

Analysis of digestive endoscopic results during COVID-19

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ABSTRACT

Objective: This study aims to explore the necessity and safety of digestive endoscopy during the epidemic of coronavirus disease 2019. **Methods:** A retrospective cohort study method was used to collect patients' data from the endoscopy center of the Civil Aviation General Hospital of China from February 1 to May 31, 2020, as the observation group. The patients' data of endoscopic diagnosis and treatment during the same period in 2019 were used as a control group, to compare the differences in the number of diagnosis and treatment and the detection rate of gastrointestinal diseases in the two groups. At the same time, patients and related staff were followed up for the situation of new infection. **Results:** During the epidemic, our endoscopy center conducted a total of 1,808 cases of endoscopic operations and 5,903 cases in the control group. The amount of endoscopic work during the epidemic period was 30.63% in the same period last year. During the epidemic, 26 patients underwent endoscopic mucosal resection (EMR)/endoscopic submucosal dissection (ESD) treatment, 26 patients underwent ERCP, and 18 patients underwent gastrointestinal stent implantation. In the control group, 273 patients underwent EMR/ESD, 17 underwent ERCP, and 16 underwent gastrointestinal stenting. During COVID-19, compared with the same period last year, the detection rates of peptic ulcer, esophageal cancer, gastric cancer, colon cancer, and rectal cancer were significantly higher ($\chi^2 = 4.482, P = 0.034$; $\chi^2 = 5.223, P = 0.006$; $\chi^2 = 2.329, P = 0.041$; $\chi^2 = 8.755, P = 0.003$; and $\chi^2 = 5.136, P = 0.023$). Through telephone follow-up, novel coronavirus nucleic acid detection and blood antibody detection, no patients or medical staff were infected with the novel coronavirus. **Conclusion:** During COVID-19, the number of digestive endoscopic operations decreased significantly compared with the same period last year, but the detection rate of various diseases of the digestive tract increased significantly. On the basis of strict prevention and control, orderly recovery of endoscopic work is essential.

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Key words: coronavirus disease 2019 (COVID-19), digestive diseases, endoscopy, detection rate

INTRODUCTION

In late December 2019, a cluster of pneumonia cases were found in Wuhan, in the Hubei province of China, then the outbreak of COVID-19 spread rapidly in the whole world; its causative pathogen has been identified to be the 2019 novel coronavirus (SARS-CoV-2) and was declared an official pandemic by the World Health Organization (WHO) on March 11, 2020.^[1] So far, there have been more than 16 million confirmed infected patients worldwide, and the death toll

has exceeded 600,000. Spreading through respiratory droplets and close contact are the main route of transmission of the new coronavirus.^[2] Because the novel coronavirus can be isolated in feces, contact transmission caused by fecal pollution is also an important mode of transmission.^[3-5] Gastrointestinal endoscopy is an invasive procedure, so it is an examination with high-risk exposure to COVID-19 infection, because of the respiratory droplets, aerosol, conjunctival contact, and the potential fecal-oral transmission.^[2,6] Nosocomial transmissions were very common in the

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pandemic regions of COVID-19: 3.8% of the confirmed cases in China were health-care personnel (HCP), whose infection rate was approximately three times of that of the general population.^[7]

Due to the shortage of personal protective equipment (PPE), several professional associations have issued recommendations to postpone selective endoscopy procedures, except for the time-sensitive procedures and emergency procedures. For outpatients, a good job of propaganda and education is necessary; if there is no urgent need, it is recommended to choose selective endoscopy procedures according to the changes of the epidemic situation.^[8-11] With the effective control of COVID-19 and the increasing demand of patients, the endoscopy center of our hospital gradually resumed the gastrointestinal endoscopy procedures in accordance with the changes of the epidemic prevention and control. This article retrospectively analyzed the clinical data of patients who received gastrointestinal endoscopy from February 1 to May 31.

MATERIAL AND METHODS

Patient management and prevention measures

Patient screening

During COVID-19, strict pre-hospital screening was carried out on all patients who were planning to undergo gastrointestinal endoscopy. The blood routine, nucleic acid test of SARS-CoV-2, blood IgM/IgG antibody, and chest CT examination, if necessary, should be performed before the procedure. All the patients and their family members who accompanied the patients should accept the epidemiological investigation and complete the “Preliminary screening questionnaire for admission of patients responding to COVID-19—Recommended by the Association of Digestive Endoscopy, Chinese Society of Medicine”.^[12] All the tests were all best conducted within three days before the procedure. For unqualified patients, doctors would postpone the examinations. On the day of the endoscopic examination, the physician re-checked whether the contents of the screening list were true and complete. If the patient had fever or new symptoms of the respiratory tract, the procedure was suspended, and the relevant examinations were completed to exclude the infection of SARS-CoV-2.

Preventive measure for the patients

All the patients and their accompanying persons must wear facial masks as required. They should accept the temperature monitoring and registered personal information (name, ID card, address, phone number, *etc.*) in the waiting hall of the endoscopy center before examination. During the waiting period, the distance between every person was ≥ 1 meter.

Operating room management

The endoscopy center opened four operation rooms for routine examination, where all patients received painless endoscopy; and one operation room was opened as an emergency operation room. Patients entered the preparation room for preoperative preparation in the order of appointment, and the distance between each patient was ≥ 1 meter. Each operation room was equipped with one endoscopist, one endoscopy nurse, and one anesthesiologist. The digestive endoscopy, equipment, monitor, rescue vehicles, and other equipment were prepared before the procedure. After the procedure, the patient's examination cart was pushed to the recovery room. During the interval time, the room was fully disinfected^[13].

Protection of medical staff

All medical staff in the endoscopy center received the nucleic acid test from a throat swab and a blood IgM/IgG antibody test to assess whether they were infected with SARS-CoV-2. The information of the relevant operators involved in the procedure of each patient was recorded in detail. According to the guidance on the diagnosis and treatment of digestive endoscopy during the prevention and control of COVID-19,^[14] the staff in the endoscopy center monitored and reported their body temperature daily and strictly implemented the hand hygiene regulations. Endoscopists, anesthesiologists, and endoscopy nurses wore isolation gowns, medical protective caps, N95 or medical surgical masks, goggles/face shields, gloves, shoe covers, *etc.* Tissue specimens obtained during endoscopy were stored in a fixed area. After the operation, the staff took off the isolation gown and protective equipment correctly, then washed their hands or disinfected their hands immediately. It was strictly forbidden to use gloves instead of washing hands.

Objects of study

A retrospective cohort study method was used to continuously collect patients who underwent the digestive endoscopy at the endoscopy center of the Civil Aviation General Hospital from February 1 to May 31, 2020, as the observation group. At the same time, patients who underwent endoscopic operations from February 1 to May 31, 2019, were collected retrospectively as the control group.

Observation data and follow-up

The total endoscopic workload and examination results of the two groups were compared. The health statuses of the patients were followed up on the 7th and 14th days after endoscopic operation. If the patient was diagnosed as a suspected or confirmed patient with COVID-19, it should be reported to the Hospital Infection Office and the Medical Affairs Department immediately, and the relevant personnel should be immediately isolated.

Table 1: Comparison of the number of endoscopic operation during the epidemic

	Sex (male: female)	Age ($X \pm s$)	Gastroscopy	Colonoscopy	EMR/ESD	ERCP	GSP
Observation group	941:867	52.4 \pm 11.2	987	751	26	26	18
Control group	3,129:2774	47.2 \pm 15.6	3,245	2,352	273	17	16
<i>t</i>	0.824	0.971	--	--	--	--	--
<i>P</i>	0.122	0.098	--	--	--	--	--

EMR: endoscopic mucosal resection; ESD: endoscopic submucosal dissection; ERCP: endoscopic retrograde cholangiopancreatography; GSP: gastrointestinal stent placement.

Statistical analysis

SPSS version 22.0 software was used for analysis, the measurement data of normal distribution were described by mean and standard deviation ($x \pm s$), and the independent sample *t*-test was used for comparison between groups; the count data were represented by the use case (%), χ^2 test was used for the comparison between groups. $P < 0.05$ indicates that the difference was statistically significant.

RESULTS

Patients' volume

During the epidemic, the endoscopy center received 1,808 patients, including 941 males and 867 females, aged (52.4 \pm 11.2) years old; the operations included gastroscopy, colonoscopy, endoscopic mucosal resection (EMR)/endoscopic submucosal dissection (ESD), endoscopic retrograde cholangiopancreatography (ERCP), and gastrointestinal stent placement (GSP). There were 5,903 patients in the control group, including 3,129 males and 2,774 females, aged (47.2 \pm 15.6) years old; the operations included gastroscopy, colonoscopy, EMR/ESD, ERCP, and GSP. The number of cases for each operation is shown in Table 1.

Detection rate of upper gastrointestinal lesions

During the epidemic, a total of 987 cases of gastroscopy were performed, whereas there were 3,245 cases in the control group during the same period last year. The upper gastrointestinal lesions included gastric polyps (GP), peptic ulcer (PU), varicosity, esophageal cancer (EC), gastric cancer (GC), and duodenal malignancies (DM). During the epidemic, the detection rate of PU, EC, and GC in the observation group was higher than that in the control group, and the differences were statistically significant, as shown in Table 2.

Detection rate of lower gastrointestinal lesions

During the epidemic, a total of 751 cases of colonoscopy were performed, whereas there were 2,352 cases in the control group during the same period last year. The lower gastrointestinal lesions included inflammatory bowel disease (IBD), colorectal polyps (CP), colon cancer (CC),

and rectal cancer (RC). During the epidemic, the detection rate of CC and RC in the observation group was higher than that in the control group, and the differences were statistically significant, as shown in Table 3.

Follow-up results

During the epidemic, a total of 14 endoscopists, nine anesthesiologists, nine endoscopy nurses, and one nursing assistant participated in the work in our hospital's endoscopy center. Through symptoms, body temperature monitoring, and throat swab nucleic acid testing of SARS-CoV-2, no medical staff was found to be infected with COVID-19. Through telephone follow-ups on the 7th and 14th days after the procedure, neither the patient nor their family members were found to be infected with COVID-19 during the epidemic.

DISCUSSION

Since the end of 2019, COVID-19 has spread rapidly across our country and all over the world; people's work and life have been significantly affected. Although as the battle position against the epidemic, the medical institutions must also meet people's needs for normal medical diagnosis and treatment. In recent years, digestive endoscopy has become increasingly important in the diagnosis and treatment of gastrointestinal diseases; endoscopy screening can enable doctors to detect the disease early, especially the early diagnosis and treatment of gastrointestinal tumors, which is of great significance for improving the prognosis of patients. Digestive endoscopy is an invasive procedure with high-risk exposure to viral infection for both doctors and patients. During the epidemic, because of the possibility to spread through respiratory droplets, including by asymptomatic individuals, as a kind of high-risk operation, for the need of epidemic prevention and control, many medical institutions have suspended routine digestive endoscopy, and many patients' medical needs remained unmet.

With the effective control of COVID-19, many domestic and foreign medical centers have resumed digestive endoscopy work one after another and have shared relevant experience.^[15-18] However, compared with the amount

Table 2: Upper gastrointestinal findings

	GP (DR %)	PU (DR %)	Varicosity (DR %)	EC (DR %)	GC (DR %)	DM (DR %)
Observation group	131 (13.27%)	179 (18.14%)	7 (0.71%)	24 (2.43%)	19 (1.93%)	2 (0.20%)
Control group	342 (10.53%)	401 (12.36%)	15 (0.46%)	27 (0.8%)	37 (1.1%)	3 (0.09%)
χ^2	0.315	4.482	1.109	5.223	2.329	1.597
<i>P</i>	0.574	0.034	0.312	0.006	0.041	0.079

DR: detection rate; GP: gastric polyps; PU: peptic ulcer; EC: esophageal cancer; GC: gastric cancer; DM: duodenal malignancies.

Table 3: Lower gastrointestinal findings

	IBD (DR %)	CP (DR %)	CC (DR %)	RC (DR %)
Observation group	7 (0.93%)	180 (23.97%)	37 (4.93%)	14 (1.86%)
Control group	25 (1.06%)	520 (22.11%)	51 (2.17%)	14 (0.85%)
χ^2	0.706	0.291	8.755	5.136
<i>P</i>	0.281	0.586	0.003	0.023

DR: detection rate; IBD: inflammatory bowel disease; CP: colorectal polyps; CC: colon cancer; RC: rectal cancer.

of endoscope work in the same period in 2019, the total workload of digestive endoscopy has dropped significantly. A report in Hong Kong found the volume of endoscopy was reduced by more than 50%, the number of patients diagnosed with GC and colorectal cancer dropped by 49.1 and 38.1%, respectively.^[19] In a recent report from a single hospital in Shanghai, it was noted that their endoscopy volume dropped by 6.3 times during COVID-19.^[20] In another North American survey, 65% of the centers were performing less than 10% of their usual workload.^[21] Our research shows that the workload of endoscopy during COVID-19 was 30.63% (1,808/5,903) of the same period last year, and patients who underwent EMR/ESD treatment were 9.52% (26/273) of the same period last year; meanwhile, the number of patients who underwent ERCP and GSP has not decreased, even has increased slightly in ratio. During the epidemic, ERCP and GSP accounted for 0.88% (16/1,808) and 1% (18/1,808) of the total workload, significantly higher than the same time last year, which was 0.29% (17/5,903) and 0.27% (16/5,903). During the epidemic, the indications of digestive endoscopy were more stringent. Most medical institutions did not provide non-emergency endoscopy operations, and the proportion of healthy crowd was significantly reduced, resulting in a significant decrease in workload. For patients who underwent ERCP and gastrointestinal stent implantation, the workload of this part was not significantly affected because of the medical necessity.

On the other hand, during COVID-19, the detection rate of digestive lesions was different from that of the same period last year. In particular, the detection rate of PU, EC, GC, CC, and RC increased significantly. Research data from

the endoscopy center of Shanghai Zhongshan Hospital also found that compared with the same period in 2019, the amount of digestive endoscopy during the epidemic was significantly reduced, and the detection rate of various malignant tumors in the digestive tract was significantly increased.^[20] This result is related to the decrease of healthy crowd and the accumulation of cases that could not be checked in time. However, the results of the Hong Kong study had some discrepancy,^[19] which might be related to the different medical habits of people in different regions. In our mainland areas, people mostly take health checkups in hospitals instead of physical examination institutions. As the domestic epidemic situation has been controlled effectively, the diagnosis and treatment work of digestive endoscopy gradually resumes normally, and the detection rate of the above diseases may gradually return to the normal level.

During the process of digestive endoscopy, especially gastroscopy, it may cause discomfort symptoms such as nausea and vomiting. These symptoms may increase the chance of infection because of the aerosol and liquid splashing. Therefore, the procedures conducted by our center were all painless endoscopy. With proper sedation, it can reduce the patient's discomfort and retching, and more importantly, reduce the risk of aerosol transmission. In addition, after airway assessment, intubation should be handled with caution by experienced anesthetists, during which modified rapid sequence induction is highly recommended and proper PPE like N95 respirator, or powered air-purifying respirator, is obligatory.^[22] Only the anesthesia team would remain in the procedural room during intubation if possible.

During COVID-19, we did strict pre-operative screening and post-operative follow-up for all patients who received endoscopy; no patients or related staffs were found to be infected, indicating that the above-mentioned operations carried out on the basis of strict prevention and control are relatively safe. Digestive endoscopy is an important diagnosis and treatment measure for digestive system diseases. Patients have a greater demand for endoscopic diagnosis and treatment. With the normalization of COVID-19, on the basis of strict prevention and control, satisfying the needs of patients for digestive endoscopy is of vital importance for the diagnosis, treatment, and prevention of digestive diseases.

Conflict of interests

None declared.

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