Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Correspondence

Delays in urgent endoscopic interventions in a gastrointestinal endoscopy referral center and dedicated COVID unit: Riding the waves?

Dear Editor,

Since the start of the COVID-19 pandemic [1], major healthcare protocol overhauls have been enforced worldwide in order to contain the disease. Due to system-wide reduced availability and because endoscopic interventions were considered to carry a high risk of transmission [2], local practices suffered significant changes including strict prioritization and increased waiting time for most endoscopic procedures. Position statements issued by expert societies offered guidance [3] on procedure stratification according to the level of emergency, but many decisions were still taken on a case-by-case basis, leading to inhomogenous practice and unnecessary delays [4,5] and potentially contributing to adverse outcomes.

In response to the anticipated rise in COVID-19 cases our unit, a tertiary referral centre for digestive endoscopy in Bucharest, Romania, was dedicated exclusively to COVID-19 cases with significant concomitant digestive pathology. Since March 2020, all endoscopic interventions in patients with confirmed active COVID-19 from a large catchment area were performed exclusively in our unit. At the beginning of the pandemic, we observed a tendency to systematically delay cases where rapid endoscopic intervention was mandatory according to pre-pandemic guidelines in order to ascertain the outcome of COVID-19 or due to reluctance of the endoscopist. We hypothesized that this might lead to suboptimal patient ourcome and consequantly analyzed demographic information and data pertaining to the endoscopic procedure and classified the procedures according to the priority levels recommended by the ESGE position statements [3]. For each case we extracted the following timepoints: confirmation of SARS-CoV-2 infection, transfer to our unit, date when the attending physician documented the emergence of an indication for endoscopic intervention, and the date of the actual endoscopic procedure. Cases in which endoscopy was performed after the recommended interval were considered as delayed and the number of days between indication and intervention was noted.

We identified 113 procedures performed in 90 patients admitted between March 2020 and March 2021. Most patients (72/90; 80%) were either asymptomatic or had mild COVID-19 at the time of admission but they had significant comorbidities according to the Charlson comorbidity index and the ASA class (81/90 were ASA class 3 or above). 72 patients were transferred to our unit specifically for an endoscopic intervention, while the other 18 developed an indication more than 24 h after admission (mostly GI bleeding). Most of the procedures were ERCPs performed for biliary obstruction; while significant gastrointestinal bleeding was the second most frequent indication. Twenty patients developed post-procedural complications (11 cases of cholangitis or incomplete drainage, 6 of GI bleeding, 3 pancreatitis) and there were 14 re-interventions due to incomplete response or procedure-related complications. Nine patients required transfer to the ICU during their admission and 10 deaths were recorded (8 due to COVID-19, 1 due to decompensated cirrhosis, and 1 due to sepsis from incomplete drainage). Upon dichotomizing the COVID severity (asymptomatic/ mild vs. moderate/severe), a statistically significant difference was found in regard to admission to ICU (2/72 *vs.* 11/18, $p < 0.001$) or death (1/72 *vs.* 9/18, $p < 0.001$). The main characteristics of the patients are presented in Table 1. No medical personnel from the endoscopy unit was infected during the analyzed period.

In order to assess the impact on procedure volume and practice, we examined corresponding data from procedures performed during a similar interval in the pre-pandemic period (April 2019-March 2020) as a comparator. In that timeframe 1907 patients were admitted to our unit for either diagnostic or therapeutic endoscopic interventions. Overall, when compared to patients treated pre-COVID, patients admitted for endoscopy in the COVID era were more likely to have an urgent or high level of priority for endoscopy. Patients with COVID-19 waited significantly more time before endoscopy was performed, they required procedural sedation more often, and they were more likely to develop severe complications related to endoscopy and a need for re-intervention.

At the beginning of the pandemic it became obvious that procedural waiting time was prolonged due to uncertainty regarding the role of infection on ultimate outcome, strong recommendations for extreme personal protection and security measures as well as overall physician reluctance to engage in procedures considered at extremely high risk of contamination. After more experience was gained and data revealed the safety and efficacy of endoscopic procedures in COVID patients, safety measures were relaxed in the second wave and this, in turn, arguably led to a decrease in delays for urgent procedures. Indeed, by dividing patients according to date of admission: « first wave » (March 2020- October 2020) and, respectively, « second wave » (November 2020- March 2021), certain significant differences were noted. Twenty-six patients were admitted for endoscopic intervention in the first wave and they were hospitalized for a median of 14 days. Comparatively, in the second wave more than twice that number of patients were admitted and their length of hospital stay was similar to the first group. Fig. 1 shows the evolution of admissions on a monthly basis in relationship to the reported cases PCR-confirmed COVID-19

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Table 1
Demographics and endoscopic procedures according to COVID wave.

	All patients (n = 90)	First wave (n = 26)	Second wave (n = 64)	p
Age (years)	66(60–76)	67 (61–77)	66 (59–76)	0.6
Gender (female/male)	39/51	11/15	28/36	1
COVID severity	Asymptomatic = 60	Asymptomatic = 17	Asymptomatic = 43	0.5
	Mild = 12	Mild = 5	Mild = 7	
	Moderate = 6	Moderate = 2	Moderate = 4	
	Severe = 12	Severe = 2	Severe = 10	
ASA class	1:1	1:0	1:1	0.2
	2:8	2:0	2:8	
	3:31	3:8	3:23	
	4:40	4:14	4:26	
	5:10	5:4	5:6	
Charlson comorbidity index	5 (4–7)	5 (4–6)	5(3–8)	0.7
Admission duration (days)	13 (8–16)	14 (10–20)	13 (7–15)	0.079
Type of procedure	UGI = 24	UGI = 8	UGI = 16	0.6
	LGI = 8	LGI = 1	LGI = 7	
	ERCP = 57	ERCP = 17	ERCP = 40	
	EUS = 1	EUS = 0	EUS = 1	
Interval from indication until endoscopy (days)	2 (1–6)	9 (1–14)	1 (1–3)	< 0.001
Interval from test until endoscopy (days)	5 (3–11)	12 (5–17)	5 (3–8)	0.008
ESGE level of priority[3]	Urgent= 41	Urgent= 19	Urgent= 22	0.002
	High= 47	High= 6	High= 41	
	Low= 2	Low= 1	Low= 1	
Sedation (Y/N)	75/15	20/6	55/9	0.3
Complications (Y/N)	20/70	6/20	14/50	1
Reinterventions (Y/N)	14/76	4/22	10/54	1
Admission to ICU (Y/N)	9/81	2/24	7/57	1
Outcome (death/discharge)	10/80	2/24	8/56	0.7

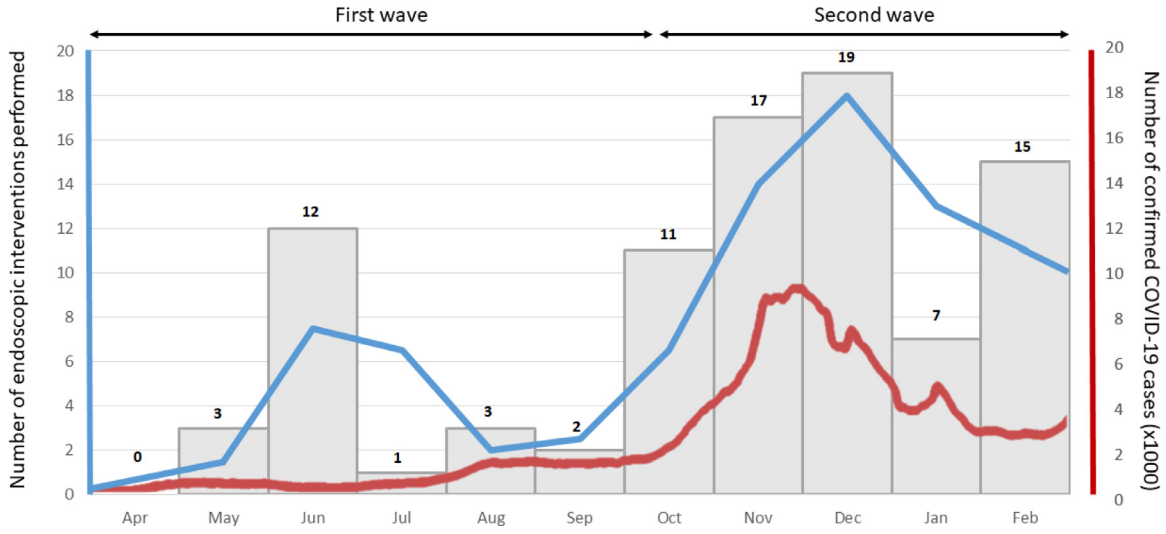

Fig. 1. Evolution of monthly number of endoscopic procedures performed in a referral centre compared to the number of newly diagnosed COVID-19 cases in Romania between April 1st 2020- Mar 1st 2021.

detected at national level. The interval of time elapsed from indication to perform endoscopy and actual intervention was significantly longer in the first group compared to the second (median of 9 *vs* 1 day, $p < 0.001$) as was the time elapsed from confirmed RT-PCR COVID infection until endoscopic intervention (median of 12 *vs* 5 days, $p = 0.008$). We found no difference in sedation, endoscopic complication rate, need for reintervention or outcome between the two groups. These results reflect the change in attitudes of the medical community in the past year. Whereas initially extreme and difficult to implement precautions were suggested for aerosol-generating procedures (including negative pressure rooms, hazmat suits, various protective devices [6]), subsequent data has shown the potential for transmission during endoscopic procedures to be much lower than estimated [7]. In a previous multicenter study we found similar changes in volume and tactics in providing ERCP for patients with COVID-19 across 12 referral centers from Europe [8], and other groups have described comparable adjustments to their workflow and protocols in response to the state of the outbreak in their countries [4,5].

From the standpoint of the ESGE criterion for prioritization of endoscopy during the pandemic[3], procedures in the first wave were mostly for an urgent indication, compared to the second wave when high-priority cases predominated. Cases in which endoscopy was delayed were much more frequent in the first group (Fig. 2) and these patients were more likely to have a favorable outcome. Endoscopic procedures for acute bleeding were less likely

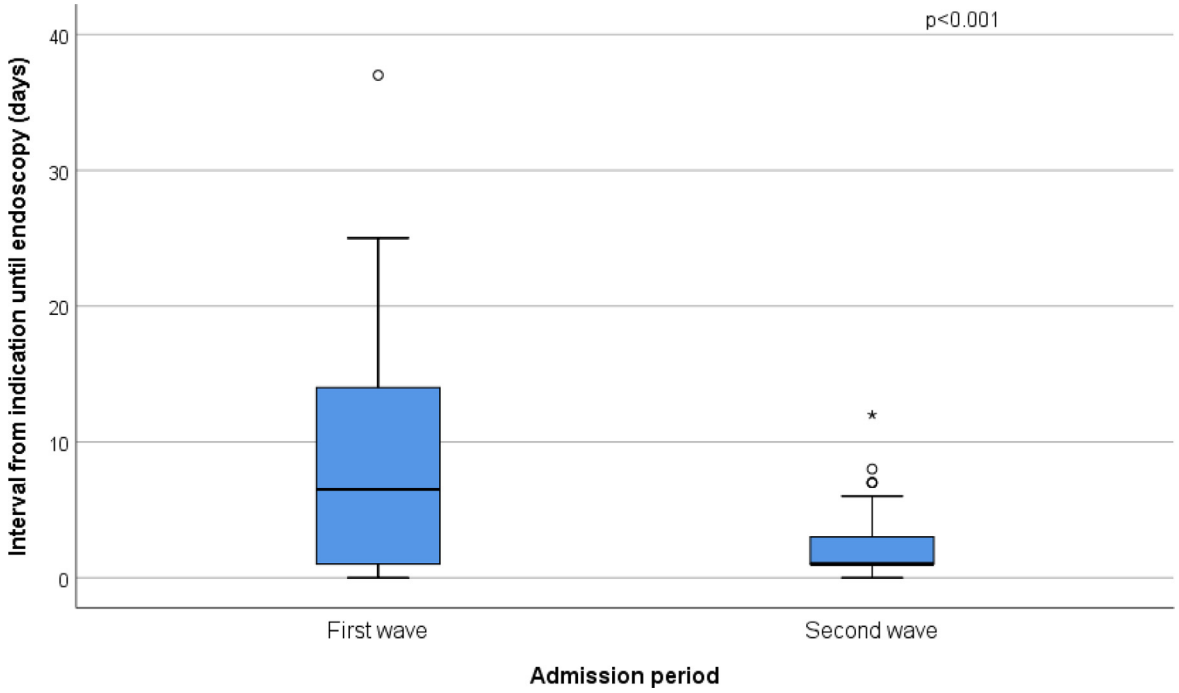

Fig. 2. Comparison of time elapsed from emergence of indication to endoscopic intervention according to period of admission.

to be postponed than other interventions, mainly for biliary obstructions (5/28 vs. 33/62, $p = 0.02$ *chi-square*). There were no differences in age, gender, COVID severity, ASA class, Charlson comorbidity index, complications and rate of reintervention.

The COVID-19 crisis has deeply altered medical practice in the past year and the impact of these changes is not completely quantifiable. Endoscopy services worldwide have reported temporary shutdowns of all activities at some point during the pandemic and, even at the moment of writing this article, resumption of normal activity is not widespread. Several groups have reported their experience with delays in endoscopic procedures due to COVID-19. The initial tendency to favor conservative treatment even in urgent cases such as significant gastrointestinal bleeding or acute cholangitis [9] reinforced the belief that conventional, pre-pandemic criteria for endoscopy could be adjusted on a case-by-case basis, with no harm to the patient and there continues to be very little agreement among endoscopists about which indications require early intervention (within 72 h) in the current epidemiological situation. Our results bring further data to this discussion as they reflect how the forced change in common endoscopic practice (such as timing of intervention) during the pandemic did not impact prognosis significantly. Patients treated in the COVID period were indeed more likely to develop procedure-related adverse events and require reintervention but mandatory interventions were not inordinately postponed, leading us to believe that this group was more frail and had an increased pre-procedural likelihood of a negative outcome.

Restricting procedures to the most relevant ones as appraised by a discerning endoscopist may be beneficial in the relative rate of significant findings, but carries the risk of delaying diagnosis and therapy for many patients [10]. This is evident in the setting of elective procedures such as screening or surveillance, where the tremendous backlog that is still accruing will definitely lead to missed opportunities for curative treatment.

As the pandemic slowly gets under control in countries with high vaccination rates it seems likely that endoscopic practice will see a return to higher workloads. We hope that the lessons learnt in this extraordinary situation, both about our limits as physicians and the real-life impact of our professional guidance, are not forgotten.

Authorship

Andrei Voiosu and Bianca Alexandra Dinescu participated in the design, data collection, statistical analysis and writing of the initial draft. Andreea Bengus participated in data collection, literature review, statistical analysis and revision of the initial draft. Radu Bogdan Mateescu and Mihail Radu Voiosu participated in the design of the study, performed additional literature review and revised the initial draft. Theodor Voiosu participated in literature review, statistical analysis, revision of the initial draft and figure design. All authors approved the final version of the manuscript.

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Declaration of Competing Interest

None to declare.

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