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DRASTIC DECREASE OF URGENT ENDOSCOPIES OUTSIDE REGULAR WORKING HOURS DURING THE COVID-19 PANDEMIC IN THE PARIS AREA

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Conflicts of interest:

Author M.C. is a consultant for Boston Scientific and Cook Medical.

Author X.D. has acted as a consultant for Alfasigma, Bouchara Recordati, Boston Scientific, Fujifilm, Medtronic, and Pentax. Author X.D. is also cofounder and shareholder of company Augmented Endoscopy.

ABSTRACT

Background and Study Aims

The coronavirus 2019 (COVID-19) pandemic has significantly affected medical care. We surmise that the number of urgent endoscopies outside regular working hours in the Paris area decreased as a result. The objective of this study was to describe the observed number of acts during the 2020 mandatory period of home isolation, compared to the values in prior years and the expected value for 2020.

Material and methods

We performed a multicenter cohort study to investigate the practice of urgent endoscopy acts, outside regular working hours, in Paris and its surrounding suburbs, in the setting of the COVID-19 pandemic. We collected the number of endoscopies performed between January 17th and April 17th 2018, 2019 and 2020. We then collected clinical, endoscopic and outcome variables from the patients of years 2019 and 2020.

Results

From March 17th to April 17th (during home isolation), the number of acts was respectively of 147 in 2018, 137 in 2019, and 79 in 2020, lower than the expected number of 142 (-44.0%). In 2020, the number of endoscopies for suspected gastrointestinal bleeding (GIB), and findings of variceal and non-variceal bleeding decreased by 52.1%, 69.2% and 43.1% respectively, after a month of home isolation. In-hospital death rate were similar.

Conclusions

This study confirms that the urgent endoscopy caseload outside regular hours decreased nearly by half during the pandemic. Our results suggest a decreased number of endoscopies for suspected gastrointestinal bleeding, and findings of variceal and non-variceal bleeding.

Keywords: COVID-19 pandemic, Urgent endoscopy, endoscopy outside regular working hours

ABBREVIATIONS

- COVID-19: coronavirus 2019
- POET: Parisian On-call Endoscopy Team
- APHP: *Assistance Publique – Hôpitaux de Paris*
- GIB: gastrointestinal bleeding
- NSAIDs: non-steroidal anti-inflammatory drugs

INTRODUCTION

The coronavirus 2019 (COVID-19) pandemic has over the span of just a few months infected millions of people around the globe. In France, the first hospitalization for acute respiratory distress syndrome, secondary to a COVID-19 infection, was on January 24, 2020. On February 28, 2020 France entered 'stage 2' of an active epidemic on its territory. The government mandated a general home isolation as of March 17, 2020, three days after entering 'stage 3'. A decrease in the number of patients hospitalized due to COVID-19 related complications has been noted since mid-April. By May 1st, 2020, 130,185 infections and 24,594 deaths had been reported.

This pandemic has significantly affected medical care worldwide. The necessary focus on the care of patients with complications of COVID-19 infection has caused a profound change in various medical and surgical units. Protective measures, the reallocation of equipment and human resources have changed the operating procedures in all departments. Several published papers have described the experience of different teams regarding the impact of the COVID-19 on the organization of routine care, hence the need for its reorganization, including in the field of gastroenterology and digestive endoscopy (1–4). A position statement has been published by the European Society of Gastrointestinal Endoscopy (ESGE) (5).

From mid-April 2020 and onward, the epidemic stabilized and then receded in France, leading to a partial easing of home isolation on May 11, 2020. The focus shifts on how to progressively resume normal functioning. For endoscopy procedures, the main interrogations regard indications, timing and precautions (6). One positive element is that the risk of COVID-19 contamination when performing endoscopic procedures appears to have been low, provided that appropriate precautions are taken (7).

Another challenge was to evaluate how exactly the pandemic impacted caring for patients. The concern that patients may not have received proper care because of the lack of hospital resources or their fear of consulting was seemingly confirmed by publications from endoscopists but also neurologists and cardiologists to name a few colleagues (8–10). We surmise that despite a significant increase in the number of critical care beds, the number of urgent acts decreased during the pandemic.

The aim of this study was to describe the observed number of urgent endoscopies outside regular working hours in the Paris and *Petite Couronne* area, during the COVID-19 pandemic in 2020, compared to its expected values based on the number of endoscopies observed in 2018 and 2019.

PATIENTS AND METHODS

We performed a multicenter cohort study to investigate the practice of urgent endoscopy acts, outside regular working hours, in Paris and its surrounding suburbs, in the setting of the COVID-19 pandemic. Informed consent was not required, in compliance with French law on retrospective studies of anonymized data. The study responds to MR004 guidelines in France and did not require a local ethics committee approval.

Our institution *Assistance Publique – Hôpitaux de Paris* (APHP) comprises 39 university hospitals, including 16 adult dedicated endoscopy units. Outside regular hours (i.e. nights, weekends and public holidays), urgent endoscopy acts are usually performed by four different on-call teams. The mobile Parisian On-call Endoscopy Team (POET), based at *Saint-Antoine* Hospital which operates within the Paris city limits and in two of its three surrounding suburbs, a mobile endoscopy team based in *Beaujon* hospital and operating in the third surrounding suburb of Paris, as well as two on-site teams based at *Pitié-Salpêtrière* and *Henri-Mondor* hospitals. We have recently published on how urgent endoscopy acts were carried out in an extended area during the COVID-19 pandemic (11). Since March 17th 2020, the outreach of the POET was extended to a larger area (Paris and its three surrounding suburbs of the so-called *Petite Couronne*, amounting to 6.7 million inhabitants within a 762 km² area). For each shift, there is a senior physician and a paramedic, both specialized in endoscopy and employed in one of the APHP hospitals (with clearance to perform urgent acts in any other hospital of the institution). Reprocessing and equipment storage take place at Saint-Antoine Hospital in Paris. For patients from outside hospitals or clinics, a transfer is arranged to one of the institution's hospital so that the endoscopy may be performed. The equipment, carried on a foldable moving cart, consists of a 7-kg portable processor (Telepack X GI, Karl Storz, Tuttlingen, Germany), 3 endoscopes (GI Silver Scope Series, Karl Storz), a 4-kg portable power source (Vio 100C, Erbe, Tuebingen, Germany) and ancillary tools (**figure 1**). Transportation by taxicab allows for this mobile team to go from one hospital to another to perform urgent acts. It should be noted that all

endoscopists and paramedics involved during the pandemic were at most 50 years old, hence with a lower risk of contracting a severe form of COVID-19 infection.

We first collected acts performed from January 17th to April 17th in 2018, 2019 and 2020. These precise dates were chosen to be aligned with those of start of the 'phase 2', the home isolation, and based on the reported epidemiology of the pandemic, showing a diminution of COVID-19 hospitalized cases after mid-April. We collected numbers for both years 2018 and 2019, so as to ascertain the stability of the usual caseload. We estimated an expected number of acts per week for 2020, based on the mean number of acts performed during the same period in 2018 and 2019. The expected and observed numbers of acts for 2020 were then compared throughout the study period.

We then included consecutive patients with urgent endoscopy performed in 2019 and 2020 during the same January 17th to April 17th period in order to study in further details these urgent acts. Indication and treatment decisions were at the discretion of the on-call endoscopist. The urgent acts were performed under general anesthesia, in a bedside fashion, in intensive care / post-anesthesia care units (ICU/PACU). For all the acts performed after March 17th 2020, personal protective equipment was used as per the recommendations of the French society of digestive endoscopy (SFED – *Société Française d'Endoscopie Digestive*), and similar to what was described in the article by Repici et al. (12). We collected clinical data such as the age and gender, as well as information on the urgent act: indication, type of endoscopy, findings and results. Whether the patients were hospitalized for a different reason or not was also documented. The number of in-hospital deaths was collected as well. The follow-up period was until May 1st 2019/2020. We also collected the number of available critical care beds in our institution before and during the COVID-19 pandemic.

The primary outcome of the study was the number of urgent endoscopy acts performed outside regular hours, during and outside the pandemic period. The secondary outcomes were the expected number of acts and the number of available critical care beds in 2020, as well as the indications and the findings of these urgent endoscopies, during and outside the pandemic period.

RESULTS

From January 17th to March 16th, the number of acts was respectively 252 and 265 in 2018 and 2019. The observed number of acts within the same period in 2020 (two-month period before home isolation) was 252, similar to the estimated number of 258 (-2.3%).

From March 17th to April 17th, the number of acts was respectively 147 and 137 in 2018 and 2019. The observed number of acts within the same period in 2020 (one-month of home isolation) was 79, lower than the estimated number of 142 (-44.0%) and compared to the 137 acts of 2019 (-44.4%).

In 2020, the number of available beds in intensive care units within our institution was 847 on January 17th, 842 on February 28th, 861 on March 17th and 1521 on April 17th. These results are summarized in **figure 2**.

Regarding the 331 acts carried out in 2020, the mean age of the patients was 62.3 ± 17.9 years, 225 of the patients were male (68.0%) and 23 patients (6.9%) had a COVID-19 infection. Two-hundred-and-nineteen patients were specifically hospitalized for the reason that lead to an endoscopy (66.2%), and 103 patients (31.1%) were hospitalized prior to the endoscopy for a different reason. Amongst these 103 patients, 88 (85.4%) had an endoscopy because of suspected gastrointestinal bleeding (GIB). Patients' characteristics were similar compared to 2019 although a higher rate of non-endoscopy-related hospitalizations was noted in 2020 (31.1% vs 26.1%). These results are summarized in **table 1**.

In 2020 (January 17 to April 17), upper endoscopy (84.6%) was the most frequent urgent act performed, followed by flexible sigmoidoscopy (15.1%) and colonoscopy (3.3%). These urgent acts were performed because of suspected GIB (77.6%), foreign body ingestion (7.9%), colonic volvulus (8.2%), suspected ischemic colitis (3.0%) and Ogilvie syndrome (0.3%). A total of 73 acts (22.1%) were either normal, or non-informative (no found cause of GIB or a migrated esophageal foreign body). Non-variceal GIB was found in 133 (40.2%) patients and variceal GIB

in 52 (15.7%) patients. Foreign bodies were found and extracted in 23 cases (7.0%). Colonic volvulus was decompressed and a flatus tube placed in 27 cases (8.2%). Colonic ischemia was confirmed in 9 cases (2.7%). The detail of the indications and findings can be found in the **supplemental table**. The in-hospital death rate was 18.2% (73 patients) in 2019 and 23.0% (76 patients) in 2020.

The numbers of cases for suspected GIB decreased progressively in 2020 (January 17 to April 17), by 52.1% overall, compared to the same period in 2019 where the numbers were stable over time. In addition, 56 such cases were performed in 2020 during the home isolation period, compared to 94 cases during the same period in 2019 (-40.4%). In terms of endoscopic findings, this progressive decrease in 2020 was seen for both variceal (-69.2%) and non-variceal (-43.1%) bleeding. The overall decrease in 2020 becomes evident during the 'stage 2' of the active epidemic, and even more so during the home isolation period, as shown in **figure 3**. The number of endoscopies for foreign body ingestion or impaction (8 to 9 patients per month) and suspected colonic volvulus (9 patients per month) were stable throughout the 2020 study period.

DISCUSSION

This study evaluates the impact of the COVID-19 pandemic on the practice of urgent endoscopies outside regular working hours in the Paris and *Petite Couronne* area. The main result is that compared to the usual stable case load, the COVID-19 pandemic coincides with a drastic drop in the number (44.4%) of urgent acts performed outside regular working hours.

A few articles have been published so far regarding endoscopy practice during the pandemic. A study from Northern Italy included 38 patients who had an urgent act performed in an academic hospital during the pandemic (February 28th to April 5th, 2020), versus 40 patients during the same period in 2019. The authors concluded that the pandemic did not alter urgent endoscopy during its occurrence (8). To our knowledge, this was the only study specifically evaluating urgent endoscopy during the pandemic. A survey conducted in Northern Italy at the end of March 2020, including 41 endoscopy units, showed a substantial decrease in the total number of endoscopies (whether urgent or not) in almost all units (1). A survey in the New York metropolitan area showed an overall 71% case load reduction at the end of March 2020 (13).

Finally, a retrospective cohort study from China, including 911 acts during the pandemic (February 20th to March 6th, 2020) showed, in comparison to 2019, a drop in the number of elective endoscopy acts (14).

This study gives an overview of the management and outcomes of urgent endoscopy during the COVID-19 pandemic. The most striking results are the 44.4% caseload decrease after the instatement of the mandatory home isolation and the 44.0% decrease compared to the expected number of acts. This was noted despite the near doubling of the number of available critical care beds, which could have been used for these cases. Colleagues in other fields such as cardiology and neurology have also published regarding the lower number of patients coming in with myocardial infarction (38.0%) and ischemic stroke (88.0%) (9,10,15). Evidently, multiple factors account for this. First of all is the inevitable reticence of the patients to come to the hospital (a widely expressed concern), even more so due to the high rate of COVID-19 patients in the hospitals of our institution. Second, many Parisians (23-25%) fled the capital when the home isolation was mandated by the Government (16).

Decisions made by on-call physicians may also have played a role. As mentioned, the outreach of the mobile POET was extended to a larger area (11). Perhaps some less urgent exams were postponed due to concern with having to travel greater distances within the densely populated area, thus delaying potentially more urgent cases to consult. It should, however, be noted that traffic during the home isolation period dropped by 89% (17). A recently published study showed via a survey on Twitter that there is no consensus among gastroenterologists regarding the timing of non-life-threatening endoscopic procedures during the COVID-19 pandemic (18). Further, a recently published randomized study showed that in the setting of upper GIB, endoscopy performed within 6 hours did not yield a lower 30-day mortality than endoscopy performed between 6 and 24 hours from admission (19). This may have prompted postponing some endoscopies to the next day. Lastly, some institutions may have favored, in light of numerous cancelled elective endoscopies, performing more urgent acts during the day. However, it should be noted that many endoscopy centers in our institution were completely shut down during the pandemic. Also, given that our on-call system has been effective for over 30 years, physicians in our institution are accustomed to promptly calling outside regular working hours. This means that all such cases would be brought to the attention of the on-call physician rather

than conservatively postponed to the next day. Some patients admitted to the hospital that would normally have had an endoscopy may have been postponed. Probably these patients did not require urgent endoscopies but it would be of interest to analyze these patients as well. Finally, regarding the COVID-19 patients, precarious respiratory conditions with reticence to intubate or concern of worsening hypoxemia in already intubated patients may have also prompted postponing endoscopies. A recent study has alerted on the balance between risks and benefits for these patients (20).

All in all, multiple factors play out to explain the substantial reduction of urgent endoscopies outside regular working hours in the setting of the pandemic. The common denominator is however the same: the COVID-19 pandemic. The key point here is that people should be made aware that they should not in such situations refrain from consulting if they present alarm symptoms. The health authorities probably have a significant role to play here. These findings also comfort us in the decision to merge the four on-call teams into one during the pandemic, allowing optimal deployment of caregivers to a larger urban area and where it would be more needed (11). Furthermore, we do not have documented cases of COVID-19 infection of medical staff in the on-call group, which serves to show that strict observance of the recommended precautions is critical. We strongly believe that this organization will prove useful in the future; to manage urgent endoscopies outside regular working hours during possible new waves of COVID-19 pandemics, as well as future influenza, coronavirus or any other pandemics.

Although the type of endoscopies did not change during the pandemic period, it is interesting to note that some indications did change. During the home isolation in 2020, the number of cases for suspected GIB decreased by 52.1%, findings of variceal GIB decreased by 69.2%, and non-variceal GIB by 43.1%. This is also likely due to multiple factors. First, the reduction of colonoscopies and polypectomies (supported by the 82% drop of Polyethylene glycol consumption nationwide (21)), as well as endoscopic retrograde cholangiopancreatography with sphincterotomies, potentially reduced the number of patients with post endoscopy bleeding. Second, there was a 70% drop in ulcer-providing-non steroidal anti-inflammatory drugs (NSAIDs) consumption nationwide (21), following the advice to avoid using these medications as they might worsen the prognosis in COVID-19 patients (22). Our concern was the higher risk of significant bleeding in COVID-19 patients receiving curative doses of preventive

anticoagulation as recommended (23). However, only 23 COVID-19 patients had an endoscopy and the number of endoscopies with GIB actually decreased numerically speaking after the start of home isolation in 2020. Third, this might also be the result of patients not consulting despite having overt signs of bleeding, which is far more worrisome and somewhat comparable to the suspected attitude in patients with signs of myocardial infarction or stroke. This result is important because probably a number of people who would have normally consulted may have had serious complications (including death) because of a failure to do so. A comparative study focused on GIB would be insightful to evaluate the clinical presentation, endoscopic findings and outcomes of these patients during the pandemic compared to the usual setting. It could suggest a change of practice for these cases.

This study has several limitations. First, it was a descriptive study, which warrants caution as to how we interpret these findings. Second, our institution, despite its size, does not include the multiple private practices and clinics so that it does not represent all health care providers in the area. Notwithstanding, patients from outside hospitals or clinics in the extended area who need an endoscopy are usually transferred, outside regular working hours, in one of our academic hospitals. Third, we did not collect data on the exact cause of death of the patients, which could have suggested a higher GIB-related death rate during the pandemic as many of us suspect. The interpretation of the observed similar death rates during the study period between the 2019 and 2020 is difficult and should be cautious.

In conclusion, this descriptive cohort study confirms that the urgent endoscopy caseload outside regular working hours decreased nearly by half during the COVID-19 pandemic, compared to prior years and the expected numbers in 2020. Our results suggest a decrease in the number of endoscopies for suspected GIB and the number of variceal and non-variceal GIB, as a consequence of home isolation. The general population needs to be made aware of the importance of consulting in case of alarming symptoms, even during nerve-racking infectious pandemics. This study also demonstrates how an organized and resource-sparing on-call system is effective in providing urgent endoscopy care during a pandemic.

FIGURE LEGENDS

Figure 1: Endoscopic portable equipment

Figure 2: Number of urgent endoscopies in 2018, 2019 and 2020, expected number of endoscopies in 2020, and available critical care beds in 2020, over the 3-months study period (January 17th to March 17th)

Figure 3: Urgent endoscopies for gastrointestinal bleeding in 2019 and 2020

TABLES

Table 1: General characteristics

	2019	2020
Number of acts	402	331
Age (years, mean \pm SD)	62.1 \pm 17.8	62.3 \pm 17.9
Male gender	271 (67.4%)	225 (68.0%)
COVID-19 infection	0 (0.0%)	23 (7.0%)
Endoscopy-related hospitalization	292 (72.6%)	219 (66.2%)
Non endoscopy-related hospitalization	105 (26.1%)	103 (31.1%)

Supplemental table: Endoscopy indications, findings and outcome in 2019 and 2020

	2019				2020			
	17.01 - 16.02	17.02 - 16.03	17.03 - 17.04	Total	17.01 - 16.02	17.02 - 16.03	17.03 - 17.04	Total
Type of endoscopy								
Upper endoscopy	111 (33.2%)	110 (32.9%)	113 (33.8%)	334 (83.1%)	121 (43.2%)	92 (32.9%)	67 (23.9%)	280 (84.6%)
Colonoscopy	8 (53.3%)	4 (26.7%)	3 (20.0%)	15 (3.7%)	5 (45.5%)	5 (45.5%)	1 (9.0%)	11 (3.3%)
Flexible sigmoidoscopy	28 (45.2%)	13 (21.0%)	21 (33.8%)	62 (15.4%)	23 (46.0%)	14 (28.0%)	13 (26.0%)	50 (15.1%)
Multiple acts	6 (66.7%)	2 (22.2%)	1 (11.1%)	9 (2.2%)	8 (57.2%)	3 (21.4%)	3 (21.4%)	14 (4.2%)
Indications								
GIB	94 (32.7%)	99 (34.6%)	94 (32.7%)	287 (71.4%)	117 (45.5%)	84 (32.7%)	56 (21.7%)	257 (77.6%)
Foreign body	18 (35.3%)	15 (29.4%)	18 (35.3%)	51 (12.7%)	9 (34.6%)	9 (34.6%)	8 (30.7%)	26 (7.9%)
Colonic volvulus	13 (40.6%)	8 (25.0%)	11 (34.4%)	32 (8.0%)	9 (33.3%)	9 (33.3%)	9 (33.3%)	27 (8.2%)
Ischemic colitis	8 (44.4%)	3 (16.7%)	7 (38.9%)	18 (4.5%)	6 (60.0%)	2 (20.0%)	2 (20.0%)	10 (3.0%)
Caustic ingestion	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Ogilvie syndrome	5 (100.0%)	0 (0.0%)	0 (0.0%)	5 (1.2%)	0 (0.0%)	0 (0.0%)	1 (100.0%)	1 (0.3%)
Other	5 (100.0%)	0 (0.0%)	0 (0.0%)	5 (1.2%)	0 (0.0%)	4 (66.7%)	2 (33.3%)	6 (1.8%)
Endoscopy findings								
Normal/Cause not found	25 (29.1%)	38 (44.2%)	23 (26.7%)	86 (21.4%)	36 (49.3%)	24 (32.9%)	13 (17.8%)	73 (22.1%)
Non-variceal GIB	46 (31.7%)	45 (31.0%)	54 (37.2%)	145 (36.1%)	58 (43.6%)	42 (31.6%)	33 (24.8%)	133 (40.2%)
Variceal GIB	29 (43.9%)	19 (28.8%)	18 (27.2%)	66 (16.4%)	26 (50%)	18 (34.6%)	8 (15.3%)	52 (15.7%)
Foreign body found and extracted	13 (34.2%)	10 (26.3%)	15 (39.5%)	38 (9.5%)	8 (34.7%)	8 (34.7%)	7 (30.6%)	23 (7.0%)
Other	29 (44.6%)	14 (21.5%)	22 (33.9%)	65 (16.2%)	14 (29.8%)	17 (36.2%)	16 (34.0%)	47 (14.2%)
Decompression & flatus tube	15 (46.9%)	7 (21.9%)	10 (31.2%)	32 (8.0%)	9 (33.3%)	9 (33.3%)	9 (33.3%)	27 (8.2%)
Confirmed ischemia	9 (64.3%)	2 (14.3%)	3 (21.4%)	14 (3.5%)	4 (44.4%)	1 (11.2%)	4 (44.4%)	9 (2.7%)
In-hospital death	30 (41.1%)	21 (28.8%)	22 (30.1%)	73 (18.2%)	40 (52.6%)	19 (25.0%)	17 (22.4%)	76 (23.0%)

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