Efficacy of endoscopic triage during the Covid-19 outbreak and infective risk

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Objective SARS-CoV-2 outbreak is spreading worldwide. As a consequence of the new circumstances, almost all endoscopic units underwent in-depth reorganization involving patients' selection. We analyzed the efficacy of the newly adopted endoscopic triage.
Methods In March 2020, we monitored endoscopies to evaluate the effects of the novel selective triage aimed to reduce the number of investigations and viral spread/contagions. Clinical-demographic data of the patients, indications, type of endoscopy, endoscopic findings (subtyped in major and minor), finding rates (major and minor) and diagnostic yields (major findings) have been analyzed and compared to the endoscopic procedures performed in March 2019. Furthermore, patients were called at least 21 days after the endoscopy to evaluate the possibility of a Covid-19 onset.
Results Accordingly to the novel triage, the number of procedures dropped from 530 to 91 (–84%). The finding rates and diagnostic yields were 83% (74–89) vs 71% (66–73) (*P* 0.015) and 56% (46–65) vs 43% (38–47) (*P* 0.03) on March 2020 and March 2019, respectively. A significant increase of operative procedures has been reported in 2020, 34% vs 22% in March 2019. All the patients were recalled and neither cases of onset of Covid-19 like symptoms nor positive nasopharyngeal swabs PCR have been evidenced.
Conclusion The novel endoscopic triage significantly reduced the number of procedures and increased finding rates and diagnostic yields. However, a careful schedule of canceled procedures should be applied to avoid to miss relevant pathologies. No Covid-19 onset or infection has been noted after endoscopies. Eur J Gastroenterol Hepatol XXX: 00–00

Introduction

A SARS-CoV-2 outbreak has spread worldwide, Italy being a high-incidence country following a lockdown strategy to reduce contagions [1]. As a consequence of the new circumstances, the need to contain the infection spread and the need to dedicate personnel and resources to the management of Covid-19 patients, almost all endoscopic units underwent in-depth reorganization involving logistics, scheduling and selection of patients [2–4]. New spaces for infected patients and waiting rooms maintaining appropriate human-to-human distancing have been prepared. Endoscopists and nurses have learnt how to use the personal protective equipment with a high-barrier effect and how to move around in the endoscopic rooms reducing the possibility of viral spread [5]. A novel triage was developed to identify and then perform only strictly necessary endoscopies. No data have been available about the efficacy of the novel 'endoscopic triage' adopted to limit the access to the endoscopic procedures.

We analyzed the efficacy of this newly adopted endoscopic triage compared to that in place during the non-Covid-19 era.

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Methods

From 9 to 27 March 2020, in the Endoscopy Unit of the Fondazione IRCCS Ca' Granda, a tertiary referral Center in Milano, a new selection of patients undergoing endoscopic procedures has been started, guided by the need to reduce the number of investigations and consequently the viral spread and contagions [2]. In the case of esophagogastroduodenoscopy (EGDS) and colonoscopy (CLS), procedures performed for oncological reasons, bleedings and other unpostponable indications have been maintained; in particular, subdivision of indications is present in Fig. 1. In the case of device-assisted enteroscopy [DAE, double balloon enteroscopy (DBE)], capsule endoscopy, endoscopic retrograde cholangiopancreatography (ERCP) and endoscopic ultrasonography (EUS), a case-by-case judgment has been adopted.

Clinical and demographic data of the patients have been recorded. Indications, type of endoscopy, endoscopic findings (subtyped in major and minor findings, Supplementary file 1, Supplemental digital content 1, *http://links.lww.com/EJGH/A597*), finding rates (major and minor findings) and diagnostic yields (major findings), as previously defined in the literature, have been analyzed

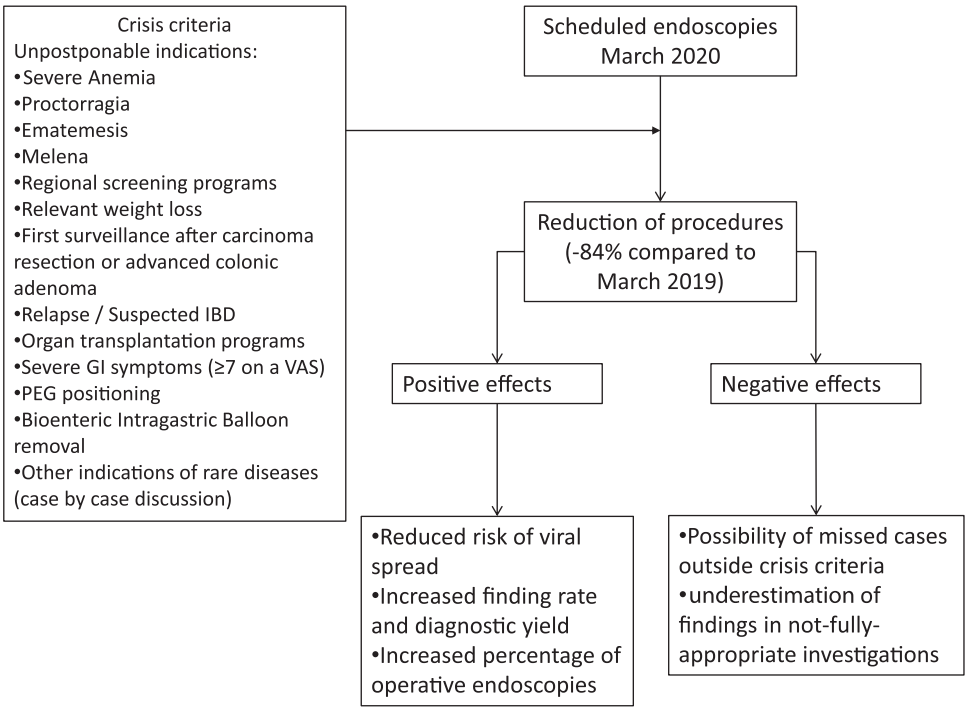

Fig. 1. Flowchart of the study reporting the 'crisis criteria' and their pro and cons.

Table 1. Procedures performed in March 2020 compared to those in March 2019

	March 2020	March 2019	*P* value
Patients			
Age (years)	59 ± 13	63 ± 16	0.03
Females (%)	43 (47.2%)	261 (49.4%)	0.64
Type of endoscopy			
All, *n*	91	530	NA
EGDS, *n* (%)	39 (31.8%)	255 (46%)	0.01
Esophageal dilatation, *n* (%)	4 (4.4%)	2 (0.4%)	0.005
Variceal band ligation, *n* (%)	4 (4.4%)	4 (0.8%)	0.005
PEG positioning, *n* (%)	1 (1.0%)	4 (0.8%)	0.54
Bioenteric intragastric balloon, *n* (%)	1 (1.0%)	1 (0.2%)	0.27
Colonoscopy	42 (46.0%)	222 (41.9%)	0.56
with polypectomy, *n* (%)	19 (20.9%)	52 (9.8%)	0.004
ERCP, *n* (%)	1 (1.0%)	21 (3.9%)	0.34
EUS, *n* (%)	0 (0.0%)	11 (2.1%)	0.38
DAE, *n* (%)	5 (5.5%)	8 (1.5%)	0.02
Anterograde, *n*	3	7	0.51[a]
Retrograde, *n*	2	1	
Capsule endoscopy, *n* (%)	4 (4.4%)	13 (2.4%)	0.29

DAE, device-assisted enteroscopy; EGDS, esophagogastroduodenoscopy; ERCP, endoscopic retrograde cholangiopancreatography; EUS, endoscopic ultrasonography.
[a]Anterograde vs retrograde.

and compared to the endoscopic procedures performed in the corresponding 2019 timeframe [6,7].

All patients were called at least 21 days after the endoscopy to evaluate the possibility of a Covid-19 onset; in particular, flu-like symptoms in the patients or cohabitants and/or positive PCR test have been evaluated [8].

Statistically, intergroup comparisons were performed by the Chi-square test or Fisher's exact test, as appropriate for discrete variables, and by the Student's *t*-test or the Mann–Whitney test, as appropriate for continuous variables. *P* value <0.05 was considered statistically significant. Analysis was performed by Graphpad software (GraphPad Software Inc, California, USA).

Results

Accordingly to the novel triage, the number of endoscopic procedures performed during Covid-19 outbreak drastically dropped from 530 to 91 (–84%). On March 2020, patients underwent endoscopy for bleeding in 32 (39%) cases, oncologic reason in 30 (37%), inflammatory bowel disease (IBD) in 3 (4%) and other indications in 16 (20%) (Table 1).

Globally, the finding rates and diagnostic yields were 83% (74–89) vs 71% (66–73) (*P* 0.015) and 56% (46–65) vs 43% (38–47) (*P* 0.03) on March 2020 and March 2019, respectively. Age and sex were not associated with diagnostic yields neither on 2020 nor 2019. In Table 2 the diagnostic yields of the routinely endoscopic procedures are reported in detail.

Findings of the endoscopic procedures on March 2019 and March 2020 demonstrated the relevant reduction of negative EGDS and CLS, from 30 to 10% and from 30 to 16%. Findings are fully detailed in Table 3.

In terms of operative EGDS and CLS, in 2019, they represented the 22% of the endoscopies, in 2020 the 34% ($P = 0.02$).

On March 2020, an ERCP has been performed for choledocolithiasis and no EUS. Five DBEs have been performed with a final diagnosis of active jejunal IBD, a case of multiple angiodysplasia, a case of segmental mucosal atrophy and two cases with normal findings. Among the four capsule endoscopies performed on 2020, one evidenced multiple jejunal angiodysplasia, one multiple jejunal bleeding ulcers and two normal.

All the patients were recalled, neither cases of onset of Covid-19 like symptoms nor cases of positive nasopharyngeal swabs PCR have been evidenced. Also the cohabitants of patients referred any symptoms compatible with Covid-19.

Table 2. Finding rates and diagnostic yields of esophagogastroduodenoscopy and colonoscopy in 2020 and 2019

Type of endoscopy	March 2020	March 2019	*P* value
EGDS (%)			
Finding rate (%)	90 (76–96)	70 (64–75)	0.0001
Diagnostic yield (%)	45 (64–89)	79 (39–51)	0.0001
Colonoscopy (%)			
Finding rate (%)	83 (69–92)	69 (63–75)	0.09
Diagnostic yield (%)	33 (20–48)	30 (25–37)	0.71

EGDS, esophagogastroduodenoscopy.

Discussion

The present study is the first evaluating endoscopic performance while adopting a new patients' triage compatible with the actual pandemic scenario. Following the novel criteria, the number of procedures has drastically dropped (–84%) with a significant increase of finding rates and diagnostic yields; similarly, the percentage of operative endoscopies has been significantly higher. No Covid-19 onset or infection has been noted after endoscopic procedures in respect of the incubation period (at least 21 days) [8].

For the first time, endoscopy units faced the necessity to apply 'war-time triage' to schedule the patients' access [2,3]. Reducing scheduled routine activities is one of the first steps to ease the pressure of a rapidly spreading infectious agent, such as SARS-CoV-2, in a hospital healthcare provision. Priority should be given to those interventions that can substantially improve patients' survival and postpone those which are not urgent nor strictly necessary [9]. Furthermore, triage is pivotal to preserve the health of healthcare professionals, as they are valuable limited resources during an epidemic outbreak [9].

On assessing patients undergoing endoscopy, we have identified bleedings, oncological patients and several peculiar cases (Fig. 1) as unpostponable indications. We have chosen these categories on consideration that

Table 3. Endoscopic findings in March 2020 and March 2019

	March 2020, *N* = 91	March 2019, *N* = 530	*P* value, compared to all procedures	*P* value, compared to the corresponding procedure
EGDS, *n* (%)	39 (42%)	255 (48%)	0.36	NA
Normal, *n* (%)	4 (4%)	76 (14%)	0.01	0.006
Major finding				
Erosive esophagitis, *n* (%)	7 (8%)	21 (4%)	0.08	0.19
Eosinophilic esophagitis, *n* (%)	0 (0%)	4 (0.7%)	1.0	1.0
Erosive gastritis, *n* (%)	0 (0%)	12 (2%)	1.0	0.37
Esophageal varices, *n* (%)	4 (4%)	35 (7%)	0.28	0.26
Portal hypertensive gastropathy, *n* (%)	2 (2%)	5 (1%)	0.27	0.23
Esophageal stenosis, *n* (%)	9 (10%)	2 (0.3)	0.0001	0.0001
Esophageal cancer, *n* (%)	1 (1%)	0 (0%)	1.0	1.0
Gastric peptic ulcer, *n* (%)	1 (1%)	9 (2%)	1.0	1.0
Gastric polyps, *n* (%)	0 (0%)	7 (1%)	1.0	1.0
Gastric cancer, *n* (%)	1 (1%)	1 (0.2%)	0.27	0.24
Barrett's esophagus, *n* (%)	0 (0%)	3 (0.5%)	1.0	1.0
Erosive duodenitis, *n* (%)	0 (0%)	1 (0.2%)	1.0	1.0
Duodenal peptic ulcer, *n* (%)	1 (1%)	5 (1%)	1.0	0.57
Duodenal stenosis, *n* (%)	0 (0%)	1 (0.2%)	1.0	1.0
Angiodysplasia, *n* (%)	4 (4%)	1 (0.2%)	0.02	0.012
Atrophy, *n* (%)	1(1%)	4 (0.7%)	0.02	0.012
Minor finding, *n* (%)	4 (4%)	63 (12%)	0.04	0.06
Colonoscopy, *n* (%)	42 (46%)	222 (42%)	0.49	NA
Normal, *n* (%)	7 (8%)	68 (13%)	0.22	0.09
Major finding				
Adenocarcinoma, *n* (%)	1 (1%)	7 (1%)	1.0	1.0
Advanced lesion, *n* (%)	3 (3%)	9 (2%)	0.39	0.41
≥3 adenomas, *n* (%)	1 (1%)	3 (0.6%)	0.47	0.50
Active IBD, *n* (%)	6 (7%)	27 (5%)	0.61	0.79
Complicated diverticular disease, *n* (%)	0 (0%)	4 (0.8%)	1.0	1.0
Ischemic colitis, *n* (%)	1 (1%)	2 (0.4%)	0.37	0.46
Angiodysplasia, *n* (%)	2 (2%)	2 (0.4%)	0.10	0.12
Hemorrhoid, *n* (%)	0 (0%)	7 (1%)	0.60	0.60
Postpolipectomy bleeding, *n* (%)	0 (0%)	1 (0.2%)	1.0	1.0
Stenosis, *n* (%)	0 (0%)	2(0.4%)	1.0	1.0
Minor finding, *n* (%)	21 (23%)	86 (16%)	0.13	0.17
Unsuccessful, *n* (%)	0 (0%)	4 (0.8%)	1.0	1.0

the endoscopic procedure has a potential impact on the patient's prognosis in the short term. Particular attention should be paid to more advanced endoscopic techniques (DAE, ERCP and EUS). In secondary and tertiary centers, such procedures should be reserved and guaranteed. In our study, operative and diagnostic enteroscopy procedures (DBE and capsule endoscopy) have been reduced (–40 and –70%) but not suspended because of the bleeding risk in patients undergoing enteroscopy. EUS was not performed and ERCP was substantially reduced (–95%) with a single patient with acute cholangitis and lithiasis undergoing ERCP. Such a situation most probably resulted from the rescheduling of palliative procedures and the reduction of the workload in surgical departments.

In spite of the realistic limits of this study, as the low number of patients, short follow-up, validation of the used tools and ethical concerns [10], the present report demonstrates that the adopted triage increases finding rates and diagnostic yields; moreover, no infection has been transmitted through endoscopy.

Despite the significant increase of finding rates and diagnostic yields shown in the March 2020 series, compared to the March 2019 one, the other side of the coin is represented by the number of major findings unavoidably missed in March 2020 (see Table 3), due to the numerical reduction of patients undergoing endoscopic investigations. It should be kept in mind that a number of endoscopic procedures with a low pretest probability and an apparently inappropriate indication could still present a clinically relevant finding, which modifies the patient's outcome and prognosis. Sometimes, these incidental endoscopic diagnoses contribute to increase the diagnostic yields of the endoscopic investigations routinely performed [11]. The impact of these 'incidental lesions' found during 'not-fully appropriate' endoscopies, is difficult to evaluate in our particular clinical setting in March 2020, influenced by the novel endoscopic triage with the need of limited access to the endoscopic unit. Moreover, to avoid missed diagnoses of severe diseases, the use of the current guidelines must be tailored to the specific clinical setting [12], also during the so-called phase 2, when a period of co-habitation with the SARS-CoV-2 should be prepared and the postponed procedures rescheduled. Beyond the Covid-19 outbreak scenario, the present study underlines the difficulty to apply a strict triage activity to reduce inappropriate investigations (and as a consequence the risk of SARS-CoV-2 infection). It is well known that also in the 'pre-Covid-19 era' activity was graved by a high number of inappropriate endoscopies, ranging from 30 to 50% and especially in the case of upper endoscopy [7]. Furthermore, inappropriateness has been associated with a decrease of diagnostic efficacy and diagnostic yields [13]. Therefore, a strict adherence to appropriate indications is essential toward the rational use of available resources, and furthermore, a correct number of endoscopic procedures is relevant to preserve personnel [9]; in fact, there is no certainty that there will no pandemic relapse with the need for operationally fit medical personnel. Figure 1 reports a flowchart of the study with potential side effects of the crisis triage.

In conclusion, it is pivotal in this phase to carefully reprogram the endoscopic examinations by evaluating all the indications case by case. It is also clear that some shortcomings are to show up in postponed investigations; thus, the careful follow-up of canceled endoscopies should be carried out, preferably by means of telemedicine [14], toward the reprogramming of the next months' activity.

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Conflicts of interest

There are no conflicts of interest.

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