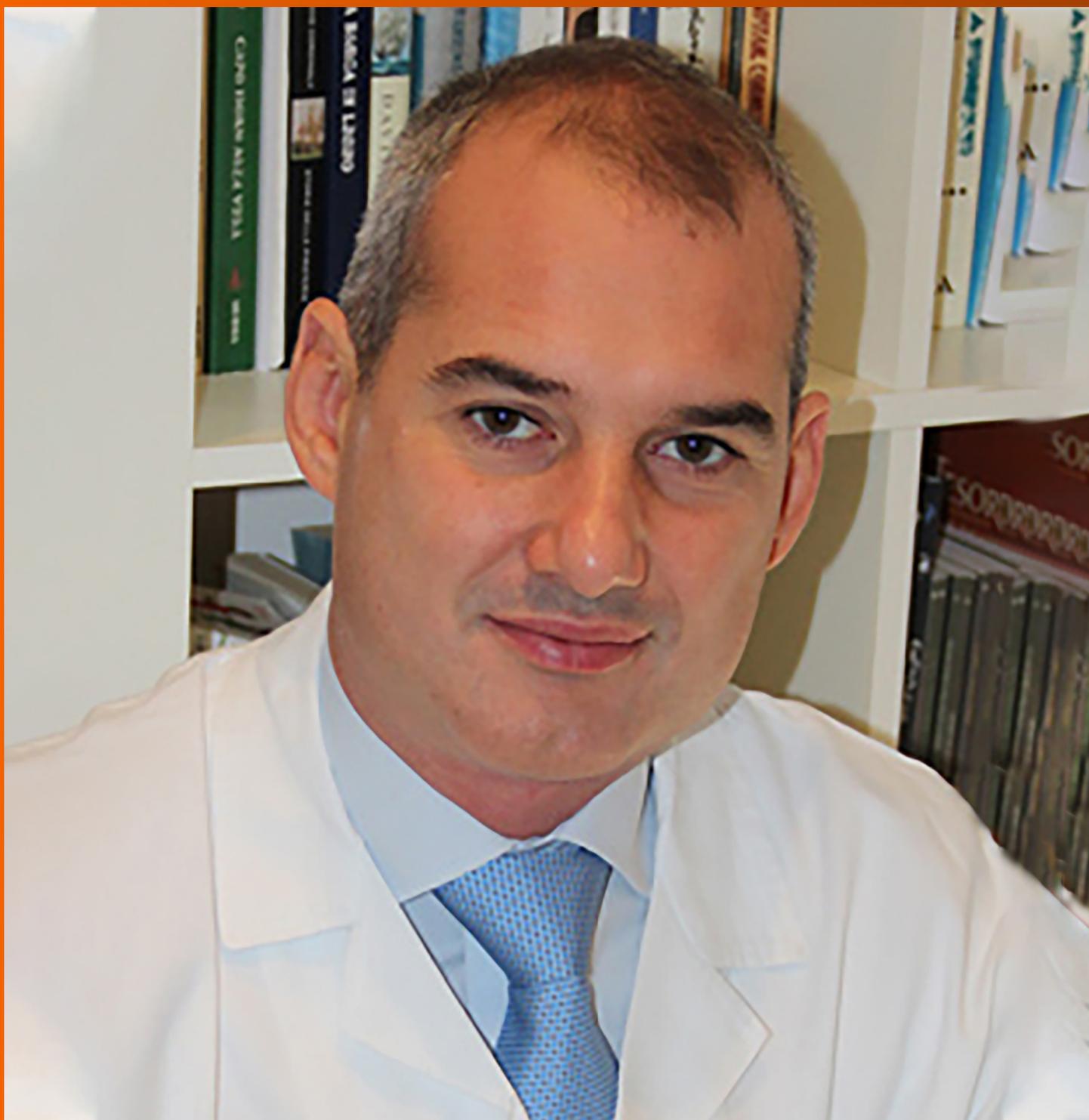


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What paradigm shifts occurred in the management of acute diverticulitis during the COVID-19 pandemic? A scoping review

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Abstract

BACKGROUND

Acute colonic diverticulitis (ACD) is common in Western countries, with its prevalence increasing throughout the world. As a result of the coronavirus disease 2019 (COVID-19), elective surgery and in-patients' visits have been cancelled or postponed worldwide.

AIM

To systematically explore the impact of the pandemic in the management of ACD.

METHODS

MEDLINE, Embase, Scopus, MedxRiv, and the Cochrane Library databases were

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searched to 22 December 2020. Studies which reported on the management of patients with ACD during the COVID-19 pandemic were eligible. For cross sectional studies, outcomes of interest included the number of hospital admission for ACD, as well as key features of disease severity (complicated or not) across two time periods (pre- and during lockdown).

RESULTS

A total of 69 papers were inspected, and 21 were eligible for inclusion. Ten papers were cross sectional studies from seven world countries; six were case reports; three were qualitative studies, and two review articles. A 56% overall decrease in admissions for ACD was observed during lockdown, peaking 67% in the largest series. A 4%-8% decrease in the rate of uncomplicated diverticulitis was also noted during the lockdown phase. An initial non-operative management was recommended for complicated diverticulitis, and encouraged to an out-of-hospital regimen. Despite initial concerns on the use of laparoscopy for Hinchey 3 and 4 patients to avoid aerosolized contamination, societal bodies have progressively mitigated their initial recommendations as actual risks are yet to be ascertained.

CONCLUSION

During the COVID-19 pandemic, fewer patients presented and were diagnosed with ACD. Such decline may have likely affected the spectrum of uncomplicated disease. Established outpatient management and follow up for selected cases may unburden healthcare resources in time of crisis.

Key Words: COVID-19; SARS-CoV-2; Acute diverticulitis; Diverticular disease; Hartmann

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Core Tip: Acute colonic diverticulitis is one of the most common conditions encountered by surgeons in the acute setting. As a result of the pandemic, elective surgery and in-patients' visits have been cancelled or postponed worldwide. Conservative strategies for surgical diseases, such as acute appendicitis and acute cholecystitis, have been furtherly supported. The primary aim of this review is to systematically explore the impact of the pandemic in the diagnosis and management of acute colonic diverticulitis.

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INTRODUCTION

Since its declaration as a pandemic by the World Health Organization in March 2020, coronavirus disease 2019 (COVID-19) has severely affected health systems throughout the globe.

As of 27 January 2021, the number of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infections was just over the 100 million mark[1].

In the effort to increase local responses to the ongoing need for hospital beds and facilities for COVID-19 patients, surgical services have been reshaped[2]. Elective surgery and in-patient visits have been cancelled or postponed[3]. Conservative strategies for surgical diseases, such as acute appendicitis and acute cholecystitis, have also been supported[4], as have more frequent indications for stoma formation in urgent colonic resections for the prevention of the life-threatening consequences of anastomotic leaks. Furthermore, perioperative infection from SARS-CoV-2 has proven to be detrimental for the overall survival and complication rates in surgical patients[5].

Acute diverticulitis represents a common cause of surgical admission in emergency settings[6]. Whether the pandemic has had an impact on the rate of admission and treatment for acute diverticulitis has not yet been systematically explored. For these reasons, we conducted a scoping review in order to map the research currently being performed in this area.

MATERIALS AND METHODS

A systematic scoping review was performed according to a predefined protocol. The study was reported in line with the PRISMA Extension for Scoping Reviews[7].

A scoping search was undertaken to identify published articles related to the management of patients with acute diverticulitis during the SARS-CoV-2 pandemic.

To be included in the review, papers needed to report on the management of patients with acute diverticulitis during the COVID-19 pandemic. Articles in any language were included. Any study design was eligible. Quantitative, qualitative and mixed-method studies were included in order to consider different methods of measuring treatment burdens. Papers were excluded if they did not fit into the conceptual framework of the study.

To identify potentially relevant documents, the following bibliographic databases were searched from December 1, 2019 to December 22, 2020: MEDLINE, Embase, Scopus, MedxRiv and the Cochrane Library databases. The final search strategy for EMBASE was “(diverticulosis OR 'colon diverticulosis' OR diverticulitis) AND ('coronavirus disease 2019' OR 'severe acute respiratory syndrome coronavirus 2')”.

Two reviewers (Ortenzi M and Grossi U) sequentially evaluated the titles, abstracts and, finally, the full text of all publications; all publications were identified by our searchers for their potential relevance. Any disagreements on study selection and data extraction were resolved by consensus and discussion with other authors (GG and SDS).

A single investigator (Ortenzi M) charted all data from eligible papers using a semi-structured charting pro-forma designed for the purpose of this study. Two other researchers verified the data's accuracy (Gallo G and Grossi U).

We abstracted data on article (country of origin) and patient characteristics. No assessments of study quality were undertaken. A narrative synthesis of data collected from eligible papers is presented.

Statistical analysis

In contrast to classic meta-analyses, the outcome was defined as the percentages of an event (without comparison) in pseudo-cohorts of observed patients. Overall proportions can be estimated from the weighted mean of percentages measured in each study. Data were expressed using descriptive statistics, including proportions and averages.

RESULTS

Selection of sources of evidence

After 34 duplicates were removed, a total of 69 citations were identified from searches of electronic databases and review article references. Based on the title and the abstract, 48 citations were excluded, with 21 full text articles being retrieved and assessed for eligibility. Of these, the following were considered eligible for this review: 10 cross sectional studies[8-17], 6 case reports[18-23], 3 qualitative studies[3,24,25] and 2 review articles[26,27] (Figure 1).

Cross-sectional studies

Of the included cross-sectional studies (Table 1), two were multicentric[12,14]. The timing of the outbreak differed in each country at the time of data collection. Indeed, the number of COVID-19 cases ranged from 1 to 3036 per 10⁶ people at the mid lockdown phase of data collection. Overall, admissions for acute diverticulitis decreased by 56%, from 749 in pre-lockdown to 332 during lockdown. A higher percentage reduction (up to 67%) was observed in the largest series[11,12,14,16,17]. A 4%-8% decrease in the rate of uncomplicated diverticulitis (defined as localized diverticular inflammation without any abscess or perforation) was also noted during the lockdown phase in the three studies from United States.[11,16,17]

Table 1 Cross sectional studies comparing the number of admissions for acute diverticulitis in the periods before and during lockdown, *n* (%)

Ref.	Country	No. COVID cases per 10 ⁶ people at mid-lockdown period ²	Observation periods during and pre-lockdown (d)	Patients (<i>n</i>)		Percentage reduction	Uncomplicated diverticulitis (%)	
				Lockdown	Pre-lockdown		Lockdown	Pre-lockdown
Anteby <i>et al</i> [8]	Israel	1	30	2	11	-82%	NR	NR
Boyle <i>et al</i> [9]	New Zealand	272	33	17	15	0.1%	11 (65)	8 (53)
Chung <i>et al</i> [10]	United Kingdom	1383	32	20	NR	NA	NR	NR
Gibson <i>et al</i> [11]	United States	2395	77	56	139	-60%	40 (71)	105 (76)
Guadalajara <i>et al</i> [12]	Spain ¹	3036	49	NR	NR	-60%	NR	NR
O'Brien <i>et al</i> [13]	Canada	228	31	15	20	-25%	NR	NR
Rausei <i>et al</i> [14]	Italy ¹	409	31	31	94	-67%	NR	NR
Rosa <i>et al</i> [15]	Italy	1431	73	6	9	-33%	NR	NR
Soriano <i>et al</i> [16]	United States	621	91	65	122	-47%	50 (77)	99 (81)
Zintsmaster <i>et al</i> [17]	United States	1017	49	120	339	-65%	106 (88)	324 (96)

¹Multicenter.²Data extrapolated in each country from www.worldometers.info/coronavirus/.

NR: Not reported; NA: Not applicable.

Case reports

There were six case reports among the included papers. Badar *et al*[18] described the case of an 82-year-old male with colo-colonic fistula as a result of delayed presentation and the onset of conservative treatment of diverticular abscess due to concerns regarding SARS-CoV-2 exposure in hospital.

Costanzi *et al*[19] presented the case of a 64-year-old male with mild acute respiratory distress syndrome related to COVID-19 pneumonia and perforated diverticulitis of the sigmoid colon. The operation was delayed due to an intensive care unit (ICU) bed shortage, and the patient was monitored and treated with antibiotics until a repeated computed tomography scan after 6 d, which showed an increase in the para-sigmoid collection. An ICU bed eventually became available, and the patient underwent a laparotomic Hartmann procedure.

Fabbri *et al*[20] described the case of an 80-year-old woman who was admitted with COVID-19 gastrointestinal symptoms and discharged after 2 wk on improved general clinical conditions. Due to a recurrence of gastrointestinal symptoms, the patient was readmitted to hospital and underwent an urgent exploratory laparotomy for a pinpoint perforation of a sigmoid diverticulum.

Lisi *et al*[21] outlined the state of colorectal emergency surgical activity during the first 2 wk of the second COVID-19 wave in Italy by focusing on the increase in the number of complex cases. Among the 11 difficult cases of emergency colorectal surgery, 4 were Hinchey stage 3 and 4 were diverticulitis.

Montali *et al*[22] reported the first confirmed case of early postoperative SARS-CoV-2 infection in an 83-year-old male recovering after a Hartmann's procedure for acute diverticulitis. After an otherwise uneventful postoperative course, the patient developed acute respiratory failure on post-operative day 8, leading to death 36 h later.

Patel *et al*[23] described the case of a 38-year-old male presenting with acute perforated diverticulitis three days after being discharged from the hospital for respiratory symptoms secondary to COVID-19.

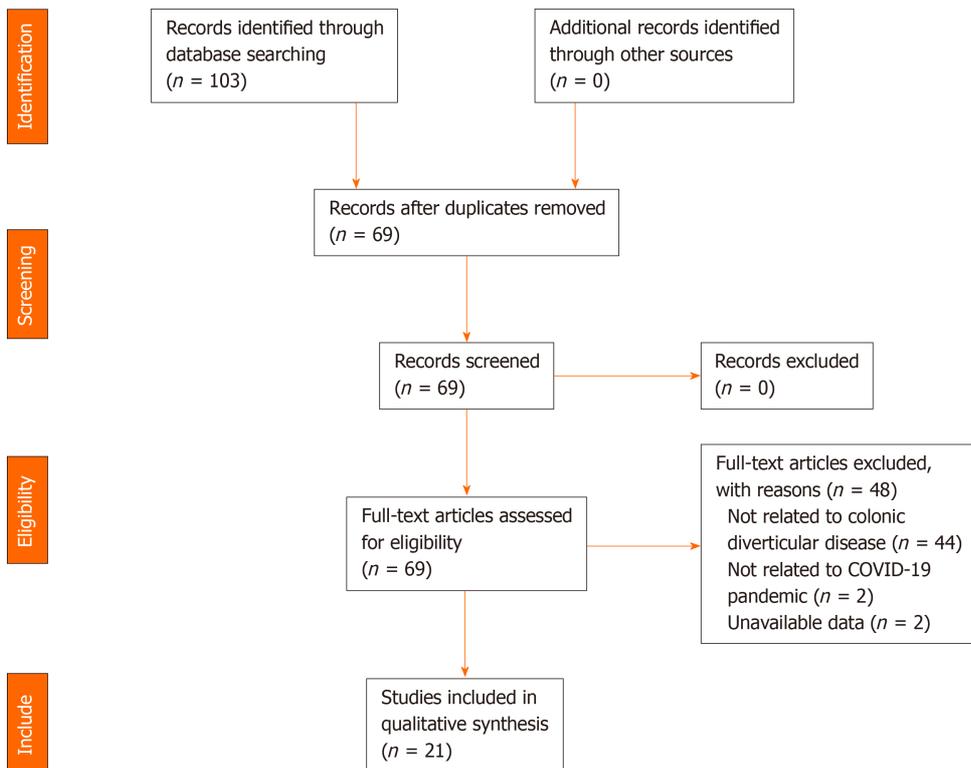


Figure 1 Prisma diagram. COVID-19: Coronavirus disease 2019.

Qualitative studies

The three qualitative studies published between March and April 2020 contained practice recommendations from the first COVID-19 outbreak[3,24,25]. All highlighted that there was a dearth of evidence related to the management of patients needing surgery for colorectal conditions during the COVID-19 pandemic.

While specifically addressing complicated diverticulitis, an initial conservative approach, with subsequent observation and antibiotic treatment, was recommended[3, 24,25]. This may also be encouraged for an out-of-hospital regimen (combined with percutaneous drainage, if necessary)[24]. Meanwhile, in COVID-19 positive patients, open surgery may be preferred to laparoscopic surgery for Hinchey 3 and 4 patients to avoid aerosolized contamination, and Hartmann might be preferred over anastomosis in this particular situation[3].

Reviews

A systematic review by De Simone *et al*[26] focused on the impact on the management of emergency and trauma surgery on the acute abdomen. Trained staff, adequate instruments and strict application of the recommendations were deemed crucial to avoid increasing the risk of contamination. In case of a lack of skills or adapted materials for enabling a safe laparoscopic surgical intervention, a laparotomy should be privileged.

As for acute diverticulitis, its management should follow the WSES guidelines[6], with a word of caution regarding the utilization of laparoscopy because of the risk of aerosolization[28], especially if a long operative duration is expected.

A second review by El Boghdady and Ewalds-Kvist[27] specifically addressed the debates raised around the safety of laparoscopic surgery during the pandemic, especially given the potential generation of contaminated aerosols from CO₂ leakage and the creation of smoke from the use of energy devices. The authors concluded that, in COVID-19 patients, non-operative treatment and delay of surgery should be considered whenever possible and safe, even with established outpatient management and follow-up for subacute, uncomplicated and/or mild abdominal conditions (*e.g.*, uncomplicated or Hinchey 1a diverticulitis). Follow-up can, for instance, be conducted by telephone if a patient can use antibiotics and is reliable in assessing their response to treatment.

DISCUSSION

Summary of evidence

In this scoping review, we identified 21 studies that reported on the management of acute diverticulitis in the COVID-19 era; all studies were published in 2020. Our findings indicate that there is a general lack of high-quality evidence regarding the impact of the COVID-19 pandemic on epidemiology and the management of acute diverticulitis. However, most studies showed a substantial decrease in the number of overall admissions between the pre-lockdown and lockdown phases. Some authors noticed how this trend was at odds with that observed in the pre-pandemic period, as it had been increasing in recent years[11,16].

The first finding could somehow be expected, especially given the need to set preventive measures, such as social distancing, to limit the spread of the virus and the associated widespread fear of infection that prevented patients from seeking medical care, even when necessary[15]. Some of the reasons put forward to explain this trend include changes in lifestyle during confinement, particularly with regard to diet (*i.e.*, low-fat, less convenience food), hygiene (*i.e.*, handwashing and personal hygiene, environmental sanitation), habits (*i.e.*, less stressing activities) and reduced bed availability in hospital[11,14].

Given the recommendation to be more cautious in the indication of surgery, as well as the preference for non-operative management when feasible, one would expect that the incidence of a disease requiring a surgical treatment would have been unchanged, even during a pandemic. However, a significant decrease in the overall number of diverticulitis cases failed to mirror a concomitant reduction in complicated diverticulitis. Indeed, the number of more complicated cases that required surgery and/or hospitalization remained fairly unchanged or slightly reduced in some studies [11,14,17].

The initial warnings about the possible role of nonsteroidal anti-inflammatory drugs and corticosteroids in worsening the severity of COVID-19[29] may have discouraged their use; this may potentially explain the decreased incidence of perforated diverticulitis (for demonstrated cause-effect relationships)[14]. These trends were also confirmed in an Italian survey administered to 150 Italian heads of General Surgery [30].

It has been a year since the first outbreak, yet little is known about the evolution of SARS-CoV-2 infection in patients undergoing surgery. The same could be said in relation to the real impact of the pandemic on surgery for diverticulitis. An intense debate emerged regarding the timing of surgery for abdominal emergencies at different levels, including acute diverticulitis. Studies uniformly advised taking extra precautions when it came to delaying surgery, even in the presence of a free perforation if the condition of a patient was not stable enough.

Secondly, the published recommendations were broadly concordant in favoring a Hartmann procedure over a sigmoidectomy. This is unsurprising given both the high risk of complications (*e.g.*, anastomotic leak and intra-abdominal collections) and the subsequent consumption of healthcare resources that the latter entails. It was also mentioned that patients with an ongoing COVID-19 infection carry a higher risk of post-operative morbidity and mortality[3].

Thirdly, an intense debate about the utilization of the laparoscopic approach was generated. After some first publications aimed to discourage the utilization of laparoscopy, several societies progressively mitigated their initial recommendations and statements[14]. Moreover, after the first wave of COVID-19 infections, these societies no longer took a clear position for or against its use, which sometimes generated more confusion among surgeons regarding whether laparotomy was appropriate or not.

We still lack evidence regarding whether SARS-CoV-2 can be found in smoke/aerosol generated within the peritoneal cavity, though the theoretical risks may be extrapolated from previous pandemics and viral infections[20]. Laparoscopy can be used with precautions because of its benefits compared to open surgery. We concluded that recommended precautions should be respected while performing laparoscopy during the pandemic[3]. On the other hand, surgeons may feel safer performing open surgery. However, the underlying reason for doing so should not be found in the supposed increased risk of virus spread but in the fact that open surgery can be less time-consuming, especially if laparoscopic skills are lacking.

The key strength of this review is its broad inclusion of study designs, which allowed us to construct a representative summary of novel and heterogeneous literature. Limitations included the difficulty in making solid comparisons between studies, as well as the diverticulitis-specific nature of this study. Hence, a number of

studies where data on patients with diverticulitis could not be segregated by other abdominal emergencies were excluded.

CONCLUSION

During the COVID-19 pandemic, there was a reduction in the rate of both complicated and uncomplicated diverticulitis. As a result of a switch towards non-operative treatment and clinical follow-up in selected patients with diverticular disease, the pandemic outbreak may have unburdened healthcare resources in time of crisis.

ARTICLE HIGHLIGHTS

Research background

Acute diverticulitis represents a common cause of surgical admission in emergency settings.

Research motivation

The pandemic has had an impact on the rate of admission and treatment for acute diverticulitis. The aim of this review is to map the research done in this area.

Research objectives

The main objective of this review was to systematically explore the impact of the coronavirus disease 2019 (COVID-19) pandemic on the rate of admission and treatment for acute diverticulitis.

Research methods

We searched five electronic databases from December 1, 2019 to December 22, 2020, for studies that reported on the management of patients with acute diverticulitis during the COVID-19 pandemic. Quantitative, qualitative and mixed-method studies were included in order to consider different aspects of measuring treatment burden. Overall proportions were estimated from the weighted mean of percentages measured in each study. Data were expressed using descriptive statistics, including proportions and averages.

Research results

The review demonstrated an overall decrease in admissions for acute complicated diverticulitis (ACD) during the pandemic peak and consequent lockdown, peaking 67% in the largest series. A reduction in the rate of uncomplicated diverticulitis was observed as well. The pandemic outbreak produced a major shift towards non-operative and out-of-hospital management of ACD.

Research conclusions

During the COVID-19 pandemic, there was a reduction in the rate of both complicated and uncomplicated diverticulitis. The pandemic outbreak may have unburdened healthcare resources in time of crisis as a result of a switch towards non-operative treatment and clinical follow-up in selected patients with diverticular disease.

Research perspectives

Whether the pandemic has had an impact on the rate of admission and treatment for acute diverticulitis has not yet been systematically explored. Besides offering a general overview of the changes in epidemiology and management of acute diverticulitis that occurred during the pandemic, the review will inform on changes in the management of this disease in the likely forecast that severe acute respiratory syndrome coronavirus 2 will become a chronic problem to deal with.

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