**STROBE Statement—checklist of items that should be included in reports of observational studies--**

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|  | Item No. | Recommendation | Page No. | Relevant text from manuscript |
| **Title and abstract** | 1 | (*a*) Indicate the study’s design with a commonly used term in the title or the abstract | 1 | A Retrospective Case-Control Study |
| (*b*) Provide in the abstract an informative and balanced summary of what was done and what was found | 1-2 | case-control study;21 relevant factors;8 risk factors associated with the occurrence of air embolism. |
| Introduction |  |
| Background/rationale | 2 | Explain the scientific background and rationale for the investigation being reported | 2 | Air embolism which has a rapid onset, complex symptoms, serious condition, and high lethality;there are few studies on how to circumvent CT-TNB air embolism. |
| Objectives | 3 | State specific objectives, including any prespecified hypotheses | 2 | The risk factors and the probability of air embolism in our hospitals are not clear. |
| Methods |  |
| Study design | 4 | Present key elements of study design early in the paper | 2 | The incidence of air embolism is low, this complication is serious and often life-threatening. |
| Setting | 5 | Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection | 2-3 | Retrospective analysis of 32748 patients who underwent CT-TNB at the First Affiliated Hospital of Zhengzhou University and Xuzhou Cancer Hospital from January 2017 to December 2021. |
| Participants | 6 | 1. ***Cohort study***—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up
2. ***Case-control study***—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls
3. ***Cross-sectional study***—Give the eligibility criteria, and the sources and methods of selection of participants
 | 1 | b |
| 1. ***Cohort study***—For matched studies, give matching criteria and number of exposed and unexposed
2. ***Case-control study***—For matched studies, give matching criteria and the number of controls per case
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| Variables | 7 | Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable | 2-3 | 21 risk factors inculded: gender, age, smoking, whether the coagulation mechanism, intraoperative cough, intraoperative hemoptysis, lesion site, lesion size, distance between the lesion and pulmonary veins, the lesion, presence of necrosis within the lesion, distance between the lesion and the pleura, emphysema, and pleural adhesions, puncture angle, patient position, sampling method, procedure time (time from needle insertion to removal), number of samples taken, postoperative pneumothorax, and puncture needle to bleeding. |
| Data sources/ measurement | 8\* | For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group | 4 | Combining the literature and our own experience, 21 risk factors associated with patients, lesions, and procedures were identified and data were collected for analysis. The patient-related risk factors included gender, age, smoking, whether the coagulation mechanism was abnormal, intraoperative cough, and intraoperative hemoptysis. Risk factors associated with the lesion included lesion site, lesion size (maximum short axis diameter), distance between the lesion and pulmonary veins, presence of cavitation within the lesion, presence of necrosis within the lesion, distance between the lesion and the pleura (puncture path), emphysema, and pleural adhesions. Risk factors associated with the procedure include puncture angle, patient position, sampling method, procedure time (time from needle insertion to removal), number of samples taken, postoperative pneumothorax, and puncture needle to bleeding. |
| Bias | 9 | Describe any efforts to address potential sources of bias | 2 | Six clinicians with 3-10 years of experience performed all CT-TNB procedures according to standard protocols.Use the same coaxial guide needle soft tissue biopsy needle |
| Study size | 10 | Explain how the study size was arrived at | 2 | All patients were from two tertiary hospitals (The First Affiliated Hospital of Zhengzhou University and Xuzhou Cancer Hospital) who underwent CT-TNB. This study was conducted in accordance with the Declaration of Helsinki as revised in 1983. The study was approved by the ethics committees of the First Affiliated Hospital of Zhengzhou University and Xuzhou Cancer Hospital. Written informed consent was obtained from all patients participating in CT-TNB. |

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| Quantitative variables | 11 | Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why | 4 | 21 risk factors associated with patients, lesions, and procedures. The patient-related risk factors included gender, age, smoking, whether the coagulation mechanism was abnormal, intraoperative cough, and intraoperative hemoptysis. Risk factors associated with the lesion included lesion site, lesion size, distance between the lesion and pulmonary veins, presence of cavitation within the lesion, presence of necrosis within the lesion, distance between the lesion and the pleura (puncture path), emphysema, and pleural adhesions. Risk factors associated with the procedure include puncture angle, patient position, sampling method, procedure time (time from needle insertion to removal), number of samples taken, postoperative pneumothorax, and puncture needle to bleeding. |
| Statistical methods | 12 | (*a*) Describe all statistical methods, including those used to control for confounding | 2 | LASSO regression analysis;logistic regression analysis; ROC operation;AUROC |
| (*b*) Describe any methods used to examine subgroups and interactions | 2-3 | All cases were grouped into case group and control group, that is, either air embolism occurred or did not occur, and there was no subgroup. Multiple regression and area under the curve were used to analyze the risk factors of the two groups of cases |
| (*c*) Explain how missing data were addressed | 3 | Air embolism occurred in 28 patients, and 1270 patients without air embolism who were punctured on the same day served as the control group, without data deletion. |
| (*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed*Case-control study*—If applicable, explain how matching of cases and controls was addressed*Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy | 2 | The control group included 1270 patients who underwent CT-TNB on the same day. |
| (*e*) Describe any sensitivity analyses | 3 | logistic regression analysis;AUROC |
| Results |
| Participants | 13\* | (a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed | 3 | 28 patients were found to have air embolism;1270 patients who underwent CT-TNB on the same day. |
| (b) Give reasons for non-participation at each stage |  | No. |
| (c) Consider use of a flow diagram | Figure legend | Figure 1 |
| Descriptive data | 14\* | (a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders | Table | Table 1 |
| (b) Indicate number of participants with missing data for each variable of interest |  | No |
| (c) *Cohort study*—Summarise follow-up time (eg, average and total amount) |  | No |
| Outcome data | 15\* | *Cohort study*—Report numbers of outcome events or summary measures over time |  | No |
| *Case-control study—*Report numbers in each exposure category, or summary measures of exposure | 3 | 28 patients were found to have air embolism (19 cases (0.079%) in the First Affiliated Hospital of Zhengzhou University and 9 cases (0.103%) in Xuzhou Cancer Hospital), with an incidence rate of 0.086%, only 7 cases were symptomatic, with a symptom rate of 25.000%.Risk factors were screened from 21 factors using LASSO regression analysis (Table 1, Figure 3, Figure 4), and 8 factors were identified as being associated with air embolism using multiple logistic regression. |
| *Cross-sectional study—*Report numbers of outcome events or summary measures |  | No |
| Main results | 16 | (*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included | 3 | ROC the AUC under the curve was 0.721 (95% confidence interval [CI], 0.565-0.773). |
| (*b*) Report category boundaries when continuous variables were categorized | Table | Table1 |
| (*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period | 3 | Risk factors were screened from 21 factors using LASSO regression analysis (Table 1, Figure 3, Figure 4), and 8 factors were identified as being associated with air embolism using multiple logistic regression. |
| Other analyses | 17 | Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses | 4 | logistic |
| Discussion |
| Key results | 18 | Summarise key results with reference to study objectives | 3 | In this study, we successfully identified risk factors for postoperative air embolism in CT-TNB patients based on patient, lesion characteristics, and procedure-related risk factors, and we identified these risk factor capabilities by ROCAUC. |
| Limitations | 19 | Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias | 5 | There are some limitations of our study. First, some factors, such as the experience of the puncturing surgeon, the size of the puncture needle and other complications. Secondly, this study is a retrospective study with fewer included institutions.Finally, there is a need for prospective projects to study these factors in depth, expand the study institutions, and increase the sample size to further understand the relationship. |
| Interpretation | 20 | Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence | 5 | The introduction of these 8 factors can help predict the risk of CT-TNB air embolism and can be used to help patients considered to be at higher risk of air embolism to make preemptive decisions to improve better optimization and better intraoperative management to reduce the occurrence of air embolism. |
| Generalisability | 21 | Discuss the generalisability (external validity) of the study results | 3-5 | We successfully identified risk factors for postoperative air embolism in CT-TNB patients based on patient, lesion characteristics, and procedure-related risk factors, and we identified these risk factor capabilities by ROCAUC.Of the 8 key risk factors identified in our study, 1 was related to the puncture procedure and 4 were related to patient symptom factors, implying that the risk of air embolism can be reduced by optimizing the procedure and preoperative adjustment of patient symptoms. Therefore, the risk of air embolism can be reduced by changing controllable factors. |
| Other information |  |
| Funding | 22 | Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based | 5 | 2021 Clinical Medical Science and Technology Development Fund of Jiangsu University and CSCO-SYTRF (No. Y-sy2018-142) |

\*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.