

INPLASY PROTOCOL

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None.

Systematic review and Meta-analysis of early and late open reduction and internal fixation in the treatment of multiple rib fractures

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Review question / Objective: The timing of operation for multiple rib fractures is an important clinical problem. According to the traditional view, the stress response of the body is obvious within 48-72 hours after trauma, and pulmonary edema and pulmonary contusion also reach the peak during this period. For the treatment of severe chest trauma with chest wall softening, it is generally not advocated to carry out early operation. It is considered that early operation will aggravate lung injury and increase mortality, so the traditional treatment scheme carries out surgical treatment after the basic condition of the patient is stable. Generally speaking, surgical treatment is performed 72 hours after injury. However, some scholars believe that compared with conservative treatment of rib fractures, choosing surgical treatment within 72 hours after injury does not increase the risk and can benefit patients. Therefore, whether early operation should be chosen for multiple rib fractures (within 72 hours after injury) is the focus of debate.

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 20 December 2020 and was last updated on 20 December 2020 (registration number INPLASY2020120101).

INTRODUCTION

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during this period. For the treatment of severe chest trauma with chest wall softening, it is generally not advocated to carry out early operation. It is considered that early operation will aggravate lung injury and increase mortality, so the traditional treatment scheme carries out surgical treatment after the basic condition of the patient is stable. Generally speaking,

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Condition being studied: Rib fractures are most common in blunt chest trauma. Multiple rib fractures often have chest wall softening, flail chest and dyspnea, which often indicate the existence of severe chest trauma. In recent years, with the renewal of the concept of the treatment of chest trauma and the improvement of the degree of attention, multiple rib fractures have gradually changed from conservative treatment to surgical treatment based on open reduction and internal fixation. At present, the treatment of multiple rib fractures can be divided into conservative treatment and surgical treatment.

METHODS

Participant or population: A patient with multiple rib fracture with flail chest diagnosed by imaging examination.

Intervention: Early operation (within 72 hours of injury).

Comparator: Late operation (72 hours after injury).

Eligibility criteria: The patients with severe multiple injuries and hemodynamic instability were excluded.

Information sources: PubMed, Embase, Cochrane library, Web of science, China knowledge Network, Wanfang and Uygur Popularization Chinese Biomedical Literature Database were searched by computer. The literature on the timing of operation for multiple rib fractures was collected.

Main outcome(s): Incidence of pulmonary complications, pain improvement rate,

operation time, ventilator-assisted ventilation time, postoperative chest X-ray improvement time, postoperative bed rest time, postoperative chest tube indwelling time, hospital stay, postoperative mortality.

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: (日) Methods of random distribution; (月) concealment of distribution scheme; (火) implementation of blind method; (水) integrity of result data; (木) selective reporting of research results; (金) 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: (日) 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); (月) the comparability between cases and controls; (火) 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 ($P > 0.05$, $I^2 < 50\%$) among the studies, the fixed effect model is used for analysis; if there is heterogeneity ($P < 0.05$, $I^2 > 50\%$) among the studies, the causes of heterogeneity and sensitivity analysis are discussed, and the random effect model is used for analysis. SMD (standardized mean difference) were used

as analysis statistics. OR (odds ratio) were used as analysis statistics. The interval estimation of each statistic is expressed by 95% confidence interval (CI). Calculate Z and P value by u-test. The test level $\alpha = 0.05$, 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: None.

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: Multiple rib fractures; flail chest; timing of operation; systematic review; Meta analysis.

Contributions of each author:

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