

Colorectal cancer screening: what was the impact of COVID-19 pandemic during the first two years? Experience in a private ambulatory clinic

Escrutinio para el cáncer de colon: ¿cuál fue el impacto en los primeros 2 años de la pandemia de COVID-19? Experiencia en una clínica privada ambulatoria

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Abstract

Background: COVID-19 pandemic had a negative impact on colorectal cancer (CRC) screening programs. **Objective:** The care strategy was modified throughout the pandemic, this paper evaluates its impact and short-term consequences. **Methods:** A retrospective, descriptive and cross-sectional study was carried out in a private ambulatory endoscopic center, in average risk subjects. The study compared two periods: pre-pandemic and pandemic (subdivided into pre-vaccination and vaccination). **Results:** During this period, 54.4% of scheduled colonoscopies were due to the screening program. The average age was 60.4 ± 7 years. Women were 52.0%. The overall cancellation rate was 41.1%, higher during pre-vaccination period. There were no differences in the degree of colonic cleansing, colonoscope exit time, and patient satisfaction. The adenoma detection rate (38.4% vs. 42.8% vs. 36.4%; $p = 0.8$) and the total number of adenomas ($p = 0.02$) was statistically significant during the pre-vaccination period. The rate of adenoma/patient showed a higher trend during this period ($p = 0.06$). The number of colorectal cancers was 10, without differences between periods. **Conclusion:** In conclusion, the impact of the decrease in screening colonoscopy procedures for CRC detection was similar to what was seen worldwide. In this period no increase in cancer cases, although this effect may be observed in the long term.

Keywords: Colorectal cancer screening. SARS-CoV-2. COVID-19. Adenoma detection rate.

Resumen

Antecedentes: La pandemia de COVID-19 tuvo un impacto negativo en el programa de detección del cáncer colorrectal (CCR). **Objetivo:** La estrategia de atención cambió y se evaluó su impacto a corto plazo. **Método:** Se realizó un estudio retrospectivo, descriptivo y transversal, en un centro endoscópico ambulatorio privado, en sujetos con riesgo promedio de CCR. El estudio comparó dos períodos: prepandemia y pandemia (subdividido en prevacunación y vacunación). **Resultados:** El 54.4% de las colonoscopias fueron por escrutinio. La edad promedio fue de 60.4 ± 7 años. El 52.0% fueron mujeres. La tasa de cancelaciones fue del 41.1%, siendo mayor durante el período prevacunación. No hubo diferencias en el grado de limpieza colónica, el tiempo de salida ni la satisfacción del paciente. La tasa de detección de adenomas (38.4% vs. 42.8% vs. 36.4%; $p = 0.8$) y el número total de adenomas ($p = 0.02$) tuvieron una significancia en el período prevacunación. El índice adenoma/paciente fue mayor durante este período ($p = 0.06$). El número de CCR fue de 10 (1.9%), sin diferencias entre los períodos.

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Conclusión: *Se concluye que la repercusión por la disminución en los procedimientos de escrutinio fue similar a lo visto en todo el mundo y no se encontró un aumento de los casos de cáncer, aunque este efecto podrá observarse a largo plazo.*

Palabras clave: *Escrutinio de cáncer colorrectal. SARS-CoV-2. COVID-19. Tasa de detección de adenomas.*

Introduction

The COVID-19 pandemic, caused by the SARS-CoV-2 virus, had a negative impact on colorectal cancer (CRC) prevention and screening programs. These programs were temporarily suspended to reduce the risk of infection among patients and the health care personnel. Consequently, the perception of health status and care strategies in endoscopy centers changed.

The increased contagiousness, albeit lower lethality, of the new Delta and Omicron variants prompted endoscopy centers to reevaluate clinical guidelines in accordance with epidemiological risk stratification to provide better care and reduce risks for patients and health care workers alike¹. The implementation of new safety measures allowed for the gradual resumption of programs. However, costs increased, delayed endoscopy appointments occurred, the number of colonoscopies per day dropped, and eventually several centers collapsed.

A survey conducted in Spain and Latin America reported a decrease in the number of colonoscopies performed (from 69.9% down to 72.3% by June 2021). Respondents perceived that the implemented measures impacted the doctor-patient relationship (43.8%), and increased emotional problems (70.9%). Training programs for new specialist physicians were temporarily suspended. The infection rate among health care staff during the pandemic ranged between 24.7%, and 19.2%² losing, at least, 1 family member and negatively impacting CRC detection programs.

The population fear of potential infection when accessing health care and hospital collapse due to the pandemic caused delays in performing follow-up colonoscopies in high-risk populations and in evaluating patients with symptoms related to a subsequent CRC diagnosis.

The aim of this study was to assess the impact in the pre-vaccination and vaccination periods in the context of the COVID-19 pandemic on a colonoscopy-based CRC screening program, and its effect on the quality of medical care provided at a private endoscopy center in Mexico City, Mexico. Secondary endpoints included evaluating the impact of vaccination on screening programs and patient and physician acceptance.

Method

This was a retrospective, descriptive, and cross-sectional study conducted at a private outpatient endoscopy center in Mexico City, Mexico. The study included individuals at a mean risk for CRC (older than 45 years, both sexes, with no family or personal history of adenomas or CRC)¹ treated with scheduled colonoscopy (screening). All participants gave their prior written informed consent.

The study compared 2 periods: pre-pandemic (from January 2019 through February 2020) and pandemic (from March 2020 through March 2022); the latter was subcategorized into pre-vaccination (from March 2020 through December 2020) and vaccination (from January 2021 through March 2022).

Patients with colectomies, GI bleeding, intestinal obstruction, acute abdominal symptoms (perforation), or inflammatory bowel diseases (inflammatory bowel disease, acute diverticulitis) were excluded, as were lactating, or pregnant women.

The patient's medical history (online questionnaires, or telephone interviews) was collected when the study was scheduled. The 28 collected items included demographic data (age, sex, education, marital status), comorbidities, and prescribed drugs. Patients were asked on their history of SARS-CoV-2 infection, and whether they had received the vaccine, including the number of doses.

Patient satisfaction with colonic cleanliness and follow-up by personnel (physicians and paramedical staff) was assessed using the aforementioned questionnaire^{3,4}. A 4-point Likert scale questionnaire was administered to patients and endoscopists to evaluate the level of satisfaction and tolerability, as described in a previous study (Annex 1)^{4,5}.

A physician explained the colonoscopy preparation technique (cleaning) to the patient and provided written information. The information was reinforced with a telephone call one day prior to the procedure, which was confirmed one day before the procedure.

Patients scheduled for colonoscopy during the pandemic who did not attend, canceled, or rescheduled

their appointments, and those who scheduled it, but did not show up or declined the procedure, were included in the study.

From March 1, 2020, preventive measures were taken to avoid SARS-CoV-2 transmission. Health tests were conducted to verify the patient's health status (negative for the disease), and a symptom questionnaire on possible infections prior to the colonoscopy was administered. In all cases, personal protective equipment was used. The allocated times for performing the colonoscopies were extended to ensure proper disinfection of the workspace and equipment. Afterwards, the patient's health status was verified at 24 hours and 7 days after the procedure.

All colonoscopies were performed using a Pentax processor (EPK-I7010), and a high-definition colonoscope (EC38-i10L).

Data on the quality of colonic cleanliness, Boston classification, procedural time (min), and patient satisfaction were collected in all cases.

Three groups were compared: pre-pandemic, pre-vaccination, and vaccination. Demographic data, the colonoscopy findings, colonic cleanliness, time from the cecum to the anorectal line, adenoma detection rate, and polyp detection rate were evaluated. Compliance to colonoscopy and patient satisfaction with the procedure were assessed.

During the pandemic, both groups completed a questionnaire on anxiety and depression related to the pandemic and the possible colonoscopy findings, scheduling delays, and safety in performing colonoscopy.

Statistical analysis

Data were expressed as mean and standard deviation, frequency, and percentages. Group comparisons were performed using chi-squared tests, Student's t-test (for 2 groups), or Kruskal-Wallis 1-way tests (for 3 non-parametric groups) for categorical and quantitative variables, respectively. p values < 0.05 were considered statistically significant. The analysis was conducted using Stata version software 17.0 and Epi Info v. 3.3.2.0.

Results

During the pandemic, 54.4% (342 out of 628) of scheduled colonoscopies were for screening, compared to the pre-pandemic period (44.3% [190 out of

428]). The mean age was 60.4 ± 7 years, and 52.0% were women, with a mean body mass index of 27 ± 4 kg/cm². No differences were seen in the mean age (63.6 vs 62.5 vs 64.3 years; $p = 0.7$) among the groups, or in the male/female ratio (Table 1). No differences were reported either regarding comorbidity (diabetes mellitus and arterial hypertension) among the groups, although they increased during the vaccination period.

Table 2 shows the total number of screening colonoscopies performed during the 3 periods. The overall cancellation rate during the pandemic was 41.1% (243 out of 585), with the highest rate (43.6%) being reported during the pre-vaccination period. The cancellation rate in the pre-pandemic phase was 5.9% (12 out of 202). A total of 42.3% of the patients had a past medical history of prior SARS-CoV-2 infection confirmed by RT-PCR assay.

The number of canceled colonoscopies significantly increased during the pandemic. During the pre-pandemic, pre-vaccination, and vaccination periods, 12, 76, and 167 cases were reported, respectively ($p < 0.00001$) (Table 2). The main reason was the fear of infection (72.1%). A total of 56 (28%) out of 201 patients, did not respond, refused, or could not be contacted regarding the cancellation.

The study did not report any differences among the groups when evaluating the degree of colonic cleanliness (Boston Scale) ($p = 0.7$), time of colonoscope withdrawal (23 vs 22 vs 25 min; $p = 0.0$), and patient satisfaction (56 (28%) $p = 0.7$) (Table 3).

Unlike the adenoma detection rate (38.4% vs 42.8% vs 36.4%; $p = 0.8$), the total number of adenomas ($p = 0.02$) showed statistical significance during the pre-vaccination period. The adenoma/patient ratio showed a higher trend during this period ($p = 0.06$).

The number of cases of CRC was 10 (1.9%), with no differences being reported among the periods (3 vs 3 vs 4; $p = \text{NS}$).

No statistically significant differences were seen when evaluating satisfaction during intestinal cleaning and the colonoscopy procedure (before, during, and after) across the 3 periods.

During the vaccination period, concerns about contagion persisted, and patients had constant questions on sanitization measures and infection prevention.

None of the subjects undergoing screening colonoscopy showed symptoms, or a diagnosis of SARS-CoV-2 infection after the procedure.

Table 1. Demographic data of the population undergoing colorectal cancer screening at a private outpatient clinic in Mexico City. Group 1: Pre-pandemic stage. Group 2.1: Pandemic stage pre-vaccination. Group 2.2: Pandemic stage vaccination

Group	Mean age, years	Sex (M/W), %	Total no. screening colonoscopies	Diabetes mellitus	Arterial hypertension	Other
1	63.6 (50-82)	105/95 (55% vs 45%)	190	10	37	4
2.1	62.5 (47-86)	42/56 (43% vs 57%)	98	4	8	2
2.2	64.3 (45-89)	118/126 (48% vs 52%)	244	16	57	15

Table 2. Characteristics of patients who underwent colonoscopies at a private outpatient clinic in Mexico City. Group 1: Pre-pandemic stage. Group 2.1: Pandemic stage pre-vaccination. Group 2.2: Pandemic stage vaccination

Group	Screening colonoscopies	Cancelled or unmade appointments	Rate of scheduled/cancelled screening colonoscopies	Vaccinated	Previous COVID-19
1	190	12	5.9% (12/202)	0	0
2.1	98	76	43.6% (76/174)	0	35
2.2	244	167	40.6% (167/411)	244	85
Total general	532	255		244	120
Subtotal pandemic	342	243	41.15% (243/585)	244	120

Table 3. Characteristics of the quality of the screening colonoscopies performed at a private outpatient clinic in Mexico City. Group 1: Pre-pandemic stage. Group 2.1: Pandemic stage pre-vaccination. Group 2.2: Pandemic stage vaccination

Group	Exit time (min)	Cleaning classification	Rate of adenomas	Total adenomas	Adenocarcinomas
1	21 (16-34)	7.5 (4-8)	38.4 (73/190)	113 (1.54/pat)	3
2.1	25 (15-42)	7.4 (5-8)	42.8 (42/98)	78 (1.85/pat)	3
2.2	22 (11-38)	7.5 (5-8)	36.8 (90/244)	117 (1.3/pat)	4

Discussion and conclusions

Strategies against the COVID-19 epidemic aimed to reduce exposure, the number of infections, the lethality rate, and the collapse of the entire health care system. In this scenario, mortality figures focused on direct deaths due to SARS-CoV-2. Several articles warned about a tsunami of collateral damage due to COVID-19^{5,6}. Emphasis was placed on the need to minimize harm in vulnerable patients and those at higher risk of death from non-communicable chronic diseases.

The COVID-19 pandemic had a significant impact on health promotion strategies, especially in CRC screening programs. Although concerns about the infection persisted after vaccination, none of the subjects undergoing screening colonoscopy showed

symptoms, or a diagnosis of SARS-CoV-2 infection after the procedure. The only quality criterion that showed statistical significance was the total number of adenomas, which was higher in the pre-vaccination period.

A study conducted in the United States compared the rates of cancer detection studies during 2 periods: 2014 to 2019 vs 2020. Cancer detection studies for breast, cervical, and CRC significantly decreased during the pandemic compared to the other period, especially in various racial groups (Hispanics, Whites, Asians, and African Americans/Blacks), which were underserved⁷. As a result of delayed or reduced early detection strategies, many patients, at the time of diagnosis, will be in a more advanced clinical stage of the disease and will only be candidates for palliative measures.

This reduction in screening studies was largely due to the closure of health care centers, which was nearly total for 3 months, as attention was directed toward patients with COVID-19 and preventing new cases. During 2020, in the pre-vaccination phase of the pandemic, outpatient endoscopy center services were limited to patients with active diseases. This, along with the implementation of sanitization measures, also affected the patients' perceptions, leading them to avoid health care centers. In our case, we saw a reduction in the number of colonoscopy studies performed for both screening and other indications during this phase. As months went by, the number of procedures increased, and during the vaccination phase, the demand for studies increased, with many patients attending their screening studies.

In a multicenter study conducted in the United States, specifically in the Veterans Affairs Healthcare System (from 2018 through 2020), 4.1 million subjects were registered for cancer screening (prostate, lung, bladder, and colorectal cancer). A total of 3.9 million procedures were performed, leading to the diagnosis of cancer in 251 647 patients (6.45%). The study reported a 45% reduction in the number of colonoscopies performed in 2020, while the CRC detection rate increased from 13% up to 23%. This reduction in colonoscopy procedures has been associated with pandemic-related restrictions, but also with unresolved opportunities in primary health care⁸. In our study, the CRC detection rate did not increase when the research periods were compared; however, during the pre-vaccination period, the adenoma index showed a significant increase.

At the onset of the COVID-19 pandemic, there was a significant decrease in the number of colonoscopies performed for screening and any other indication, initially due to restrictions recommended for public health reasons and subsequently due to the pandemic-induced fears. The delay of screening colonoscopies has had various repercussions on the patients' health by causing delays in cancer diagnoses, resulting in detection at later stages⁸. However, it is still too early to determine the full effects of diagnostic delays during the pandemic; studies may be able to report the extent of the impact starting from 2023, considering adenoma frequencies and the interval CRC rate (over 36 months)¹.

A study conducted by Mason et al.⁹ reported that the number of cases with advanced neoplasms was not different compared to pre-pandemic numbers, suggesting initially that there may not have been a

significant consequence of the delay. Unfortunately, the number of patients (28%) who canceled or did not respond, refused, or could not be contacted over cancellation reasons did not allow for an understanding of the relationship between their health status and the pandemic process. This is significant because in follow-up studies for CRC screening, we know that various factors can impact patient attendance, such as smoking and physical activity¹⁰. We should evaluate the effect of infection, or its chronic signs on screening programs in the future.

As limitations, we should mention that our study was conducted in a private endoscopy center, with a small and biased sample of the population that attends such centers, which may impact results on the possibility of misdiagnosing more cases of CRC. A different factor that should be considered is that the incidence rate of CRC in Mexico is lower compared to that from other Western countries.

In conclusion, the pandemic notably altered perceptions regarding the safety of undergoing colonoscopy screening, especially during the pre-vaccination period. The overall cancellation rate was 41.1%, with a higher rate (43.6%) being reported during the pre-vaccination period, primarily due to fear of contagion (72.1%). The quality of colonic cleanliness and satisfaction with colonoscopy did not change significantly during the pandemic. The adenoma and CRC detection rates did not vary compared to the pre-pandemic period.

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Ethical disclosures

Protection of human and animal subjects. The authors declare that the procedures followed were in accordance with the regulations of the relevant clinical research ethics committee and with those of the Code of Ethics of the World Medical Association (Declaration of Helsinki).

Confidentiality of data. The authors declare that they have followed the protocols of their work center on the publication of patient data.

Right to privacy and informed consent. The authors have obtained the written informed consent of the patients or subjects mentioned in the article. The corresponding author is in possession of this document.

Supplementary data

Supplementary data associated with this article can be found in the online version available at DOI: 10.24875/CIRUE.M23000531. This material is provided by the corresponding author and published online for the benefit of the reader. The content of the supplementary material is the sole responsibility of the authors.

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