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The prevalence of lung cancer after lung transplantation: a systematic review and Meta-analysis

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ADMINISTRATIVE INFORMATION

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Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 12 April 2024 and was last updated on 12 April 2024.

INTRODUCTION

Review question / Objective The prognosis for lung cancer in transplant recipients is unfavorable, resulting in limited large-scale studies on the prevalence of post-lung transplantation lung cancer. Therefore, the objective of this study is to employ meta scores methods to enhance comprehension, diagnosis, and treatment of lung cancer following lung transplantation, ultimately improving long-term survival rates among transplant patients.

Condition being studied Lung transplantation has become the most effective treatment for end-stage lung disease. With the continuous development of lung transplantation technology, early survival after transplantation has improved significantly in recent decades, but the long-term prognosis is still not optimistic. In addition to chronic lung dysfunction

and infection, postoperative malignant tumors were the main factors affecting the long-term survival of recipients. After solid organ transplantation, most of the recipients need to receive lifelong immunosuppressive therapy, and the immunosuppressive intensity of lung transplantation recipients is generally higher than that of other organ transplantation recipients. Immunosuppression is the main factor leading to impaired anti-tumor immune surveillance function and promoting the development of lung cancer. Nevertheless, to the best of our knowledge, there are no prior systematic reviews and meta-analytic studies that determined the prevalence of lung cancer among recipients after lung transplantation.

METHODS

Participant or population Lung transplantation recipients.

Intervention No.

Comparator No.

Study designs to be included Cohort studies.

Eligibility criteria Study inclusion criteria were as follows:(i)The study participants were people who had received lung transplants;(ii)Report the prevalence of lung cancer or report the data used to calculate the incidence; (iii) There were no significant abnormalities in lung imaging before lung transplantation;(iv)be an observational cohort study where researchers observe participants and track health outcomes of interest (the occurrence of lung cancer for this study)over times;(v)be published in English.The following exclusion criteria were used to exclude articles from the meta-analysis:(i)Reviews, commentaries, case reports and articles performed on animal subjects were excluded.(ii)written in language other than English;(iii) patients who were found to have cancer during the pre-transplant evaluation or at the time of transplant;(iv)had incomplete data. All studies were independently reviewed by two authors.Disagreement were resolved with the help of third researcher.

Information sources Studies were identified from the following electronic database:Cochrane、Embase、PubMed、Web of Science, using the terms “lung transplantation”,“lung cancer”and “prevalence”.

Main outcome(s) The prevalence of lung cancer after lung transplantation.

Quality assessment / Risk of bias analysis Two independent authors extracted separately relevant data from the included studies and evaluated the quality of the included studies based on the Newcastle-Ottawa Scale(NOS).The NOS scale,with a full score of 9, consist of 8 items in 3 dimensions :4 items for subject selection,1 item for comparability and 3items for outcome.A maximum of 1 point is awarded to each item,except for comparability,which is assigned a maximum of 2 points.A higher score indicates higher research quality and studies with a score of ≥ 6 are considered eligible for the analysis.The data extracted per study included the following information:the first author,sample size,publication year,country of study,age,gender,lung cancer cases after lung transplantation,etc.Any disputes in the process of information extraction and quality assessment will be consulted and confirmed with the thirdresearcher.

Strategy of data synthesis In this study, stata18.0 software was used for statistical analysis.[9]The prevalence rates from the individual studies were pooled by using a random-effect meta-analysis. [10]Statistical heterogeneity among the included studies was assessed using Cochran's Q statistic and Higgins' I^2 statistic.The values of I^2 statistics such as 75, 50 and 25%, represented high medium and low heterogeneity respectively.[11]A funnel plot and Egger test were used to assess the potential publication bias.Subgroup analysis was performed on the occurrence of lung cancer after lung transplantation according to the gender of participants, the type of lung transplantation, study region.Low-quality studies(NOS score < 6) were excluded from sensitivity analyses.Furthermore,we removed one study each time and recalculated the pooled risk estimates to assess the robustness of our results.

Subgroup analysis In our subgroup analysis,the p value between different regions was 0.094($p > 0.05$), indicating that there was no significant difference in the risk of lung cancer in patients after LTx from different regions.Changing the type of LTx also did not change the increased risk of lung cancer.There was no heterogeneity in the risk of lung cancer between single and double LTx.(P for homogeneity=0.168).(Fig 3)

However,concerning the sex of the participants,the prevalence of lung cancer was higher for males (3%) than females (1%).There was significant difference in the risk of lung cancer in patients between male and female.($p < 0.05$) (Fig 3).This suggests that sex may be one of the sources of heterogeneity.

Sensitivity analysis To identify the possible source of heterogeneity across the studies as well as to test the difference across the groups that estimated lung cancer among participants,we conducted a stratified analysis by restricting the analysis to the tools used to measure lung cancer ,areas,sex(male vs female),single/double lung transplantation.This analysis resulted in the observed variation in the prevalence of lung cancer according to the above three variables(groups) and is not statically significant.

We also conducted a leave-one-out sensitivity analysis to further examine the possible cause of heterogeneity across the studies involved in the analysis.This analysis suggested that the findings of the main analysis are robust and not dependent on a single study. (Fig S2).

Country(ies) involved China.

Keywords lung cancer, lung transplantation, Systematic review, meta-analysis.

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