



Morbidity and Mortality in Patients with Surgical Treatment During the COVID-19 Pandemic in Reconversion Hospital

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Abstract

Introduction: COVID-19 has generated greater morbidity in patients, forcing a hospital reconversion.

Objective: The objective of the study was to evaluate the morbidity and mortality of patients undergoing surgery during the epidemic phase.

Material and Methods: A prospective, cross-sectional, descriptive and observational study was conducted in patients undergoing surgery during hospital reconversion. Demographics, comorbidities, hospital stay and postoperative complications were recorded. Descriptive statistics, Chi square were used to look for an association between the presence of complications and comorbidities and demographics.

Results: There were 133 patients, 69 women and 64 men; median age 56 years, median hospital stay 4 days; 19.5% had diabetes mellitus, 29.3% arterial hypertension, 5.3% chronic lung disease, 45.1% immunosuppression and 3.8% confirmed by SARS-Cov-2. 39 patients had post-surgical complications. Morbidity of 29.3% and mortality of 6.8% were observed. We found a significant difference in the association between complications and high blood pressure ($p = 0.021$), age group ($p = 0.006$), and confirmation of COVID-19 ($p = 0.001$).

Conclusions: Arterial hypertension, advanced age and confirmation of SARS-Cov-2 are associated with the presence of post-surgical complications in this pandemic.

Keywords: Coronavirus Infection; Covid-19; Pandemic; Morbidity; Post-Surgical Complications

Introduction

At the end of 2019, in Wuhan, China, an outbreak of pneumonia caused by a new viral agent called severe acute respiratory syndrome coronavirus 2 (SARS-Cov-2) was reported, the contagion of this disease grew exponentially and was declared a pandemic by the World Health Organization on March 11, 2020 [1,2]. In Mexico, despite establishing extraordinary sanitary measures, on April 21, 2020, 9501 confirmed cases of coronavirus disease (COVID-19) and 857 deaths were reported, so the government officially declared a national emergency and the epidemic phase (phase 3) of the pandemic began.

Throughout this pandemic, different strategies have been carried out focused on preoperative evaluation, perioperative management and even for remote postoperative surveillance, in addition, considering the impact that will be presented by the delay and deferral of elective surgery, some guidelines have also been recommended for the return of this, always contemplating the protection of health personnel and the adaptation of hospital infrastructure for the management of patients with suspected or confirmed COVID-19 [3-5].

In the health services, the hospital reconversion plan was activated, which aimed to prepare medical units for the reception and care of patients with respiratory symptoms. Within the plan, it was decided to suspend outpatient consultation and elective surgery to reduce the risk of contagion and obtain a greater number of available beds, making adaptations, improvisations and innovations to achieve this [6-8].

There are reports that highlight a greater morbidity in patients undergoing surgery during the COVID-19 pandemic [9,10]; In addition, the presence of the virus has been detected in various fluids and tissues during abdominal surgery [11,12], although as it is a new disease, the real impact of these situations is still unknown.

The objective of this study was to evaluate the morbidity and mortality of patients undergoing surgery during the epidemic phase of the pandemic in a reconversion hospital.

Material and Methods

A prospective, cross-sectional, descriptive and observational study was conducted in patients undergoing surgery during hospi-

tal reconversion in the epidemic phase of the COVID-19 pandemic at the Specialty Hospital no. 1 Bajío of the Mexican Institute of Social Security (IMSS) in the city of León, Guanajuato, Mexico.

Patient data were recorded for a period of 3 months from April 21, 2020, the official date of the start of the epidemic phase of the pandemic. A non-probabilistic sampling of consecutive cases was carried out and all patients over 17 years of age undergoing surgical, urgent or elective treatment by the general surgery, oncology and orthopedic services at the Specialty Hospital no. 1 Bajío of the IMSS during phase 3 of the pandemic were included. Demographic data were collected including gender and age, the presence or absence of comorbidities (diabetes, systemic arterial hypertension, chronic lung disease and immunosuppression), clinical diagnosis, surgical treatment instituted, days of hospital stay, suspicion or confirmation of SARS-Cov-2 infection and the type of postoperative complication according to the Clavien-Dindo classification [13,14].

The study was submitted for review by the Local Health Research Committee and the Research Ethics Committee of the hospital unit and approved with the institutional registration R-2020-1001-061. The data collected was kept under strict confidentiality and privacy.

Statistical analysis was performed using IBM SPSS® software. Descriptive statistics were used to determine the distribution of the variables. The Quantitative Variables were applied the Kolmogorov-Smirnoff normality test, observing a free distribution so they are reported as median and range. Categorical variables are reported as frequencies and percentages. Chi square test was used to look for association between the presence of complications with gender, comorbidities and treating service, we also sought association between complications and age groups (under 65 years and age equal to or greater than 65 years) and the presence of complications with confirmation or suspicion of SARS-Cov-2 infection, considering statistically significant a value of $p = < 0.05$.

Results

During the official period of phase 3 of the pandemic, 133 patients underwent surgical management were registered; 69 women (51.9%) and 64 men (48.1%); with a median age of 56 years (range 18-92); 48 patients (36.1%) treated for general surgery, 30 patients (22.6%) for orthopedics and 55 (41.4%) for oncology; in

relation to comorbidities, 26 patients (19.5%) had a diagnosis of diabetes mellitus, 39 patients (29.3%) with systemic arterial hypertension, 7 patients (5.3 %) with chronic lung disease and 60 patients (45.1%) with some immunosuppression condition; 12 patients (9%) were confirmed with SARS-Cov-2 infection; a median hospital stay of 4 days (range 1-28) was recorded (Table 1). The post-surgical complications presented according to the Clavien-Dindo scale [15] were: one patient (0.8%) grade 1, 12 patients (9%) grade 2, 4 patients (3%) grade^{3b}, 7 patients (5.3%) grade^{4a}, 6 patients (4.5%) grade 4b and, 9 patients (6.8%) grade 5; representing a morbidity of 29.3% and a mortality of 6.8% (Table 2).

	Medium (Me)	Rank
Age	59	18-92
Days of hospital stay	4	1-28
	Frequency	Percentage (%)
Sex		
Women	69	51.9
Men	64	48.1
Comorbilidades		
Diabetes mellitus	26	19.5
Systemic arterial hypertension	39	29.3
Chronic lung disease	7	4.8
Immunosuppression	60	56.7
COVID-19	5	3.8
Processing service		
General surgery	48	36.1
Oncology	55	41.4
Orthopaedics	30	22.6

Table 1: Demographic characteristics and comorbidities of the 133 patients undergoing surgery during the official period of the epidemic phase of the COVID-19 pandemic.

Asthma, bronchitis, cystic fibrosis or chronic obstructive pulmonary disease were considered as chronic lung disease; immunosuppression was considered to be any pathology that decreased the patient’s immune status, including cancer and chemotherapy.

When looking for an association between the presence of complications with gender, age, comorbidities and treating service, a statistically significant difference was found between the presence of complications with arterial hypertension (p = 0.021), with the

age group (p = 0.006), with the treating service (p = 0-001) and with confirmation of SARS-Cov-2 infection (p = 0.001) (Table 3).

Degree of complication	Frequency	Percentage (%)
Grade 1	1	0.8
Grade 2	12	9
Grade 3b	4	3
Grade 4a	7	5.3
Grade 4b	6	4.5
Grade 5	9	6.8
Total	39	29.3

Table 2. Postoperative complications presented in patients according to the Clavien-Dindo scale.

Post-surgical complications accounted for 29.3% morbidity and 6.8% mortality.

Yes		Complications (frequency)		
		No	p	
Age group	Under 65 years old	22	75	0.006 [†]
	Equal to or more than 65 years	17	19	
Sex	Female	19	50	0.638
	Male	20	44	
Diabetes mellitus	Yes	11	15	0.211
	No	28	78	
Systemic arterial hypertension	Yes	18	21	0.021 [†]
	No	21	72	
Chronic lung disease	Yes	3	4	0.599
	No	35	89	
Immunosuppression	Yes	16	44	0.542
	No	23	50	
COVID-19	Negative	33	94	0.001 [†]
	Suspicious	1	0	
	Confirmed	5	0	
Processing service	General surgery	24	24	0.001 [†]
	Orthopaedics	8	12	
	Oncology	7	48	

Table 3: Association between the presence of post-surgical complications and demographic variables and comorbidities.

Chi square test was used to analyze the association between the presence of postoperative complications and the study variables, considering a statistically significant difference a p-value <0.05

[†] Statistically significant difference.

Discussion

Various reports and medical associations have made recommendations for the development of surgery during this pandemic, positioning themselves in favor of the postponement of elective surgery and changes in the criteria for surgical decision [16-18]; recommendations have been issued for health personnel primarily when they are at risk of contagion by drops, contact or aerosols, related to the use of personal protective equipment and consider all patients as suspects in the context of the pandemic, optimizing the need to confirm or rule out the presence of SARS-Cov-2 infection before the operation, either by polymerase chain reaction (PCR) test or by pulmonary tomography, as well as close perioperative surveillance in case of requiring any surgical procedure [2,7,19-22]; in relation to minimally invasive surgery, emphasis has been placed on the aspiration of pneumoperitoneum and smoke generated by the use of energy devices [23-25]. In the hospital unit the general surgery and orthopedic services suspended elective surgery and only carried out urgent surgeries, the oncology service continued to work on a regular basis, without modifying its surgical criteria; no laparoscopic procedure was performed.

When entering a phase of hospital reconversion, priority was given to patients with respiratory symptoms, considering as suspects only those who met an operational definition referring to those people who presented at least two of the manifestations fever, cough, headache and, accompanied by at least one of the following symptoms: dyspnea, arthralgia, myalgia, odynophagia, rhinorrhea, conjunctivitis or chest pain, in the previous seven days [7,26]; not considering those asymptomatic patients. In this context, patients undergoing surgery were not routinely tested for COVID-19, only those with clinical suspicion.

In several reports , greater morbidity and mortality have been observed in patients undergoing surgery during the COVID-19 pandemic, mentioning, in addition, the development of unexpected postoperative complications, both pulmonary and gastrointestinal [9,10,27]; in the studied population, the presence of complications in patients with confirmation of SARS-Cov-2 had a statistically significant difference, since all these patients presented some postoperative complication and 5 of them died (Table 4).

Sex	Age	Diagnosis	Procedure performed	Post-surgical complication	Days of hospital stay
Male	83	Bleeding duodenal ulcer	Pyloroplasty and ulcer hemostasis	Death	15
Female	46	Post-surgical biliary stenosis	Remodeling of bilio-enteric diversion	Pneumonia	15
Female	39	Post-surgical intestinal perforation (abdominal hysterectomy)	Intestinal resection and anastomosis	Death	28
Male	62	Severe acute pancreatitis and splenic thrombosis.	Splenectomy	Death	10
Female	70	Cholecystoduodenal fistula and peritonitis	Jordan-Vaughan Procedure	Death	20
Female	36	Bile duct injury	Bilio-digestive diversion	Pneumonia and reoperation for deep surgical site infection	7
Male	36	Liver abscess	Abscess drainage	Pneumonia	6
Female	83	Intestinal occlusion	Adherenciolisis	Death	10
Male	64	Fournier’s gangrene	Surgical grooming, debridement	Death	20
Male	30	Traumatic brain injury	Gastrostomy	Pneumonia and acute renal failure	7
Female	59	Severe acute cholecystitis	Subtotal fenestrating cholecystectomy	Acute renal failure	3
Female	22	Liver abscess	Abscess drainage	Pneumonia and acute renal failure	8

Table 4: Characteristics of patients confirmed with SARS-CoV-2 infection undergoing surgery.

During the development of this research, an international cohort study was published with a total of 1128 patients with the collaboration of 235 hospitals in 24 countries and they report a mortality of 23.8%, associated with the male sex, age group over 70 years and related to a diagnosis of malignancy [28]. In our series of patients a morbidity of 29.3% and a mortality of 6.8% was found and in the analysis of the information a statistically significant association was observed between the presence of complications with the presence of arterial hypertension and the age group (greater than 65 years); an association with the treating service was also observed, observing a greater morbidity in patients treated by general surgery, this we attribute to a greater state of severity and complexity of the procedure performed because the patients presented and referred to our unit in an advanced period of the disease, most of them with a picture of severe sepsis and were urgent procedures; in addition, all patients confirmed with SARS-CoV-2 infection were treated for general surgery. No association was found with the presence of immunosuppression, malignant pathology or sex.

The results observed in the present study are related to those presented in other publications, although no greater than usual general morbidity was observed, if a mortality of 41% was observed in patients undergoing surgery with suspicion and confirmation of COVID-19, it should be noted that these patients underwent surgery with a severe septic state and with a prolonged hospital stay.

We consider that the main limitation of the study was not to perform tests for COVID-19 routinely in patients undergoing surgery, we currently know that there are patients who do not develop symptoms, but this situation should be considered for the protection of the personnel involved, we consider that such tests should be part of the preoperative protocol in the context of the pandemic, mainly in a reconversion hospital; the results of these tests could modify the management of patients in relation to the protection of staff and patients and even be associated with a change in morbidity.

Conclusions

Although some aspects of the disease and its impact on surgical outcomes are still unknown, we consider that the presence of co-

morbidities, advanced age and confirmation of SARS-Cov-2 infection are factors that seem to be related to the appearance of post-surgical complications, so they should be taken into account. In the presence of epidemiological peaks and an increase in cases of SARS-Cov2 infection when opting for surgical management. Even in patients without respiratory symptoms, it is important to consider the use of protective equipment on health personnel involved in surgical care.

Ethical Aspects

Ethical Responsibilities

This research protocol complies with the ethical standards set out in the Nuremberg Code, the Declaration of Helsinki and its 2013 amendment, as well as the bioethical principles set out in the Belmont Report. It also complies with the rules established in the General Health Law Title Fifth and the Regulations of the General Law on Health Research considering a type I research, of low risk, also conforms to those established in nom-012-SSA3-2012, which establishes the criteria for the execution of research projects for health in human beings. The study was submitted for review by the Local Health Research Committee and the Research Ethics Committee of the hospital unit and approved with the institutional registration R-2020-1001-061.

Protection of People and Animals

The authors state that no experiments have been conducted on humans or animals for this research.

Confidentiality of Data

The authors declare that they have followed the protocols of their work center on the publication of patient data, maintaining strict confidentiality of the data obtained.

Conflict of Interest

This investigation does not have any situation of actual, potential or obvious conflict of interest, including any financial or other interest or other relationship with a third party, that may have a commercial interest attributed to obtaining access to any confidential information obtained in the matters or procedures of this investigation. The authors declare that they have no conflict of interest.

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