were performed in our unit. In the period covered by this study, 507 procedures were performed, of which 309 (60.9%) were performed on outpatients, and 198 (39.1%) were performed on hospitalized patients. Of these patients, 277 (54.6%) were men, and the median patient age was 58 years (45–67). All 507 (100%) patients were from Latin América. Thus, there was a 92.5% reduction in the performance of procedures. Of the total procedures conducted, biopsies were taken in 140 (27.6%), and 234 (46.3%) were therapeutic. In patients without COVID-19, biopsies were taken in 130 (30.2%), and 197 (45.9%) therapeutic procedures were performed. In patients with COVID-19, biopsies were taken in 10 (12.9%), and therapeutic procedures were performed in 37 (48%).

Table I. Proportion of patients with COVID-19 in each type of endoscopic procedure

Procedure type	With COVID-19
Total	77 (15.1%)
EGD or duodenoscopy	61 (20.5%)
Colonoscopy or recto-sigmoidoscopy	10 (9%)
Enteroscopy	1 (9.1%)
ERCP	4 (6.5%)
EUS	1 (4%)

COVID-19 – coronavirus disease 2019, EGD – esophagogastraduodenoscopy, ERCP – endoscopic retrograde cholangiopancreatography, EUS – endoscopic ultrasound.

Indications for gastrointestinal endoscopy procedures in patients with COVID-19

Of the total number of procedures performed, 77 (15%) were conducted in patients with COVID-19. The COVID-19 status of each case is shown in Table I. In the group of patients with COVID-19 evaluated in this study, the most frequent indications were the following: for EGD or duodenoscopy, gastrointestinal bleeding, placement of enteral accesses, and persistent upper abdominal symptoms; for colonoscopy or recto-sigmoidoscopy, gastrointestinal bleeding, chronic diarrhoea, and iron deficiency anaemia; for enteroscopy, gastrointestinal bleeding; for ERCP, evaluation and management of alterations in the biliary and pancreatic ducts and placement and replacement and removal of biliary prostheses; and for EUS, evaluation of abnormalities of the biliary tract. The complete indications for gastrointestinal endoscopy procedures in patients with COVID-19 are shown in Table II. Of the total procedures performed, the indication was found to be related to COVID-19 in 70 (13.8%). In the case of outpatients, only in 3 (0.7%) was the indication found to be related to COVID-19, on the other hand, in the case of hospitalized patients the indication was found to be related to COVID-19 in 67 (95.7%).

Complications

Of the total procedures performed, 7 (1.4%) complications were documented. Of these, 3 (0.6%) were in outpatients (without COVID-19) and included a post-polypectomy bleed in a colonoscopy, a variceal trans-ligation bleed in an EGD, and a bile leak in an ERCP. Four (5.1%) complications were documented in hospitalized patients (with COVID-19) and included an endoscopic post-therapy bleed due to upper gastrointestinal bleeding in one EGD, one post-ligation endoscopic bleed in one EGD, and two post-sphincterotomy bleeds in two ERCPs. The difference in the rate of com-

plications in procedures performed in patients with and without COVID-19 was statistically significant ($p < 0.05$).

Discussion

Studies have evaluated the impact of the COVID-19 pandemic on the number of endoscopic procedures and the changes in some of its characteristics; for example, whether they were for preventive or diagnostic purposes [15]. Other studies have evaluated the indications and results of endoscopic procedures performed in patients with COVID-19; however, the samples have been small. The most frequently performed procedures were EGD, followed by colonoscopy and ERCP, and the most frequent indications were gastrointestinal bleeding, placement of enteral accesses, and the need for diversion of the bile duct [21–23]. A nationwide study in the USA determined that at the beginning of the pandemic, there was a decrease in the performance of EGD and colonoscopy procedures by 38.5% and 33.4%, respectively. They observed regional variations, an increase in diagnostic procedures, and a decrease in preventive procedures, but they did not evaluate all types of endoscopic procedures, their specific indications, or their relationships with COVID-19 infection [15]. Endoscopic procedures performed in patients with COVID-19 were evaluated in a multicentre study in North America. The total sample comprised 27 endoscopic procedures performed in patients with COVID-19. There were 18 EGDs, 7 colonoscopies, and 2 ERCPs. The most common and predominant indications were gastro-intestinal bleeding and placement of enteral accesses. In 10 of the 27 procedures (37%), some therapeutic intervention was performed [21]. In a European study of 91 procedures performed in patients considered to be at high risk of COVID-19 infection, they described the following: the most frequently performed procedures were EGD, ERCP, and colonoscopy. The most common indications were gastrointestinal bleeding, enteral access placement, and bile duct diversion [22]. A European study evaluated the impact of the COVID-19 pandemic on endoscopic procedures in terms of indications, procedures performed, and reported findings. They reported a decrease in the performance of EGD and colonoscopy by 57% and 45%, respectively. In their study, the types and numbers of endoscopic procedures performed are very well detailed; however, regarding the indications and findings, they only reported information about the diagnosis of gastrointestinal cancer, and they mentioned that many colonoscopies were performed for haematochezia and that in many EGDs they found peptic ulcer disease, without providing further details [23]. More studies were conducted through surveys. An international survey with 48 participating countries reported

Table II. Indications for endoscopic procedures in patients with and without COVID-19

Indication	Patients with COVID-19 (N = 77) n (%)	Patients without COVID-19 (N = 430) n (%)
EGD or duodenoscopy:	61 (100)	237 (100)
Gastrointestinal bleeding	31 (50.8)	53 (22.3)
Enteral access placement	26 (42.6)	10 (4.2)
Persistent upper abdominal symptoms	1 (1.6)	5 (2.1)
Dysphagia or odynophagia	1 (1.6)	8 (3.3)
Iron deficiency anaemia	1 (1.6)	13 (5.4)
Portal hypertension	0 (0)	39 (16.4)
Evaluation and/or management of non-surgical stenosis	0 (0)	24 (10.1)
Upper abdominal symptoms with alarm signs	0 (0)	15 (6.3)
Other	1 (1.6)	70 (29.9)
Colonoscopy or recto-sigmoidoscopy:	10 (100)	101 (100)
Gastrointestinal bleeding	5 (50)	20 (19.8)
Chronic diarrhoea	3 (30)	5 (4.9)
Iron deficiency anaemia	1 (10)	6 (5.9)
Screening, evaluation, and surveillance of colorectal cancer	1 (10)	34 (33.6)
Evaluation, management, and surveillance of polyps	0 (0)	11 (10.8)
Evaluation, management, and surveillance of inflammatory bowel disease	0 (0)	7 (6.9)
Other	0 (0)	18 (18.1)
Enteroscopy:	1 (100)	10 (100)
Gastrointestinal bleeding	1 (100)	1 (10)
ERCP by enteroscopy	0 (0)	5 (50)
Evaluation, management, and surveillance of polyps	0 (0)	1 (10)
Enteral access placement	0 (0)	1 (10)
Evaluation and/or management of non-surgical stenosis	0 (0)	1 (10)
Evaluation of alterations observed in imaging study	0 (0)	1 (10)
ERCP:	4 (100)	58 (100)
Evaluation and management of alterations of the biliary and pancreatic ducts	3 (75)	22 (37.9)
Placement, replacement, or removal of biliary prosthesis	1 (25)	11 (18.9)
Evaluation and management of stenosis of the biliary and pancreatic ducts	0 (0)	19 (32.7)
Obstructive jaundice	0 (0)	3 (5.1)
Ampullectomy	0 (0)	2 (3.4)
Other	0 (0)	1 (1.7)
EUS	1 (100)	24 (100)
Evaluation of abnormalities of the biliary tract	1 (100)	6 (25)
Evaluation of abnormalities of the pancreas	0 (0)	11 (46)
Evaluation of intra-mural or extra-luminal abnormalities of the gastrointestinal tract	0 (0)	2 (8.3)
Cancer staging	0 (0)	1 (4.1)
Biliary or pancreatic canulation	0 (0)	1 (4.1)
Other	0 (0)	3 (12.5)

EGD – esophagogastroduodenoscopy, GERD – gastroesophageal reflux disease, ERCP – endoscopic retrograde cholangiopancreatography, EUS – endoscopic ultrasound.

a reduction in the performance of EGD, colonoscopy, and ERCP of 80.66%, 81.82%, and 56.64%, respectively. The most frequent indications were gastrointestinal bleeding, cholangitis, suspected cancer, removal of foreign bodies, and gastro-intestinal obstruction [24]. The following was reported in a multicentre study in Europe. Most centres reported a > 75% decrease in the performance of endoscopic procedures. Also in the survey, the participants considered that the priority endoscopic procedures during the pandemic should be gastrointestinal bleeding, the extraction of foreign bodies, and the evaluation and management of obstructive jaundice [14]. Regarding the reduction in the number of procedures, the impact was greater in our centre than in other centres in the world. In the multicentric European study by Bor (2021), most centres reported a reduction of > 75% in all endoscopic procedures. In the multicentric American study by Calderwood (2021), they reported a reduction of 38.5% in EGD and 33.4% in colonoscopy. In the international multicentric study by Alborai (2020), they reported a reduction of 80.66% in EGD, 81.82% in colonoscopy, and 56.64% in ERCP. In our study, we found a reduction of 92.5% in the total number of procedures, and in specific procedures, we observed a reduction of 92.3% in EGD, 94.2% in colonoscopy, 88% in enteroscopy, 85.2% in ERCP, and 94.1% in EUS. The differences observed in the reduction rates of procedures were possibly due to the consideration of all types of centres, non-COVID-19, COVID-19, and hybrid, in previous studies. In our case, the study was conducted in a single centre that operated as a hybrid centre during the study period and the most important concentration centre in our country during the COVID-19 pandemic, and therefore with more restrictions for carrying out the endoscopic procedures [14, 15, 24]. In the study by Kuffinec (2021), it was reported that the most frequently performed studies in patients with COVID-19 were EGD, colonoscopy, and ERCP. Ratyński (2020) reported that the most frequently performed studies in patients with COVID-19 were EGD, ERCP, and colonoscopy. In our study, the most frequently performed studies in patients with COVID-19 were EGD or duodenoscopy (58.7%), colonoscopy or recto-sigmoidoscopy (21.8%), and ERCP (12.2%). These results are consistent with previous reports [21, 22]. With respect to the indications of the procedures performed in patients with COVID-19, in our study, the most common indications were gastrointestinal bleeding, placement of enteral accesses, and evaluation and management of alterations of the bile and pancreatic ducts (Table II). These results are consistent with previous studies describing indications for endoscopic procedures performed in patients with COVID-19 [21, 22]. In this study we also observed that

fewer biopsies were taken in procedures performed on patients with COVID-19. This is explained by the indications under which the procedures were performed in each group. For example, in both groups the most commonly performed procedure was EGD; however, in the group of patients with COVID-19 the vast majority of procedures were performed under the indications of gastrointestinal bleeding and enteral access placement, in which the need of biopsies is generally not necessary. On the other hand, in the group of patients without COVID-19, a greater number of studies were performed under indications such as persistent upper abdominal symptoms or with alarm signs, dysphagia or odynophagia, iron deficiency anaemia, etc. in which the need of biopsies is often necessary. One of the strengths of this study is that it is the first to describe the indications for endoscopic procedures performed in patients with COVID-19 according to the standardized indications described in international clinical guidelines [20]. It is the first study to describe the characteristics of endoscopic procedures performed in patients with COVID-19 in Mexico and Latin America. Also, it is a study that illustrates what happens in a real-life scenario in a teaching hospital in the face of an epidemiological contingency such as the first year of the COVID-19 pandemic. The weaknesses of this study are that it was conducted in a single centre and had a retrospective design.

Conclusions

During the first year of the COVID-19 pandemic in Mexico, the number of endoscopic procedures was significantly reduced, and the procedures most required in patients with SARS-CoV-2 infection were EGD, colonoscopy, and ERCP, mainly indicated by gastrointestinal bleeding, placement of enteral accesses, and alterations of the bile and pancreatic ducts. It seems that patients with COVID-19 are more susceptible to the development of complications following endoscopic procedures, which must be considered when weighing the risk-benefit of performing an endoscopic procedure in this group of patients.

Conflict of interest

The authors declare no conflict of interest.

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