INPLASY PROTOCOL

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No conflict of interest statement.

Thoracic cavity drainage and clinical observation in the treatment of occult pneumothorax：a systematic review and meta-analysis

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Review question / Objective: **Occult pneumothorax is a kind of pneumothorax which can not be shown by chest X-ray, but can be clearly diagnosed by chest CT. And it may be turn into life-threatening tension pneumothorax. The treatment of occult pneumothorax has always been controversial, the focus of which is whether chest drainage tube should be placed to prevent the development of pneumothorax. There is no unified standard on whether to observe or drainage for occult pneumothorax. Therefore, this study is expected to analyze this problem from the perspective of evidence-based medicine.**
Condition being studied: **Occult pneumothorax is a very important clinical problem. It refers to pneumothorax that can not be displayed on chest X-ray but can be clearly diagnosed on chest CT. And it may be turn into life-threatening tension pneumothorax. The current treatment measures are clinical observation and chest drainage.**

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 10 April 2020 and was last updated on 10 April 2020 (registration number INPLASY202040049).

INTRODUCTION

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METHODS

Participant or population: All trauma patients diagnosed with occult pneumothorax.

Intervention: Thoracic cavity drainage (including thoracic cavity closed drainage and thoracentesis).

Comparator: Clinical observation: including physical examination and dynamic imaging examination. And all of the above are inpatients.

Study designs to be included: Including randomized controlled study, non-randomized controlled study, prospective study and retrospective study.

Eligibility criteria: Patients with blunt chest injury diagnosed as occult pneumothorax in all age groups, including those who need mechanical ventilation and those who do not need it, regardless of the cause of injury and whether there are combined injuries or not.

Information sources: We searched PubMed, Embase, Cochrane library, OVID and Springer Link databases to collect literature on the treatment of occult pneumothorax.

Main outcome(s): The incidence of respiratory distress, pneumothorax progression, tension pneumothorax, pneumonia, atelectasis and overall pulmonary complications in the two groups. The incidence of thoracic cavity drainage in the clinical observation group.

Additional outcome(s): The mechanical ventilation time, the ICU stay time and the length of hospital stay in the two groups.

Quality assessment / Risk of bias analysis: The randomized controlled study uses the risk of bias assessment tool recommended by the Cochrane network. It mainly includes 6 aspects: ① Methods of random distribution; ② concealment of distribution scheme; ③ implementation of blind method; ④ integrity of result data; ⑤ selective reporting of research results; ⑥ other bias sources. To evaluate the included literature and draw the literature quality evaluation form. According to the evaluation results, we divided them into three levels: a (low risk bias), B (medium risk bias), C (high risk bias).The non-RCT study was evaluated by the Newcastle Ottawa scale (NOS). It mainly includes three items: ① the selection of objects (including four items: whether the definition of cases is clear, how representative the cases are, the selection of controls, and the definition of controls); ② the comparability between cases and controls; ③ the exposure factors (including three items: the determination of exposure factors, the consistency of cases and controls, and the non-response rate).When appropriate, each item is indicated by "☆", in which the item of comparability can obtain 2 ☆ at most. The total score of the evaluation of the document quality by the NOS scale is 9☆.

Strategy of data synthesis: Statistical software was used for meta-analysis. The heterogeneity of the literature was analyzed. If there is no significant heterogeneity ($P > 0.1$, $I2 < 50\%$) among the studies, the fixed effect model is used for analysis; if there is heterogeneity ($P < 0.1$, $I2 > 50\%$) among the studies, the causes of heterogeneity and sensitivity analysis are discussed, and the random effect model is used for analysis. WMD (weighted mean difference) and SMD (standardized mean difference) were used as analysis statistics. WMD is selected when the measurement

methods or units of the same effect index are identical; SMD is selected when different measurement methods or units are used for the same effect index, or the mean difference between different studies is too large. RR (relative risk) and OR (odds ratio) were used as analysis statistics. RR was selected in randomized controlled trials and OR was selected in non-randomized controlled trials.The interval estimation of each statistic is expressed by 95% confidence interval (CI). Calculate Z and P value by u-test. The test level α =0.05, that is, when P<0.05, the difference between the two groups is statistically significant. The analysis results are represented by drawing a forest map.

Subgroup analysis: Mechanical ventilation group vs non-mechanical ventilation group, randomized controlled study VS non-randomized controlled study.

Sensibility analysis: Sensitivity analysis is used to verify the stability of the research results.It is especially important when the analysis results have large heterogeneity.Including the use of random effect model analysis and the elimination of studies one by one to verify the stability of the results.

Country(ies) involved: China.

Keywords: Thoracic cavity drainage; clinical observation; occult pneumothorax; systematic review;meta-analysis.