COVID-19: analysis of the risks of operating during the pandemic. What are the real perioperative complications in asymptomatic patients and how to optimize early diagnosis?

COVID-19: análise dos riscos de operar durante a pandemia. Quais as reais complicações perioperatórias em pacientes assintomáticos e como otimizar o diagnóstico precoce?

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Introduction: Controlling dissemination as well as treating patients infected with the new coronavirus are global challenges. Despite the protocols and guidelines generated by the WHO and the leading medical societies that seek to control the pandemic, there are still few reports in the literature that show complications in the perioperative period of patients, initially asymptomatic, infected by COVID-19. This study aims to offer data to plastic surgeons beyond the scope of aesthetic and reconstructive surgeries. Methods: A review article was performed after selecting sixteen articles from PubMed. These were analyzed for their type, statistical relevance, number of participants, complications, and reported outcomes. Results: The mortality rate of patients with COVID-19 undergoing surgical procedures was higher than that estimated in infected patients who did not undergo these procedures. There were also increases in the patient’s admission rate to intensive care units and the pulmonary complications rate. The main predictors of mortality were defined, besides the role of chest tomography for the diagnosis of COVID-19 in the perioperative period. Conclusion: It is essential to understand the risk of operating patients during the pandemic, even if asymptomatic. The increased risk of complications and mortality in elective and emergency surgeries requires disseminating adequate information to both doctors and patients. The objective, therefore, is not to define the medical conduct of surgeons, but to allow analysis in the decision-making process. Keywords: Coronavirus; Plastic surgery; Postoperative complications; Mortality; Risk; Risk factors.
Risks of operating during the pandemic

METHODS

A research was conducted in PubMed on June 22nd and 23rd for the following terms: “perioperative,” “postoperative,” “surgical,” “surgery,” “aesthetic” and “reconstruction,” which should be accompanied by the words “COVID” or “SARS-CoV-2”. Therefore, all selected articles had at least one of the terms used in the search in the title. Thus, 16 (sixteen) articles were selected and analyzed regarding the type of article, statistical relevance, number of participants, complications, reported results, and even if they agreed with other clinical studies. It should be mentioned that all the patients who were included in the selected studies, at some point, had a clinical, laboratory, or imaging diagnosis that confirmed the infection by the new coronavirus.

INTRODUCTION

In December 2019, in the city of Wuhan, China, we witnessed the beginning of a pandemic with a high mortality rate worldwide, including in more developed countries, such as the United States (USA) and countries of the European Union. Because we are facing a disease in which the clinical spectrum varies from asymptomatic patients to seriously ill patients and its pathogenesis is not yet known, there are technical and economic difficulties related to its treatment and diagnosis. Thus, it is known that the fight against the new coronavirus (COVID-19) has become a global challenge. Notwithstanding the concern of WHO and the leading medical societies regarding the dissemination of COVID-19 in hospital and the surgical environment, few reports in the literature show the complications in the perioperative period of initially asymptomatic patients.

OBJECTIVE

This study’s objective is to review articles in the literature that report the main complications presented in the perioperative period during the new coronavirus pandemic. This information is essential for surgeons to understand the real risk of operating a patient, in the context of the pandemic, even asymptomatic.

RESUMO

Introdução: O controle da disseminação e o tratamento de pacientes infectados pelo novo coronavírus é um desafio global. Apesar de protocolos e orientações geradas pela OMS e principais sociedades médicas visando o controle da pandemia, ainda são poucos os relatos na literatura que mostram as complicações no perioperatório de pacientes, inicialmente assintomáticos, que foram infectados pela COVID-19. O presente estudo objetiva oferecer dados aos cirurgiões plásticos que extrapolam o âmbito das cirurgias estéticas e reconstrutoras. Métodos: Foi realizado um artigo de revisão após a seleção de dezesseis artigos do PubMed. Estes foram analisados quanto ao seu tipo, relevância estatística, número de participantes, complicações e desfechos relatados. Resultados: A taxa de mortalidade de pacientes com COVID-19 submetidos a procedimentos cirúrgicos foi superior do que a estimada em pacientes que não foram submetidos a estes procedimentos. Também foram observados aumento na taxa de admissão de pacientes em unidades de terapia intensiva e na taxa de complicações pulmonares. Os principais fatores preditores de mortalidade foram definidos, assim como o papel da tomografia de tórax para o diagnóstico da COVID-19 no perioperatório. Conclusão: É essencial entender o risco de operar pacientes durante a pandemia, ainda que assintomáticos. O maior risco de complicações e mortalidade em cirurgias eletivas e emergenciais demanda a disseminação de informações adequadas tanto aos médicos quanto aos pacientes. O objetivo, portanto, não é definir a conduta médica dos cirurgiões, mas possibilitar a ponderação no processo de tomada de decisões. Descritores: Coronavírus; Cirurgia plástica; Complicações pós-operatórias; Mortalidade; Risco; Fatores de risco.
RESULTS

Of the sixteen articles selected, four articles were “case reports”1-4. After analyzing them thoroughly, it was possible to generate a data synthesis, including clinical presentation, diagnosis, and outcomes. In this way, we can concretely assess how patients evolved after COVID-19 infection and the risk factors that each presented individually (Table 1).

Two articles consisted of brief criticisms of other studies5,6. The first cohort article, by Zoe et al., in 20207, conducted at an institution in New York with patients over the age of 60 and confirmed diagnosis of COVID-19 through polymerase chain reaction (PCR), which would be submitted to hip surgery, showed a very different mortality rate (10%). However, due to the small number of patients analyzed (10 patients), a large number of comorbidities (mean 3.8, range 1-9), as well as older age groups (mean age 79.7, range 67-90), the current study did not find it valid to make a comparison with the data found.

Postoperative fever was considered a red flag, even in the absence of other symptoms. Lei et al., in 20208, in a cohort article that reports a retrospective study carried out in four Wuhan hospitals, from January 1st to February 5th, 2020, where they analyzed 34 elective surgical patients, fever was evidenced as the main symptom in patients with COVID-19 in the postoperative period, being present in 91.20% of those infected. The other most prevalent symptoms, according to the study, were fatigue (73.5%), dry cough (52.9%), and dyspnea (44.1%).

The average time between the surgery and the first symptoms was two days (range between 1 and 4 days), three days (range between 2 and 4.5 days) until the diagnosis of pneumonia, and five days (range 2 and 5, 3 days) until the development of dyspnea, this is the only article that describes the postoperative evolution8. It is worth questioning, however, the small number of patients evaluated in the article, as well as the absence of diagnostic tests during the preoperative period, reverse transcription followed by polymerase chain reaction (RT-PCR) between them, and the probable marking and performing surgeries during the viral incubation period.

The mortality rate in patients who contracted COVID-19 in the perioperative period was 20.6%, and the presence of at least one comorbidity was still cited as a risk factor for mortality.

Because of the pulmonary complications found in most of the analyzed articles, we should highlight the contribution of the article by Lei et al. (2020)8, in which 100% of patients, initially asymptomatic, evolved with pneumonia in the postoperative period, among them, 32.4% progressing to acute respiratory distress syndrome (ARDS).

The extensive cohort articles, prospective or retrospective, thanks to a higher number of participants and their respective statistical significance, showed us that pulmonary complications could be present in up to 50% (fifty percent) of patients, with considerable variation in the clinical presentation and, therefore, with different outcomes8,9.

Along with the increase in postoperative complications, an increase in the admission of patients to intensive care units was also observed, varying between 31.83% and 44.11% in the two main cohort

<table>
<thead>
<tr>
<th>Study place</th>
<th>Age and sex</th>
<th>Type of surgery</th>
<th>Date of surgery</th>
<th>Date of symptoms</th>
<th>Clinical presentation</th>
<th>Chest CT</th>
<th>Result RT-PCR</th>
<th>Evolution and outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iran</td>
<td>75, F</td>
<td>Incisional herniorrhaphy</td>
<td>09/02/2020</td>
<td>27/02/2020</td>
<td>Fever, cough, dyspnea</td>
<td>Typical 19º POD</td>
<td>+</td>
<td>Death</td>
</tr>
<tr>
<td>Iran</td>
<td>81, M</td>
<td>Cholecystectomy</td>
<td>08/02/2020</td>
<td>22/02/2020</td>
<td>Abdominal pain, anorexia, fever, dyspnea, diarrhea</td>
<td>Typical 16º POD</td>
<td>-</td>
<td>Death</td>
</tr>
<tr>
<td>Iran</td>
<td>54, F</td>
<td>Cholecystectomy and hysterectomy</td>
<td>24/02/2020</td>
<td>26/02/2020</td>
<td>Fever in the 2nd POD and dyspnea in the 3rd POD</td>
<td>Typical 3º POD</td>
<td>+</td>
<td>Symptoms improvement</td>
</tr>
<tr>
<td>Italy</td>
<td>64, F</td>
<td>Ileum volvolus enterectomy</td>
<td>04/03/2020</td>
<td>04/03/2020</td>
<td>Fever in the 3rd POD and diarrhea in the 5th POD</td>
<td>Typical 14º POD</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>USA</td>
<td>51, M</td>
<td>Left mastectomy</td>
<td>-</td>
<td>-</td>
<td>Intraoperatório</td>
<td>Desaturation, dyspnea, ventilatory asynchrony</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>China</td>
<td>63, M</td>
<td>Right lobectomy</td>
<td>-</td>
<td>1ºDPO</td>
<td>1st POD Fever, cough, sputum in the 1st POD and dyspnea in the 4th POD</td>
<td>Typical 4º POD</td>
<td>+</td>
<td>Death</td>
</tr>
</tbody>
</table>

F: Female; M: Male; POD: Postoperative days.
not submitted to chest tomography, which makes us question whether the diagnostic method was not underused, thus interfering in statistics.

Moliere and Veillon, in 2020, the fourth cohort article, emphasized the use of chest computed tomography for early diagnosis of COVID-19 infection. The article showed that in 17% of patients diagnosed with COVID-19 through computed tomography, 100% had their diagnosis confirmed by RT-PCR (Figure 5). Among the chest tomographies analyzed, the most common findings in patients with a confirmed diagnosis of COVID-19 were ground-glass opacities and linear subpleural opacities. The imaging diagnosis was made an average of up to 1.2 days (range between 0 and 4 days) before the result of the PCR, which would allow early treatment measures in the context of potentially severe disease.
Main pulmonary complications

Figures 3. Comparative analysis of pulmonary complications presented by patients with confirmed diagnoses of COVID-19

Postoperative pulmonary complications

Figures 4. Comparative analysis of pulmonary complications between elective and emergency surgeries.

Figure 5. Relationship between laboratory and imaging diagnostic methods for the detection of COVID-19.

Ye et al., in 2020\textsuperscript{11}, corroborate the data found when defining that the tomographic findings characteristic of the new coronavirus are ground-glass opacity, consolidations, reticular pattern, and mosaic paving pattern (Figure 6).

Ai et al. confirm the importance of chest tomography. In 2020\textsuperscript{12}, it showed 97% sensitivity in suggesting infection by the new coronavirus. Thus, tomography is an essential ally in the early diagnosis of these patients in the perioperative period, even without the positive result of RT-PCR.


discussion

Despite the data collected, it is unknown whether the effects of surgical and anesthetic stress, the use of perioperative medications, blood loss, and the systemic inflammatory response syndrome are related to a higher predisposition to COVID-19 and worsening of a pre-existing infection. However, we can assume that the immunocompromised state, mainly due to the decrease...
in the postoperative cellular immune response and the inflammatory response itself, is related to a worse prognosis of surgical patients facing infection with the new coronavirus.

We conclude that there is a higher risk of complications and mortality in elective and emergency surgeries due to individual risk factors such as age, sex, and comorbidities.

Chest computed tomography was defined as a means of early diagnosis, considering its higher sensitivity and availability of execution than RT-PCR, ideally performed on any suspected COVID-19. It should be noted that in the face of potentially severe disease, with pathophysiology not yet fully defined, a day of early treatment can represent not only a change in the clinical outcome of the patient but changes regarding the team’s conduct, aiming at protection and less risk of contamination.

The data presentation referring to elective and emergency surgeries, as well as patients with several comorbidities, oncology, and a wide age range, legitimizes the use of the data found for plastic surgery. Thus, the objective of the current study is to offer plastic surgeon data beyond the scope of aesthetic and reconstructive surgeries. However, the objective is not to define the medical conduct of surgeons but to allow for consideration in the decision-making process, to preserve the patient’s life.

CONCLUSION

This review article proposes to analyze the main complications presented in the perioperative period during the new coronavirus pandemic and, therefore, to provide the necessary data, so that plastic surgeons understand the risk of operating patients in this context, even if initially asymptomatic, since the chances of complications and unfavorable outcomes are considerably higher.

COLLABORATIONS

TSG
Analysis and/or data interpretation, Conception and design study, Conceptualization, Data Curation, Final manuscript approval, Formal Analysis, Methodology, Project Administration, Supervision, Visualization, Writing - Original Draft Preparation, Writing - Review & Editing

BLC
Analysis and/or data interpretation, Conception and design study, Data Curation, Formal Analysis, Methodology, Supervision, Writing - Review & Editing

LPB
Analysis and/or data interpretation, Conception and design study, Conceptualization, Data Curation, Methodology, Supervision, Writing - Review & Editing

SC
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FH
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