Original Article

Continuing Monitoring in Respiratory Intensive Care Unit and Mortality in Patient Post Bronchoscopy Procedure

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Abstract

Background: Bronchoscopy is a relatively safe procedure in the diagnosis and therapy of lung disease, however in some cases complications can occur which lead to further monitoring in the intensive care or respiratory intensive care unit (RICU) and even lead to mortality. This study aimed to determine the need for intensive care unit monitoring and the risk factors that increase the need for intensive care unit monitoring followed by mortality after bronchoscopy procedure.

Method: A retrospective data of consecutive bronchoscopy procedures in Persahabatan Hospital between July to December 2021.

Results: From 410 patients underwent bronchoscopy procedures, there were 52 patients (12.6%) were admitted to RICU after bronchoscopy. From patients who were treated in RICU 3 (5.8%) of them died. Patients who died during monitoring in intensive care unit had an older mean age of 60.3 years. There were 2 (12.5%) died after bronchoscopy procedures with two or more intervention, 1 patients (3%) died in the group with one intervention. There were 2 patients (13.3%) died with two or more comorbidities and 1 patient (5.9%) died with one comorbid. In the group with diagnosis of malignancy, 3 patients (7.5%) died. Whereas in patients who were performed surgery during bronchoscopy there were 2 patients (20%) died and only 1 patient (2.4%) died without any surgery during bronchoscopy.

Conclusion: Although bronchoscopy is a relatively safe procedure but the need of monitoring in intensive care after bronchoscopy procedures were relatively high and mortality quite high compare to previous study. Further research is needed to determine the risk factors that increase the need of continuing monitoring in intensive care unit followed by mortality after bronchoscopy procedure.

Keywords: bronchoscopy, mortality, RICU

INTRODUCTION

Bronchoscopy is an important diagnostic and therapeutic procedure in the management of lung disease. The flexible fiber optic bronchoscope allows excellent visualization of the airway lumen and the luminal surface of the bronchial segments with relatively less traumatic instruments.

A rigid bronchoscope allows more therapeutic options but is limited to the trachea and main bronchi, unless it is combined with a flexible fiber optic bronchoscope. Several studies have shown that bronchoscopy is a relatively safe procedure with a very low mortality rate ranging from 0% to 0.1%.[1,2]

Although bronchoscopy is a relatively safe procedure, complications can occur in some procedures. Most of the complications occur in patients with comorbidities or interventions during bronchoscopy. Overall, both rigid bronchoscopes and flexible fiber-optic bronchoscopes are safe and effective procedures for the diagnosis and treatment of airway disorders and lung disorders.[2]

The most common reported complications, although not the same in several studies, are tachycardia/ bradycardia, bleeding, bronchospasm/ laryngospasm, cough, dyspnea, apnea, seizures, desaturation, pneumothorax and pulmonary edema. Other smaller studies reported a complication rate of 5-32%, and a mortality rate of 0-0.8%, but these studies are limited as they are from retrospective data so data regarding variable definition of adverse events and follow-up is limited.[3]

An escalation in level of care although does not necessarily reflect harm, but it could have been considered in the short term following therapeutic bronchoscopy.[4] Currently there are very few studies that discuss the need for intensive care or respiratory intensive care unit (RICU) in patients after bronchoscopy procedure. This study discusses the risk factors that increase the need of intensive care unit or RICU monitoring and the mortality of patients after bronchoscopy.

METHOD

We included patients who need intensive care unit after bronchoscopy procedures from July to December 2021 at the Persahabatan Hospital, Jakarta, Indonesia. The data collected included sex, age, diagnosis divided into malignancy and non-malignancy, the totaln number of interventions performed during bronchoscopy, the presence of comorbidities, mortality and other surgical procedures performed concurrently with bronchoscopy. All the data were collected retrospectively from electronic medical record and analyzed used SPSS.

RESULTS

Of the 410 patients who underwent bronchoscopy procedures, 52 (12.6%) patients were treated in the RICU after bronchoscopy, 47 patients underwent diagnostic bronchoscopy procedures and 5 patients underwent therapeutic bronchoscopy procedures.

Of the 52 patients, 32 (61.5%) were male and 20 (38.5%) female with a mean age of 50.3 years. There were 3 patients (5.8%) post bronchoscopy procedures in RICU died. Patients who died during treatment in the intensive care unit had an older mean age of 60.3 years compared to patients who survived, with an average age of 49.6.

Table 1. Patient's Characteristic

Variables	N (%)
Sex	
Male	32 (61.5%)
Female	20 (38.5%)
Age (mean)	50.3
Interventions during bronchoscopy	
Bronchoscopy explorative	3 (5.8%)
Bronchoscopy + 1 intervention	33 (63.5%)
Bronchoscopy + ≥2 interventions	16 (30.8%)
Diagnosis	
Malignancy	40 (76.9%)
Non-malignancy	12 (23.1%)
Comorbid	
No comorbid	20 (38.5%)
1 comorbid	17 (32.7%)
2 or more comorbid	15 (28.8%)
Status	
Decease	3 (5.8%)
Survive	49 (94.2%)
Other surgery	
No	42 (80.8%)
Yes	10 (19.2%)

There were 2 patients (12.5%) who died in the group undergoing bronchoscopy procedures with two or more. Whereas in interventions during bronchoscopy, 1 patient (3%) died in the group with one intervention during bronchoscopy.

As for mortality associated with comorbid, there were 2 (13.3%) with two or more comorbidities who died and 1 patient (5.9%) with one comorbid who died. In the group with a diagnosis of malignancy, 3 patients (7.5%) died. Whereas in patients who were performed surgery during bronchoscopy there were 2 patients (20%) died and without any surgery during bronchoscopy only 1 patient (2.4%) died.

DISCUSSION

Bronchoscopy is generally considered a safe procedure. Data on complications associated with bronchoscopy are mostly obtained through retrospective studies. In a systematic review by Ost et al, the mortality rate for bronchoscopy was low, but it was difficult to compare populations between these studies.[4]

Table 2. Mortality was associated with age, interventions, diagnosis, comorbidities and surgery

Variables	Alive	Death
Age, years (mean)	49.6	60.3
Intervention during bronchoscopy		
Bronchoscopy explorative	3 (100.0%)	0 (0.0%)
Bronchoscopy + 1 intervention	32 (97.0%)	1 (3.0%)
Bronchoscopy + ≥2 interventions	14 (87.5%)	2 (12.5%)
Diagnosis		
Malignancy	37 (92.5%)	3 (7.5%)
Non-malignancy	12 (100.0%)	0 (0.0%)
Comorbid		
No comorbid	20 (100.0%)	0 (0.0%)
1 comorbid	16 (94.1%)	1 (5.9%)
2 or more comorbid	13 (86.7%)	2 (13.3%)
Other surgery		
No	41 (97.6%)	1 (2.4%)
Yes	8 (80.0%)	2 (20.0%)

In this population, the bronchoscopy procedure was shown to be more diagnostic than therapeutic, which is in line with Suleman's study that bronchoscopies were mainly done for diagnostic purposes, while bronchoscopy for therapeutic purposes is limited due to lack of equipment and expert staff.[5] This is consistent with our study, the high rate of RICU care in patients with malignancy and all the mortality from patients with malignancy.

In this study, without assessing the complications that occurred there were 12.6% of patients that led to intensive care after bronchoscopy with an overall mortality rate of 0.7% which was quite high compared to previous studies. Facciolongo et al reported a mortality rate of 0.02% in a large prospective study at 19 hospitals performing diagnostic and therapeutic bronchoscopy. This may be due to the number of samples in this study is too small, so further research with greater samples is needed. The study also stated the low incidence of complications in the exploratory bronchoscopy group (i.e, carried out without sampling).[6]

In accordance with our study, there was no mortality in exploratory bronchoscopy without other interventions. In our study it was also shown that mortality increased with the number of interventions during bronchoscopy. Bronchoscopy accompanied by intervention in the form of lung biopsy is most often associated with increased complications during bronchoscopy procedures and increased mortality compared to other interventions. It is in accordance with the study by Jacomelli et al that most of the complications occurred in patients undergoing sample collection procedures, particularly biopsy.[7] Meanwhile, broncho alveolar lavage (BAL), which is used to diagnose infection cases, is the safest procedure and no study has ever reported complications associated with this procedure.[5]

There are still very few studies that report patient characteristics related to the safety of bronchoscopy such as indications for bronchoscopy, gender, age, comorbidities, types and procedures or interventions performed during bronchoscopy and whether there are other surgical procedures along with bronchoscopy which can cause an increased risk of treatment. RICU and death. A study by Kaparianos et al reported a mortality rate of 0.04%, that is, there were 2 deaths. One of the patients experienced hypoventilation and cardiac arrest after the end of the procedure while the other died from sudden hemorrhage after manipulation of endotracheal carcinoma. These patients had comorbidities, namely chronic obstructive pulmonary disease, hypertension and diabetes mellitus.[8] In our study, the cause of death was not known due to a lack of data.

Jin and colleagues reported three deaths following bronchoscopy. One patient died had comorbid coronary heart disease, cardiac arrest at the time of action and could not be resuscitated and two patients died of major airway obstruction

after bronchoscopy.[9] This is similar to our study of comorbidities increasing the risk of death. The study also showed that malignancy was the most common indication for bronchoscopy, but did not mention its effect on complications and mortality. Whereas in our study all deaths were in the group with a diagnosis of malignancy.

In Boyd et al's study, it was shown that there is an increased risk of side effects with increasing age, but the absolute frequency is low, so that age should not be a contraindication for bronchoscopy.[10] Meanwhile, in our study, mortality was higher at an older age, but the following factors must be considered such as comorbidities and interventions during bronchoscopy.

This study provided the characteristics of patients who need intensive care and mortality post bronchoscopy procedure, which has very little data in previous studies. However, this study has a limitation with small number of samples and no data regarding complications that occur during bronchoscopy causing treatment in the intensive care unit and causes of death.

CONCLUSION

This study showed that although bronchoscopy is a relatively safe procedure but the need of RICU care after bronchoscopy procedure needs to be considered. Therefore, health facilities that perform bronchoscopy are expected to have a special intensive room for further monitoring of patients after bronchoscopy procedure. Further research is needed with more samples and more complete data as predictors of clinical outcomes based on patient characteristics, interventions performed and complication during bronchoscopy procedure which can increase the risk of RICU care and post-bronchoscopy mortality.

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