INPLASY PROTOCOL

To cite: Zhang et al. Robotic-assisted bronchoscopy for the diagnosis of peripheral pulmonary lesions: A systematic review and meta-analysis. Inplasy protocol 202290115. doi: 10.37766/inplasy2022.9.0115

Received: 27 September 2022

Published: 27 September 2022

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Support: **Clinical Research Plan of SHDC.**

Review Stage at time of this submission: **Completed but not published.**

Conflicts of interest:
None declared.

Robotic-assisted bronchoscopy for the diagnosis of peripheral pulmonary lesions: A systematic review and meta-analysis

Zhang, C[1]; Xie, F[2]; Li, R[3]; Cui, N[4]; Sun, J[5].

Review question / Objective: **What is the overall diagnostic yield and complication rate of robotic-assisted bronchoscopy for peripheral pulmonary lesions?**
Condition being studied: **Many of peripheral pulmonary lesions (PPLs) may represent early-stage lung cancer. Lung cancer is the leading cause of cancer mortality globally. Early diagnosis and treatment of lung cancer are crucial for a better prognosis. With the widespread use of low-dose computed tomography (LDCT), the detection rate of PPLs is increasing. As a result, the number of PPLs requiring biopsy is progressively increasing. Transbronchial lung biopsy (TBLB) and transthoracic needle aspiration (TTNA) are the main modalities of non-surgical biopsy for PPLs. TTNA has a diagnostic yield of 90%, however, it also has a pneumothorax rate of 25%. Since TBLB avoids destroying the structure of normal pleura and lung tissue, the incidence of complications is lower. Unfortunately, traditional flexible bronchoscopy has a modest sensitivity of 34% and 63% for lesions 2 cm, respectively. The advent of guided bronchoscopy has increased the diagnostic yield to 70%. However, there is still a gap in diagnostic yield compared with TTNA. The advent of robotic-assisted bronchoscopy (RAB) is expected to further improve the diagnostic yield of TBLB for PPLs. However, the diagnostic performance of RAB for PPLs has not reached a consensus.**

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 27 September 2022 and was last updated on 27 September 2022 (registration number INPLASY202290115).

INTRODUCTION

Review question / Objective: **What is the overall diagnostic yield and complication rate of robotic-assisted bronchoscopy for peripheral pulmonary lesions?**

Rationale: The advent of robotic-assisted bronchoscopy (RAB) is expected to further improve the diagnostic yield of transbronchial lung biopsy (TBLB) for peripheral pulmonary lesions (PPLs). However, the diagnostic performance of RAB for PPLs has not reached a consensus.

Condition being studied: Many of peripheral pulmonary lesions (PPLs) may represent early-stage lung cancer. Lung cancer is the leading cause of cancer mortality globally. Early diagnosis and treatment of lung cancer are crucial for a better prognosis. With the widespread use of low-dose computed tomography (LDCT), the detection rate of PPLs is increasing. As a result, the number of PPLs requiring biopsy is progressively increasing. Transbronchial lung biopsy (TBLB) and transthoracic needle aspiration (TTNA) are the main modalities of non-surgical biopsy for PPLs. TTNA has a diagnostic yield of 90%, however, it also has a pneumothorax rate of 25%. Since TBLB avoids destroying the structure of normal pleura and lung tissue, the incidence of complications is lower. Unfortunately, traditional flexible bronchoscopy has a modest sensitivity of 34% and 63% for lesions 2 cm, respectively. The advent of guided bronchoscopy has increased the diagnostic yield to 70%. However, there is still a gap in diagnostic yield compared with TTNA. The advent of robotic-assisted bronchoscopy (RAB) is expected to further improve the diagnostic yield of TBLB for PPLs. However, the diagnostic performance of RAB for PPLs has not reached a consensus.

METHODS

Participant or population: Adults with peripheral pulmonary lesions requiring biopsy will be included.

Intervention: Robotic-assisted bronchoscopy was the main intervention.

Comparator: None.

Study designs to be included: Randomized controlled trails, prospective and retrospective studies meeting eligibility criteria will be included.

Eligibility criteria: The inclusion criteria were: (a) studies that employed RAB for the diagnosis of PPLs, (b) sufficient data were presented to calculate diagnostic yield, (c) diagnosis was confirmed histologically or by close clinical follow-up, (d) more than 10 patients were included, (e) studies conducted in human subjects. When data or subsets of data were presented in more than one article, the article with most details or the most recent article was chosen. We excluded conference abstracts, review papers, case reports, letters and comments.

Information sources: PubMed, EMBASE, Web of Science and Cochrane Library databases.

Main outcome(s): overall diagnostic yield and complication rate.

Quality assessment / Risk of bias analysis: Quality assessment was performed using the Quality Assessment of Diagnostic Accuracy Studies-2 (QUADAS-2) tool.

Strategy of data synthesis: The diagnostic yield and complication rate were pooled and presented with their respective 95% confidence intervals (CI). A P-value of < .05 was considered statistically significant. The heterogeneity of the pooled data was evaluated using the Cochran Q test and Higgins inconsistency index (I2) test. The Cochran Q test with P < .10 or an I2 > 50% was considered to indicate heterogeneity. If significant heterogeneity was found, random effects model was used. Subgroup analysis was used to identify possible sources of study heterogeneity. Publication bias was explored by funnel plot and Egger's test. All statistical analyses were performed using R version 4.0.3 with the "meta" package (The R Foundation for Statistical Computing).

Subgroup analysis: Subgroup analysis was used to identify possible sources of study

heterogeneity. It was performed according to malignancy prevalence, whether ROSE/ fluoroscopy/rEBUS/CBCT was used or not, and robotic system (Ion or Monarch).

Sensitivity analysis: Sensitivity analysis will be performed to verify the robustness of results.

Country(ies) involved: China.

Keywords: robotic-assisted bronchoscopy; lung cancer; peripheral pulmonary lesion; systematic review and meta-analysis; diagnostic yield.

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