



CIÊNCIAS MÉDICAS:

**ESTUDOS CLÍNICOS E
REVISÕES
BIBLIOGRÁFICAS**

Volume 1

**Organizadora:
Ana Alice de Aquino**



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PREFÁCIO

A constante evolução da pesquisa na área da saúde está refletida nos avanços das ciências médicas, em que o diagnóstico, o conhecimento sobre antigas e novas doenças e até mesmo a nossa própria atuação e vivências como profissionais estão em permanente *status* de atualização.

O presente livro contém 23 capítulos elaborados por autores pesquisadores da área das ciências médicas e áreas afins. Estando as nossas vidas tão marcadas pela pandemia (ainda em curso) da covid-19 e sendo este livro uma obra que trata sobre saúde, vida e doença, o tema covid-19 corresponde, oportunamente, ao maior número de capítulos.

Acredito que esta obra multidisciplinar representa uma importante contribuição para as ciências médicas, especialmente como fonte de revisão e atualização para nós, acadêmicos e profissionais da área.

Em nossos livros selecionamos um dos capítulos para premiação como forma de incentivo para os autores, e entre os excelentes trabalhos selecionados para compor este livro, o premiado foi o capítulo 17, intitulado “MÉTODOS LABORATORIAIS UTILIZADOS PARA O DIAGNÓSTICO DAS LEUCEMIAS: UMA REVISÃO BIBLIOGRÁFICA”.

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MANIFESTAÇÕES GASTROINTESTINAIS DIRETAS E INDIRETAS CAUSADAS PELA INFECÇÃO POR COVID-19: UMA REVISÃO SISTEMÁTICA.

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RESUMO: Introdução: Em dezembro de 2019 o novo coronavírus surgiu em Wuhan, província de Hubei, China, apresentando-se como uma emergência de saúde pública de preocupação internacional. Notou-se que esta doença tem acometimento multissistêmico, podendo afetar diversos órgãos do corpo humano. **Objetivo** – Levantar a literatura emergente sobre as consequências diretas e indiretas da infecção pelo SARS-CoV-2 (o COVID-19) no sistema gastrointestinal, através de uma revisão integrativa de estudos publicados entre os anos de 2019 e 2021, permitindo reunir os conhecimentos acerca da doença: novos protocolos, novas evidências, informações e impactos do vírus na saúde pública mundial quando nos referimos ao Sistema Gastrointestinal. **Métodos** – Revisão da literatura publicada entre dezembro de 2019 a janeiro de 2021 em bases eletrônicas, onde foram selecionados artigos baseados em níveis de evidência e correlacionados com os objetivos do trabalho. **Resultados** – Foram identificados artigos que relacionam o COVID-19 e o sistema gastrointestinal, explicando fisiopatologia, possíveis prognósticos, abordagens revisadas em relatos de casos em pacientes. **Conclusão** – Impacto direto e indireto da infecção pelo COVID-19 provocaram revisão e mudança de protocolos clínicos e cirúrgicos durante a pandemia, impactando na abordagem em infecções oportunistas, pancreatites, questão nutricional, isquemias mesentéricas agudas e outros procedimentos cirúrgicos no sistema gastrointestinal.

PALAVRAS-CHAVE: Covid-19. Sintomas. Gastrointestinal

DIRECT AND INDIRECT GASTROINTESTINAL MANIFESTATIONS CAUSED BY COVID-19 INFECTION: A SYSTEMATIC REVIEW.

ABSTRACT: Introduction – In December 2019 the new coronavirus appeared in Wuhan, province of Hubei, China, presenting as an international concern of public health emergencies. It was noticed that this disease has multisystemic impact affecting several organs of the human body. **Objective** – The purpose of this paper is to raise on the emerging literature about both direct and indirect consequences through SARS coronavirus by-2- (o-COVID 19) into the gastrointestinal system, through an integrative review on the published studies between 2019 and 2021 which have enabled us to gather knowledge about the disease, such as new protocols, new indication, information and impacts of the virus on worldwide public health when referred to the gastrointestinal system. **TRENDS**, and impacts of the virus on public health worldwide when we refer to the Gastrointestinal System. **Methods** – Literature review published between December 2019 and January 2021 on electronic bases, where articles were selected based on levels of evidence and correlated with the objectives of the study. **Results** – Articles that link COVID-19 and the gastrointestinal system were identified, explaining pathophysiology, possible prognosis, approaches reviewed in case reports in patients. **Conclusion** – Direct and indirect impact of COVID-19 infection caused a review and change in clinical and surgical conditions during a pandemic, impacting the approach to opportunistic procedures, pancreatitis, nutritional issues, acute mesenteric ischemia and other surgical surgeries in the gastrointestinal system.

KEY WORDS: Covid-19. System. Gastrointestinal.

INTRODUCTION

This article aims to identify the bibliography that directly and indirectly links COVID-19 and the Gastrointestinal System, in addition to knowing the direct and indirect consequences of SARS-CoV-2 (COVID-19) infection in this system, as well as discussing the protocols that were being used before the pandemic and now in the management of gastrointestinal involvement by COVID-19 through the review of scientific articles.

Evidencing the symptoms, from the theoretical rescues as studies of Zhang H, et al. (2020) and Zhang H, et al. (2020), a discussion about opportunistic infections is proposed from the perspective of Gu S, et al. (2020) and on nutritional changes where he cites, according to the Ulakes Journal Of Medicine (2020), the relationship of probiotics with COVID-19 patients.

Therefore, an invitation is made to discuss the theoretical and practical observations of the authors referenced here, as well as the contribution of Gu S, et al. (2020), where he reveals important arguments in defense of the use of high fiber content in the diet to increase the immune response of antiviral CD8 + T cells

METHODS

This is a systematic review on the published literature between December 2019 to January 2021 based on electronic data such as, PubMed / Medline, Scielo and Lilacs, which indicates both COVID-19 direct and indirect relations to the gastrointestinal system, Keywords have been used with COVID-19 terms combinations as symptoms and gastrointestinal and digestive tract, in Portuguese, English and Spanish languages.

After the research stage, we selected original articles from the review of correlated issues and briefs, according to the following inclusion criterion: 1) primary articles in full (Clinical Trial) or secondary (Meta-Analysis, Randomized Controlled Trial or Systematic Review); 2) diversified articles with online access to full text; 3) articles published in the last year 4) articles that would be able to cover the objective of this study.

The study excluded: 1) letters, editorials and book chapters; 2) incomplete texts; 3) texts involving patients under 18 years old 4) studies on indigenous patients.

Thus, according to the inclusion criteria were found in Pubmed: 94 texts, Scielo: 14 texts and Lilacs: no text was found, making a total of 108 texts (table 1).

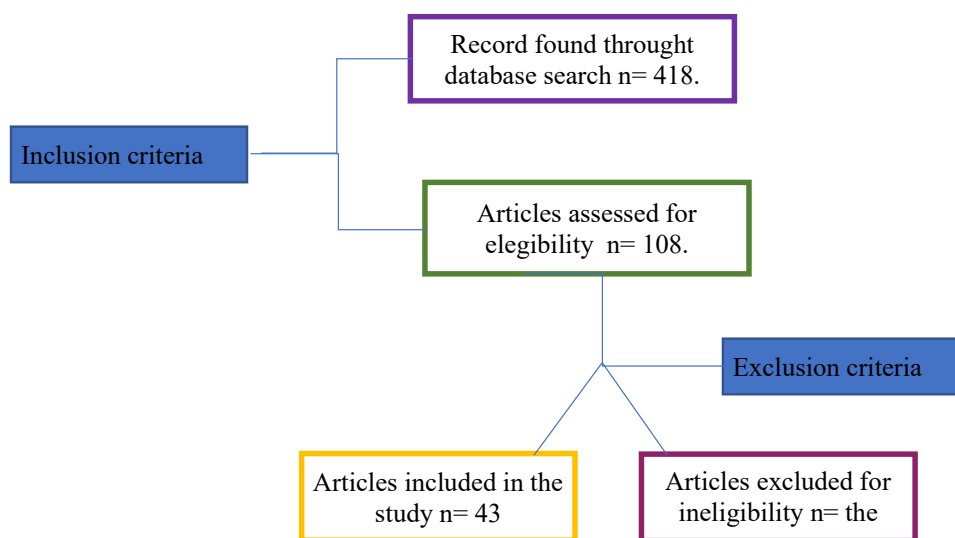
Some publications were ruled out, such as the ones that: 1) addressed the COVID-19 issue without mentioning the gastrointestinal system in a direct or indirect way; 2) duplicated entries in the database files. After applying the exclusion criteria, X articles were selected whose texts were read in

full to compose the discussion about the objectives of this article. This critical analysis was performed independently by exploratory and analytical reading for each study evaluation content (Figure 1).

Table 1 - Number of articles per database

DATA BASE	FOUND	INCLUSION CRITERIA	ELEGIBILITY
Pubmed	1210	94	37
Lilacs	0	0	0
Scielo	23	14	6

Figure 1. Process of article selection



RESULTS

Initially, it was observed that there were important cases of acute mesenteric ischemia, pancreatitis and significant changes in nutrition. In addition, gastrointestinal symptoms were observed and cited in more detail. Directly or indirectly, COVID-19 also affected surgical procedures in the gastrointestinal system (Frame 1).

Frame 1. Systematization of the corpus

Author	Title	Type of production	Journal
Li LQ, et al.	COVID-19 patients' clinical characteristics, discharge rate and fatality rate of meta-analysis.	Review and meta-analysis	Med Virology
Tariq R, et al.	Prevalence and Mortality of COVID-19 Patients with gastrointestinal Symptoms: A systematic review and meta-analysis	Systematic Review and Meta-analysis	Mayo Clinical Procedure
Li J, et al.	Epidemiology of COVID-19: A systematic review and meta-analysis of clinical characteristics, risk factors and outcomes.	Systematic Review and meta-analysis	Journal Medical Virology
Jayant K, et al.	COVID-19 in hospitalized liver transplante recipients: An early systematic review and meta-analysis.	Systematic Review and Meta-analysis	Clinical Transplant
Liu J, et al.	Correlation between gastrointestinal symptoms and disease severity in patients with COVID-19: a systematic review and meta-analysis.	Systematic Review and meta-analysis	Open Gastroenterology
Zhang Y, et al.	Association of digestive symptoms with severity and mortality of COVID-19: A protocol systematic review and meta-analysis.	Systematic Review and Meta-analysis	Medicine Baltimore
Cha MH, et al.	Gastrointestinal and hepatic manifestations of COVID-19: a comprehensive review.	Systematic Review and Meta-analysis	World Journal Gastroenteroly
Mao R, et al.	Manifestations and prognosis of gastrointestinal and liver involvement in patients with COVID-19: a systematic review and meta-analysis.	Systematic Review and Meta-analysis	Lancet Gastroenteroly Hepatology
Cheung KS, et al.	Gastrointestinal manifestations of SARS-CoV-2 infection and virus load in fecal samples from a Hong Kong court: Systematic review and meta-analysis.	Systematic Review and Meta-analysis	World Journal Gastroenteroly

Sultan S, et al.	Gastrointestinal and Liver manifestations of COVID-19, meta-analysis of international data and recommendations of the consultative management of patients with COVID-19.	Systematic Review and Meta-analysis	Journal of Clinical Gastroenterology
Velev V, et al.	COVID-19 and gastrointestinal injury: a brief systematic review and data from Bulgaria.	Systematic Review and Meta-analysis	Infez Med
Rokkas T	Gastrointestinal involvement in COVID-19: a systematic review and meta-analysis.	Systematic Review and Meta-analysis	Ann Gastroenterology
Suresh Kumar VC, et al.	Novelty in the gut: a systematic review and meta-analysis of the gastrointestinal manifestations of COVID-19.	Systematic Review and Meta-analysis	BMJ Open Gastroenterology
Zarifian A, et al.	Gastrointestinal and hepatic abnormalities in patients with confirmed COVID-19.	Systematic Review and Meta-analysis	Journal Medical Virology
Kukla M, et al.	COVID-19, MERS and SARS with concomitant liver injury-systematic review of the existing literature	Systematic Review	Journal of Clinical Medicine
Wang H, et al.	The liver injury and gastrointestinal symptoms in patients with coronavirus disease 19: a systematic review and meta-analysis.	Systematic Review and Meta-analysis	Clinics and Research in Hepatology
Dorrell RD, et al.	Gastrointestinal and hepatic manifestations of COVID-19: a systematic review and meta-analysis.	Systematic Review and Meta-analysis	JGH Open
Dong ZY, et al.	The prevalence of gastrointestinal symptoms, abnormal liver function, digestive system disease and liver disease in COVID-19 infection: A systematic review and meta-analysis.	Systematic Review and Meta-analysis	Journal of Clinical Gastroenterology
Puli S, et al.	Gastrointestinal symptoms and elevation in liver enzymes in COVID-19 infection: A systematic review and meta-analysis.	Systematic Review and Meta-analysis	Cureus

Kumar A, et al.	A gastrointestinal and hepatic manifestations of Corona Virus Disease-19 and their relationship to severe clinical course: A systematic review and meta-analysis.	Systematic Review and Meta-analysis	Indian Journal of Gastroenterology
Li F, et al.	The impact of COVID-19 on intestinal flora: a protocol for systematic review and meta-analysis.	Systematic Review and Meta-analysis	Medicine Baltimore
Makvandi S, et al.	Manifestations of COVID-19 in pregnant women with focus on gastrointestinal symptoms: a systematic review and meta-analysis.	Systematic Review and Meta-analysis	Gastroenterology and Hepatology from bed to bench
Silva FAFD, et al.	COVID-19 gastrointestinal manifestations: a systematic review.	Systematic Review	Revista Sociedade Brasileira de Medicina Tropical
Sanz Segura P, et al.	Involvement of the digestive system in covid-19.	Systematic Review	Journal Of Gastroenterology and Hepatology
Moosavi SA, et al.	COVID-19 clinical manifestations and treatment strategies among solid-organ recipients: A systematic review and meta-analysis.	Systematic Review and Meta-analysis	Journal Of Gastroenterology and Hepatology
Hassaniyazad M, et al.	The clinical effect of Nano Micelles containing curcumin as a therapeutic supplement in patients with COVID-19 and the immune responses balance changes following treatment: a structured summary of a study protocol for a randomised controlled trial.	Randomised Controlled Trial	Trials
Wong MC, et al.	Detection of SARS-CoV-2 RNA in fecal specimens of patients with confirmed COVID-19: a meta-analysis.	Meta-Analysis	Journal of Infection
Merola E, et al.	Prevalence of gastrointestinal symptoms in coronavirus disease 2019: a meta analysis.	Meta-Analysis	Acta Gastroenterology Belgium

Van Doom AS, et al.	Systematic review with meta-analysis: SARS-CoV-2 stool testing and the potential for faecal-oral transmission.	Systematic Review and Meta-analysis	Alimentary Pharmacology & Therapeutics
Akin H, et al.	Newly reported studies on the increase in gastrointestinal symptom prevalence with COVID-19 infection: a comprehensive systematic review and meta-analysis.	Systematic Review and Meta-analysis	Diseases
Ye L, et al.	Digestive system manifestations and clinical significance of coronavirus disease 2019: a systematic literature review.	Systematic Review	Journal Of Gastroenterology and Hepatology
Zeng W, et al.	Gastrointestinal symptoms are associated with severity of coronavirus disease 2019: a systematic review and meta-analysis.	Systematic Review and Meta-analysis	European Journal of Gastroenterology and Hepatology
Juhasz MF, et al.	Insufficient etiological workup of COVID-19 associated acute pancreatitis: A systematic review.	Systematic Review	World Journal Gastroenterology
Pamplona J, et al.	Epidemiological approximation of the enteric manifestation and possible fecal-oral transmission in COVID-19: a preliminary systematic review.	Systematic Review	European Journal of Gastroenterology and Hepatology
Shi S, et al.	The effect of Chinese herbal medicine on digestive system and liver functions should not be neglected in COVID-19: an updated systematic review and meta-analysis.	Systematic Review and Meta-analysis	IUBMB Life

Gastrointestinal Symptoms

The SARS coronavirus-2, also known as Corona virus-19 (COVID-19) binds to the angiotensin 2 (ACE2) converging enzyme through its receptors in order to invade the human cells. Such receptors are highly expressed in the intestinal epithelium. This linkage may interfere in the nutrient receptors' absorption and cause symptoms similar to those of gastroenteritis and disrupting the intestinal homeostasis(1).

There is a specification that the distribution of these receptors occur in both arterial and venous endothelial cells, smooth muscles cells and in the cholangiocytes and highly expressed in kid-

ney, cardiovascular and gastrointestinal tissues, especially(2).

They also relate the ACE2 to digestive symptoms, and diarrhea emerged with a remarkable proportion ranging from 8.0% to 12.9%. The results revealed that the mRNA and the ACE2 protein are highly expressed in the enterocytes of the small intestine, but not in the goblet cells or intestinal immune cells. The high ACE2 expressions in the digestive tract's cells surface may lead to gastrointestinal symptoms and susceptibility to inflammation⁽²⁾. It shows that the human intestinal tract including primary intestinal epithelial cells, small intestine explants, and intestinal organoids are highly susceptible to MERS-CoV⁽⁴⁰⁾⁽⁵⁷⁾.

He keeps on stating that ACE2 can mediate the virus' invasion and extent and also the activation of a gastrointestinal inflammation, perhaps by explaining the virus presence on the studied patients' stool samples⁽²⁾. Besides that, some researches indicated that SARS-CoV-2 might be spread by fecal-oral transmission, and diarrhea could be a presenting feature in the incubation period⁽⁵²⁾⁽⁵⁸⁾. SARS-Cov-2 is commonly present in stool samples or anal swabs in which the virus can persist long after respiratory testing has become negative and that the virus may be viable⁽⁴³⁾⁽⁶⁰⁾.

There are studies claiming that the high expression of ACE2 in near and distal enterocytes in the intestine may increase the vulnerability to SARS-CoV-2 infection. However, in the same study, there is no report of a correlation between the presence of gastrointestinal symptoms and the severity of COVID-19(36). Further studies are needed to have a reliable estimate of this association, ensuring effective preventive strategies and successful global treatments⁽³⁷⁾.

About that, nauseous or vomit and diarrhea are unusual symptoms, affecting only 5% and 3.8%, respectively, of their study in 1099 patients. In other hand, diarrhea, in some studies, was the only symptom found in the absence of respiratory symptoms(41). Also they found out that the COVID-19's clinical characteristics imitates SARS-cov's where fever and coughing are common symptoms while gastrointestinal symptoms are rare which shows the difference on the viral tropism compared to SARS-cov, MERS-cov and seasonal influenza(3). When gastrointestinal symptoms are present, anorexia shows to be the most prevalent gastrointestinal presentation of COVID-19(45), such as diarrhea(42)(49)(51)(54)(62)(63).

Studies alert the need to pay more attention to patients with headaches, dizziness, diarrhea, anorexia, nausea and vomiting, even without evident respiratory symptoms. For differential diagnosis, fecal samples should be tested, minimizing false negatives for COVID-19 on examination by upper airways. Chinese studies of the beginning of the pandemic do not highlight gastrointestinal symptoms so much, however, not because of the lack of attention, but because as the pandemic progressed, new studies were emerging and increasing data in other countries (32) (33). Other symptom found is abdominal pain, that could potentially serve as an indicator of severity in patients with COVID-19 infection to aid from triaging to deciding the aggressiveness of management(44)(50)(61).

Another important detail is that people with a higher risk of dying may be those who are malnourished and become infected with the virus, as reflected in low albumin⁽³⁴⁾. In addition, pregnant women affected by the virus, the most common gastrointestinal symptoms of COVID-19 in pregnant

women were diarrhea (4.5%) and abdominal pain (1.6%), respectively. Evidence suggests that approximately 2% to 33% of patients suffered from diarrhea as one of the symptoms of COVID-19, reinforcing studies previously cited ⁽⁵³⁾.

In addition, the same author observed that patients with gastrointestinal symptoms had higher levels of liver enzymes, monocytes reduction, and increase of prothrombin time and received antimicrobial therapy. In these cases, the symptoms improve and the treatment base needs further studies (47)(66).

He goes on stating that the gastrointestinal symptoms are common and physicians should recognize that these symptoms are frequent in COVID-19. Besides COVID-19's respiratory symptoms some patients show gastrointestinal symptoms such as diarrhea, vomit and loss of appetite(5), and as the severity of the disease increases, digestive symptoms and liver injury become more pronounced(39). In conclusion, SARS-CoV-1 was also suggested to be associated with liver injury(46)(55). Virus infection of liver cells may be the direct cause of liver damage(38)(47).

Further, state that annual swabs of COVID-19 confirmed patients contain SARS nucleic acid samples and it can be isolated from these patients' stool samples indicating the possibility of fecal-oral transmission and also the possibility of new means of the infection diagnosis⁽³⁾⁽⁶⁾⁽⁵⁹⁾.

In turn, the gastrointestinal symptoms may appear in some cases, before fever or symptoms respiratory and reports the case of a six-family member's analysis where two family members presented diarrhea as an initial symptom and were hospitalized without even presenting fever(7).

It is able to resist in sewage water for 2 weeks. This case was registered in hospitals that treated infected patients. This SARS-Cov-2 high stability enables long range and easy dissemination, as well as easy contamination and either long period of contamination⁽⁸⁾.

The gastrointestinal intolerance is common during the early and late disease's acute phases, particularly those which are intubated, sedated or in the prone position (ventral decubitus). This intolerance can be manifested as unexplainable abdominal pain, vomit, diarrhea or remarkable abdominal distention with dilated intestinal loops with hydro levels, besides intestinalis pneumatosis(9). In another study, were considered patients with solid organ transplantation and found that they were more likely to suffer from GI symptoms more often than the general population(56).

OPPORTUNISTIC INFECTION

One of the most striking findings was the increase in the active relation of opportunistic pathogen, including Streptococcus, Rothia, Veillonella, Erysipelatoclostridium and Actinomyces in patients with COVID-19. These findings were associated with the presence of PCR, the bacterial infection rate. It is believed that Rothia contributes to the pathogen of pneumonia, especially in immunocompromised individuals and in patients with retained catheters(1).

The community's average richness and microbial diversity were significantly lower in pa-

tients with COVID-19 and H1N1 than the control group, according to Shannon's diversity index and Chao's diversity. In their analyzes, it was shown that the relative abundance of *Streptococcus* sp. *Escherichia* sp. e / *Shigella* sp. were significantly higher in patients with COVID-19 and H1N1, respectively, compared to the control group(1).

In addition, Ruminococcaceae family's abundance and many genres of Lachnospiraceae family (*Fusicatenibacter*, *Anaerostipes*, *Agathobacter*, Lachnospiraceae not classified and group *Eubacterium hallii*) were drastically reduced in COVID patients -19. Furthermore, these patients had a low count of lymphocyte and a significant higher level of IL-6 and TNF- α (1).

COVID-19'S NUTRITIONAL ALTERATIONS

The mechanisms involving COVID-19 are still into constant studies. Despite the various clinical tables presented by patients, gastrointestinal symptoms are present in most cases. Under this view, there are reports that malnutrition as a progressive result that is stays with the patients during after-disease especially in severe cases(10).

The same explains that despite the higher nutritional need, the inflammatory picture and other associated symptoms, patients develop one hyporexia frame, which extends as sequelae of a process after intubation evolving for dysphagia, especially elderly and multimorbid⁽¹⁰⁾.

Another symptom of great relevance is the ageusia, accompanied by anosmia. A study carried out in India, at the Government Medical College hospital, reports that between 15 May 2020 and 15 August 2020, of the 300 patients positivized to COVID-19, 159 (53%) had both gustatory and olfactory disfunctions, showing the predominance of these symptoms that directly impact the nutritional issue(11).

This gustatory disfunction may be related to both saliva's changes and composition, while the olfactory damage occurs through the virus tropism throughout superior sensitive airways and also by olfactory receptors in nasal epithelium(11).

These study's evidences and subsequent studies suggested that ageusia and anosmia are pathognomonic of COVID19 and discard the relation between comorbidities presence and greater predisposition to develop this clinical picture. In comparison other research conducted states that there is no predilection to genre(12).

In turn, other authors mentions that children and adolescents in severe disease stage develop a sarcopenia frame also caused by bad nutrition habits. The complete study in adult patients the lack of appetite is the main reason in the malnutrition process which is also accompanied by anosmia, as already mentioned by other authors(13).

The inflammation in different degrees and both gustatory and olfactory disfunctions entail great difficulty in eating, which may lead in anorexia and may result in worse prognostic. The caloric deficit cited by may result in a DRE, among other diseases. Therefore, early diagnosis is very

important for good recovering in order to avoid overexposure to possible secondary infections that may emerge from injuries caused by the disease; as well as a rich and balanced diet rich(10)(48).

Any dysfunction involving this axis can deregulate the whole body response which is important for both not-contaminated and recovering patients who. The roles of this axis were deeply explained, making it clear that good communication between the brain and the intestines is essential for a good host's immunological response(16)(17).

Furthermore, the psycho-biotic therapy updating in order to help the immunological balance. According to him, the inflammatory cytokines released during the COVID-19 infection decrease the level of serotonin, leading to psychological disturbance such as anxiety and depression and consequently a decrease in the host's immunity(17).

Therefore, maintain a balanced diet and regular consumption of probiotic strains is very important for the body balance, mainly to keep the immunological system healthy(18).

ACUTE MESENTERIC ISCHEMIA

The exact pathological mechanism between COVID-19 and IMA is not fully known, but there are supposed four mechanisms when isolated or combined may be combined responsible for the lethal complication of the patient. The first one is a coagulation disturbance originated from the systemic inflammatory situation which may lead to a mesenteric vascular thrombosis during virus infection(19)(65).

The second and third mechanisms are related to Von Willebrand's factor high levels that are released by Weibel-Palade bodies in response to endothelial damage caused by the enzyme angiotensin 2, leading to endothelial cells tropism, endothelial dysfunction and the action into the microcirculation of the digestive tract and affecting small intestine's enterocytes⁽¹⁹⁾.

The fourth refers to hemodynamic impairment which is associated with the virus that may cause an occlusive mesenteric ischemia. It is important to consider that an appropriate approach is necessary to suspect, diagnose and manage this complication(19).

In Brazil, were reported three cases of acute mesenteric ischemia, an acute syndromic abdomen as a result from vascular insufficiency driving to a hypoxemia and bad nutrition of the gastrointestinal organs due to a sudden arterial obstruction(20).

All three cases did not present previous trigger and they took place in a period in which case COVID-19 increased in Manaus-AM, suggesting a correlation between the two pathologies, since, as previously reported, recent studies report that infection by the virus increases the thrombo-embolic phenomena. It is important to note that, due to increases of the number of contaminated by COVID-19, these cases were treated at the unit in question, outside of the hospital routine(20).

PANCREATITIS

A survey where the high levels of lipase were associated with non-pancreatic etiologies such as gastritis and enteritis, raising the hypothesis that pancreatic damage may be related to the SARS-CoV-2's direct effect or as a result of the inflammatory cascade, dehydration and multiple organs disfunction(21).

In addition, hypertriglyceridemia, an important risk factor for pancreatitis, has been associated with ritonavir in HIV patients. The same product was used in some studies for the treatment of patients with COVID-19, however, it should be noted the induced toxicity by drugs should also be taken into consideration as an additional risk factor for the development of pancreatic damage(21).

In contrast, the case of a patient who was admitted with an acute pancreatitis and after hospital internment this patient presented characteristic symptoms of COVID-19, confirmed by RT-PCR examination with virus detection in the higher pathways. This highlights the professional health concerns with the COVID-19 pandemic consequences and the risks of infection by SARS-CoV-2 in patients requiring to be hospitalized as a consequence of other diseases(22)(64).

THE CONSEQUENCE OF THE DELAY OF SURGERY PROCEDURES DUE TO PANDEMIC COVID-19

There are arguments whether we should test and how we should test COVID-19 patients in the elective surgery lines, whereas the delay in the beginning or in these patients' continuity treatment with non-emergency diseases, severe and / or chronic may result in the increase of the procedures morbidity and mortality initially addressed as elective(23).

The Brazilian Society of Bariatric and Metabolic Surgery (2020), for instance, requested joint organization priority to resumption of calls during a pandemic. It was determined that all candidates to digestive tract surgery and bariatric and metabolic surgery should be placed in a single list for elective procedure, however not prioritizing the arrival order but the clinical needs and severe cases(23).

The pandemic impacted other surgery procedures on the gastrointestinal system, to this extent the Brazilian Surgeon College and The Brazilian Society of Bariatric and Metabolic Surgery revised their determinations during the peak of the pandemic in Brazil(23).

The task of prioritizing or not some oncologic treatments is very difficult. Physicians must balance a possible delay on both cancer diagnosis and treatment against the risk of exposure to the COVID-19. Simultaneously, in a study involving more than four million oncologic patients that most surgical oncology can be postponed safely for at least four weeks without showing impacts on patient's survivor or progression of the disease(24)(25).

In turn, some authors reported a case of a patient undergoing a urgent surgery treatment by colorectal cancer without any suspicious of initial contamination by the virus, however, in one's operatory evolution it was confirmed the infection, which led to an unfavor outcome with involvement of the digestive tract, with abdominal focus of sepsis and dysfunction in multiple organs, even with intense support and multidisciplinary treatment⁽²⁶⁾.

In one's macroscopic analysis it was noticed fibrous material in the colon serous while in the microscopic's one it was observed changes in the ischemic standard, partial or total necrosis of the intestinal wall and lost areas of the mucosa, edema, inflammation and hemorrhage. In subserous areas, adipose tissue necrosis was observed with congestion and several vascular thrombi in hemorrhage organization⁽²⁶⁾.

It is interesting to note that the chest tomography exam before surgery showed a small nodular opacity. One day after the surgery, the result of RT-PCR exam returned positive to SARS coronavirus-2. The patient was well and had good clinical improvement⁽²⁷⁾.

Other study (2020) confirms that most hospitals offered to treat patients with COVID-19, limiting the surgery treatment only for emergency procedures, even though people continue recovering from other diseases which shows the weakness in relation to the medical and hospital resources⁽²⁸⁾.

In turn, the pandemic forced permanent changes in the medical protocols and hospitals worldwide. He emphasizes that asymptomatic patients are eligible patients for emergency surgeries. Thus, it is unsure the time to the right time the disease's contagion and the time of surgery, the risk of this patient develop the disease in the hospital or shortly after the operation endangering other patients and the health of the professionals⁽²⁹⁾.

Other important points, as mentioned, is the decrease of vacant beds in intensive care units (ICU), organizational difficulties of workers and worries concerned the COVID-19 infection of both patients and health staff⁽³⁰⁾.

In Brazil there was a decrease of 23.6% in the number of living donor transplants for liver transplant due to the potential risk of infection during the procedure. Were propose a redefinition of the strategies for liver transplant during the pandemic, starting off with optimization of the resources available, especially ICU capacity stratification of the multidisciplinary risk of transplant candidates to hepatic transplants in the waiting list, implementation of a systematic strategy sorting of the COVID-19 prior to transplantation and definition of the ideal correspondence of receiver-donor⁽³¹⁾.

There is a need for further studies to elucidate the impact of COVID-19 infection. There are cases of individuals transplanted during the pandemic who had one or two of their immunosuppressants suspended, increasing the dose of steroids to control the cytokine storm that the virus naturally causes in the patient. Care in liver transplantation must be redoubled, with the possibility of prolonged viral replication period ⁽³⁵⁾.

The Federation the Surgical Specialty Associations suggests that emergency surgery which include, for instance, emergency laparotomies, peritonitis, intestinal obstruction, after-operatory com-

plications, complicated appendectomies, abdominal trauma, obstruction of the respiratory tract O holiday and even organs transplant to be undergone on a period less than 24 hours.

CONCLUSION

Although respiratory symptoms are more serious and studied, there is a direct relation by virus infection with important signs and symptoms in the gastrointestinal system that should be considered by health professionals. It is important to treat the COVID-19 infection, but also avoid new avoided complications arise in the patient.

Not only mild symptoms such as pain, diarrhea is going and lack of appetite but also ischemia, embolism, opportunistic infections and the nutritional issues are of total importance to set a patient's prognostic and provide a comfortable and complete treatment.

There are many studies on the COVID-19's symptomatic effect, however just a few about surgery cases or emergency ones when the virus aggravate or caused some pathology in this system. However, it is already possible to verify new protocols necessary to avoid contamination of other people while the patient is admitted in the hospital for elective surgeries, avoiding this way, erroneous prognostics and increasement of lines.

STATEMENT OF INTEREST

We, the authors of this article, declare that we have no financial, commercial, political, academic and personal conflicts of interest.

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