INPLASY PROTOCOL

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None declared.

EIT-derived PEEP Vs other PEEP titration strategies for patients with Acute Respiratory Distress Syndrome: A Systematic Review and Meta-Analysis

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Review question / Objective: **This study aimed to more precisely quantify the methods of several PEEP titrations, to determine which methods are most useful, and to establish an evidence base for the clinical impact of EIT-based individual PEEP setting which appears to be a promising method to optimize PEEP in ARDS patients.**
Eligibility criteria: **For inclusion, any studies except reviews and case report in adults, and examine the effect of any other PEEP titration strategies and EIT based individual PEEP setting on respiratory markers and clinical impacts of ARDS. The outcome was assessed by use of respiratory markers (PaO2/FiO2-ratio and respiratory system compliance). Only studies published as full-length articles or letters in peer-reviewed English-language journals were included.**

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 25 June 2021 and was last updated on 25 June 2021 (registration number INPLASY202160094).

INTRODUCTION

Review question / Objective: **This study aimed to more precisely quantify the methods of several PEEP titrations, to determine which methods are most useful, and to establish an evidence base for the clinical impact of EIT-based individual PEEP setting which appears to be a promising method to optimize PEEP in ARDS patients.**

Condition being studied: **A systematic review and meta-analysis of 4 databases with no language restrictions from 1980 to December 2020, for trials comparing the PEEP titration with electrical impedance tomography and conventional PEEP**

titration strategies for ARDS patients. Effects on primary discrete endpoints (PaO2/FiO2-ratio and respiratory system compliance) were assessed by random-effects and fixed-effects meta-analysis. 8 trials, including a total of 222 participants, were eligible for analysis. Meta-analysis demonstrates a significantly EIT-based individual PEEP setting for patients receiving higher PaO2/FiO2-ratio as compared to other PEEP titration strategies [5 trials, 202 patients, SMD 0.636, (95% CI 0.364-0.908)]. EIT-derived PEEP titration strategy did not significantly increase respiratory system compliance when compared to other peep titration strategies, [7trials, 202 patients, SMD -0.085, (95% CI -0.342-0.172)]. The benefits of PEEP titration with EIT on clinical outcomes of ARDS in placebo-controlled trials probably result from the visible regional ventilation of EIT. These findings offer clinicians and stakeholders a comprehensive assessment and high-quality evidence for the safety and efficacy of the EIT-based individual PEEP setting as a superior option for patients who undergo ARDS.

METHODS

Participant or population: Patients with Acute Respiratory Distress Syndrome.

Intervention: EIT-derived PEEP titration.

Comparator: Other PEEP titration strategies.

Study designs to be included: To assess the effect of EIT-based individual PEEPsetting, we undertook a systematic review and meta-analysis investigating the effect ofEIT-derived PEEP vs. other PEEP titration strategies for patients with Acute RespiratoryDistress Syndrome across respiratory markers and clinical outcomes.

Eligibility criteria: For inclusion, any studies except reviews and case report in adults, and examine the effect of any other PEEP titration strategies and EIT based individual PEEP setting on respiratory markers and clinical impacts of ARDS. The outcome was assessed by use of respiratory markers (PaO2/FiO2-ratio and respiratory system compliance). Only studies published as full-length articles or letters in peer-reviewed English-language journals were included.

Information sources: Four electronic databases (PUBMED, EMBASE, Web Of Science, and the Cochrane Library).

Main outcome(s): 1. EIT-guided PEEP titration was associated with a raise respiratory system compliance and significant raise in PaO2/FiO2-ratio. 2. EIT group retains a favorable balance between safety and efficacy when compared with the conventional type. 3. EIT is a superior option for patients with ARDS.

Strategy of data synthesis: The following information was extracted and entered into databases by three investigators (MNY, TTZ, CW): study design, type of intervention, patients' characteristics, and outcomes (web appendix). If relevant information regarding the design or ARDS outcomes was unavailable, or doubt existed about duplicate publications, authors were contacted to obtain the necessary information (web appendix). Uncertainties were resolved by consensus. This study is reported by the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement and the Cochrane Handbook for Systematic Reviews of Interventions. Our detailed study protocol is available online and has been previously published. No institutional review board approval was required for this meta-analysis because the study included data that had been published previously.

Subgroup analysis: The subgroup analysis of respiratory system compliance and PaO2/FiO2-ratio.

Sensitivity analysis: None.

Country(ies) involved: China.

Keywords: Acute Respiratory Distress Syndrome, Electrical Impedance Tomography, Metaanalysis, Positive End-expiratory Pressure.

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