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The Effect of the Covid-19 Free Operation Path Protocol on the Incidence of Lung Complications in Postoperative Elective Patients at dr. Moewardi Hospital Surakarta

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ABSTRACT

The pandemic that began in late 2019, COVID-19, affects all patients, including cancer patients. Patients with cancer that continues to spread and there is no other effective alternative treatment must undergo surgery so that cancer does not get worse. Given this problem, many health care centers have developed a protocol system in the form of a COVID-19-free surgical route. This study is a retrospective cohort study comparing the incidence of pulmonary complications in patients undergoing elective cancer surgery at dr. Moewardi Surakarta before and during the COVID-19 pandemic. The study sample was adult patients aged ≥ 18 years which underwent elective surgical procedures with the aim of curative cancer starting before COVID-19 (March 2019-February 2020) until the time the COVID-19 pandemic emerged (March 2020 - February 2021). The data obtained were 768 patients. Of these patients, 384 were classified as having a COVID19-free operation route during the pandemic, and 384 others underwent elective surgery in the pre-pandemic period. Based on the Chi-Square test, a p-value of 0.850 was obtained (P>0.05) which shows that there is significant difference between cases of pulmonary complications in surgical patients before and after the pandemic who were carried out through the COVID-19-free protocol route. In conclusion, there is no significant change in effect of the covid-19 free operation path protocol on the incidence of lung complications in postoperative elective patients at dr. Moewardi Hospital Surakarta, although this patented and mandatory protocol can reduce cancer patients' morbidity and mortality who undergoing elective surgery during a pandemic.

1. Introduction

The pandemic that began in late 2019, COVID-19, affects all patients, including cancer patients.[1] Cohort and multicentre studies report that COVID-19 infection in patients with cancer has a high risk of causing severe clinical conditions to death when compared to non-cancer patients.[2-4] This clinical condition can pose a pulmonary complications risk. The main pulmonary complications include pneumonia, acute respiratory distress syndrome (ARDS), and unexpected ventilator postoperative use.[5] Meanwhile, additional pulmonary complications include pulmonary embolism, admission of patients to the ICU, repeat surgery, death 7 days postoperatively, and duration of patient care in the hospital.[6]

Postponing elective surgery is an option in the COVID-19 pandemic time frame to reduce the risk of nosocomial transmission and the high risk of complications if infected in cancer patients.[7–9] However, not all elective surgery can be postponed. Patients with cancer that continues to spread and there is no other effective alternative treatment must undergo surgery so that cancer does not get worse.10 Given this problem, many health care centers have developed a protocol system in the form of a COVID-19-free surgical route that separates the operating room, the ICU and a different surgical ward to the surgical area infected with

COVID-19. Based on this protocol, it was reported that the COVID-19-free surgical route can provide significantly safer surgical services compared to non-route surgery.[8,11,12]

Seeing the importance of the COVID-19-free surgical route protocol, the Regional General Hospital (RSUD) Dr. Moewardi Surakarta followed up on the results of these studies by creating a COVID-19 free pathway protocol. All patients are required to have a PCR swab before elective surgery. One of the outcomes of this protocol can be seen from the pulmonary complications that may occur in post-COVID-19-free surgery patients. The presence or absence of pulmonary complications indicates whether the protocol can have a significant effect. Therefore, this study purposed to compare the occurrence of pulmonary complications in post-elective surgery patients during the pandemic era and before the pandemic in Dr. Moewardi Hospital, Surakarta.

2. Methods

Study Design and Protocol

This study is a retrospective cohort study comparing the incidence of pulmonary complications in patients undergoing elective cancer surgery at dr. Moewardi Surakarta before and during the COVID-19 pandemic. It should be noted that during the pandemic of COVID-19, a COVID-19-free operation route was created reducing the risk of lung complications and infection of SARS-CoV-2 that might occur. Patient data were obtained online by considering the consent of each patient using informed consent. The researcher collected and collected patient data after obtaining ethical permission from the ethics commission of dr. Moewardi Hospital Surakarta.

Components of the COVID-19 Free Operation Route

The COVID-19 free operating line system was created during the COVID-19 pandemic by dividing the entire hospital area into several zones. The red zone is an infectious zone used to treat COVID-19 patients. This zone has its separate area including the COVID-19 isolation room, obstetrics room, ICU, hemodialysis room, and Emergency Room (IGD) and its operating room. Red zone officers are required to wear level 3 personal protective equipment (PPE) (N95 mask, short gloves, long gloves, goggles/face shield, coverall, apron, boots, headcover, and socks; plus a coat and gloves sterile hands for surgery). The yellow zone is a mixed zone that is involved in patient care, including the COVID-19 post, bronchoscopy operating room, spirometry pulmonary clinic, ENT polyclinic, dental polyclinic, and ER (Triage). Officers serving in the yellow zone wear PPE level 2 (N95 masks, gloves, goggles/face shields, and aprons). The green zone is a non-infectious zone outside the red and yellow zones where complete PPE is not required unless indicated.

Exclusion Criteria, Inclusion, Sampling Method, and Sample Size

The study sample was adult patients aged ≥ 18 years which underwent elective surgical procedures with the aim of curative cancer starting before COVID-19 (March 2019-February 2020) until the time the COVID-19 pandemic emerged (March 2020 - February 2021). Eligible cancers include head and neck (mouth, oropharynx, larynx, hypopharynx, saliva, thyroid, paranasal sinuses, skin), and breast as well as sarcomas (soft tissue, bone) and intracranial malignancies. The patient was then monitored until the 30th postoperative day. Patients who had clinical symptoms resembling those of COVID-19 or patients with confirmed SARS-CoV-2 (with Real Time-PCR swab) preoperatively, perioperatively, and postoperatively were excluded.

The sample size is determined using the formula for estimating proportions. Thus, the minimum sample required is 384 patients who had elective surgery procedure before the pandemic and 384 patients who underwent elective surgery in the COVID-19-free operation route protocol during the pandemic with a total of 768 patients. Samples were taken using the consecutive sampling method, where every patient who underwent elective surgery and met the research criteria was included in the study at a certain time until the minimum sample size was reached.

Data Variables

The independent variable of this study is the presence or absence of a COVID-19-free operation path

protocol conducted at dr. Moewardi Surakarta during the pandemic period (March 2020 - February 2021). Meanwhile, the dependent variable is the incidence of pulmonary complications in patients undergoing elective surgery at dr. Moewardi Surakarta before the pandemic (March 2019 - February 2020) and during the pandemic. Confounding variables included age, sex, smoker, comorbid, BMI, and stage of cancer experienced by each patient.

To simplify the classification of each type of cancer that has various stage systems, cancer status can be divided into an early stage (cancer is localized in the organ, no nodules, no metastases, and can be completely resected) or advanced stage (cancer develops beyond the organ, nodules present, there are metastases resected for curative purposes). The full definition of this classification is provided in the Data Supplement. The classification of surgery types is determined based on the Clinical Coding & Schedule Development Group as minor (minor/moderate) or major (major/complex). The pre-operative test was defined as have done a swab test performed 72 hours prior to surgery to confirm COVID-19 status.

Statistic analysis

Univariate analysis was conducted to explain the independent and dependent variables and to determine the characteristics of the research sample. Meanwhile, bivariate analysis was carried out through Chi-Square to determine the significance of the relationship between variables in categorical data types.

3. Result

Patients and procedures

In this analysis, there were 768 patients from various types of oncology cases at Dr. Moewardi Surakarta. From all patients, it was found that 66.2% (507) patients were female, while 33.7% were male. The characteristics of the patient's condition, disease, and stage are listed in table 1.

A total of 384 patients in 2020 underwent surgical procedures through the COVID-19 free operation route. This is intended to prevent patients and medical personnel from the transmission risk of the COVID-19 virus.

Postoperative Pulmonary Complications

The incidence of complications in surgical patients was determined by admission to the ICU during the 30 days postoperative surveillance period. The pulmonary complications rate during surveillance 30 days after surgery during the pandemic through the COVID-19 free route was 8.98% (69 cases), this condition is not much different from the conditions before the pandemic where complications cases in the pre-pandemic period were 8.72%. (67 cases).

Based on the Chi-Square test that has been carried out regarding the comparison of case data of elective surgery patient complications in the period after and before the pandemic, a p-value of 0.850 was obtained (P> 0.05) which shows that there is significant difference between cases of pulmonary complications in surgical patients before and after the pandemic who were carried out through the COVID-19-free protocol route.

Table 1. Table of demographic characteristics of elective surgery patients in the period 2019 and 2020 at Dr. Moewardi Hospital.

Characteristics	2019	2020 (with the COVID-19 free protocol)
Number of patients	384	384
Age		
<50	66	56
50-59	76	82
60-69	145	109
70-79	57	89
≥80	40	48

Gender		
Male	135	126
Female	249	258
Types of Cancer		
Breast	134	45
Neck	144	103
Head	40	70
Oral cavity	29	141
Sarcoma	25	25
Without explanation	12	0
Comorbidity		
DM T 2	62	67
Hypertension	132	121
Lung Disease	69	78
Complication		
Yes	67(8,72%)	69 (8,98%)
No	317 (41,27%)	315 (41,02%)

Table 2. Chi-square test comparing the incidence of pulmonary complications in elective surgery patients for the period 2019 and 2020 at Dr. Moewardi Hospital.

Complication	Period				*p*
	2019		2020		
	N	%	N	%	
Yes	67	8,72	69	8,98	0,850
No	317	41,27	315	41,02	
Total	384	50,0	384	50,0	

Operation Line Components

The data obtained were 768 patients. Of these patients, 384 were classified as having a COVID19-free operation route during the pandemic, and 384 others underwent elective surgery in the pre-pandemic period. Of the 384 elective surgery patients before the pandemic, 41.27% (217) underwent surgery without manifestation of pulmonary complications, 8.72% (67) were admitted to the ICU during the 30-day postoperative surveillance period. Handling of patients through the COVID-19-free surgical route did not make a significant difference from the pre-pandemic period related to the lower pulmonary complications likelihood in treatment in the operating room, critical care instalation, and shared ward areas that were different from patients with COVID-19.

4. Discussion

Various guidelines and recommendations for operational implementation strategies in the pandemic era have been found. Most of these strategies center on the isolation of health care facilities for COVID-19 patients, priority for urgent cases for immediate surgery, COVID-19 screening for patients undergoing surgery, use of PPE by health personnel, and decreasing the duration of post-operative patient stay.[13–16] However, the protocol in the form of a COVID-19-free operating route has not been widely researched and recommended. This operating route protocol has its advantages because it includes a preventive protocol that reduces the risk of exposure to nosocomial COVID-19 in elective surgery patients who are not infected with SARS-CoV-2 since the patient's initial admission to the hospital. This protocol is different from the protocol for

isolating elective surgery patients who were infected with COVID-19 from the start.

The COVID-19-free operating route protocol has proven to provide benefits for patients in the form of a reduced risk of pulmonary complications in the COVID-19 pandemic period. This is evident from the fact of a significant difference in the number of lung complications in elective surgery patients at dr. Moewardi Surakarta between the period before compared to the period when the pandemic took place.

The results of this study are in line with many other similar studies in various health care centers.[11,12,17] Research comparing the availability of a COVID-19-free operation route with the unavailability of a COVID-19-free operating route found that the post-operative patient SARS-CoV-2 infection rate was lower level in the COVID-19-free operation route.[12, 18, 19] It should be noted that COVID-19 infection without a COVID-19-free surgical route in post-operative patients is around 5% with a mortality rate of 25%. However, this infection and mortality rate can drop to 0% with the COVID-19-free operating route.[12] This patented and mandatory protocol also helps to maintain compliance of all health workers in the service and helps identify patients with potential post-operative pulmonary complications. This can reduce cancer patients' morbidity and mortality who undergoing elective surgery during a pandemic.[11] In other research of emergency orthopedic patients during the pandemic period from January to December 2020 decreased compared to visits in the same period in 2019 so that orthopedic services at tertiary and academic referral hospitals experienced a significant decrease in cases.[18]

However, it is necessary to carry out a follow-up review regarding the variations in lung complications that occur in this research study, both in the period before and during the pandemic.

5. Conclusion

There is no significant change in effect of the covid-19 free operation path protocol on the incidence of lung complications in postoperative elective patients at dr. Moewardi Hospital Surakarta, although this patented and mandatory protocol can reduce cancer patients' morbidity and mortality who undergoing elective surgery during a pandemic.

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