INPLASY PROTOCOL

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A comparison of regional anesthesia techniques in patients undergoing of video-assisted thoracic surgery: A network meta-analysis

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Review question / Objective: Although video-assisted thoracoscopic surgery is a minimally invasive surgical technique, the pain remains moderate to severe. We comprehensively compared the regional anesthesia methods for postoperative analgesia in patients undergoing video-assisted thoracoscopic surgery.

Eligibility criteria: All published full-article RCTs comparing the analgesic efficacy of investigated regional anesthesia technique or comparative blocks in adult patients undergoing any VATS were eligible for inclusion. There were no language restrictions. Moreover, we also excluded case reports, non-RCT studies, incomplete clinical trials, and any trials used multiple nerve blocks. We also excluded any conference abstracts which could not offer enough information about the study design, or by data request to the author.

INTRODUCTION

Review question / Objective: Although video-assisted thoracoscopic surgery is a minimally invasive surgical technique, the pain remains moderate to severe. We comprehensively compared the regional anesthesia methods for postoperative analgesia in patients undergoing video-assisted thoracoscopic surgery.

Rationale: In the presence of advanced surgical techniques promotion, minimally invasive thoracic surgery (MITS) has been used widely over the past decade. Video-assisted thoracic surgery (VATS) as one technique of MITS with smaller skin incisions, less tissue trauma and contribute to better recovery compared to conventional thoracotomy. However, the pain of VATS still causes significant acute

moderate to severe postoperative pain and tend to a high risk of chronic post-surgical pain (CPSP). Ensuring pain-relief is still the priority in patients undergoing VATS.In the presence of advanced surgical techniques promotion, minimally invasive thoracic surgery (MITS) has been used widely over the past decade. Video-assisted thoracic surgery (VATS) as one technique of MITS can with smaller skin incisions, less tissue trauma and contribute to better recovery compared to conventional thoracotomy. However, the pain of VATs still causes significant acute moderate to severe postoperative pain and tend to a high risk of chronic post-surgical pain (CPSP). Truncal Regional anaesthesia technique as one essential part of multi-modal anesthesia has been preferred by clinical practitioners, including paravertebral block (PVB), erector spinae plane block (ESPB), thoracic epidural anesthesia (TEA), serratus anterior plane block (SAPB), intercostal nerve block (ICNB), rhomboid intercostal block (RIB) and local infiltration anesthesia (LIA). Although TEA and PVB may provide promising analgesia effect in VATs, existence data suggested TEA and PVB are difficult to operate and numerous technique related complications ranging from pneumothorax to devastating spinal cord injury. For LIA, ICNB and RIB may not offer adequate postoperative analgesia efficacy and overlapping visceral pain. The feasibility and safety of ESPB still in investigate.

Condition being studied: Regional anaesthesia technique as one essential part of multi-modal anesthesia has been preferred by clinical practitioners, including thoracic epidural anesthesia (TEA) paravertebral block (PVB), serratus anterior plane block (SAPB), intercostal nerve block (ICNB), rhomboid intercostal block (RIB), local infiltration anesthesia (LIA) and erector spinae plane block (ESPB). Although TEA and PVB would provide promising analgesia effect in VATS, existence data suggested TEA and PVB are difficult to operate and numerous technique related complications ranging from pneumothorax to devastating spinal cord injury. For LIA, ICNB and RIB may not

offer adequate postoperative analgesia efficacy and overlapping visceral pain. The feasibility and safety of ESPB is still in investigating. To compare the analgesia effect of regional anesthesia methods after VATS, several meta-analyses have been conducted. However, a traditional meta-analysis can only compare differences in efficacy and safety between two interventions and is limited when comparing three or more interventions. Moreover, the lack of headto-head randomised controlled trials in many interventions challenges the traditional evidence synthesis method of a two-arm meta-analysis. Whereas, a network meta-analysis can make indirect quantitative comparisons in the absence of direct comparative intervention studies to provide evidence on the comparative efficacy of different interventions and determine which method is safest and most effective. This article aimed to perform a network meta-analysis to comprehensively compare the analgesia effect of regional anesthesia methods for postoperative VATS and try to find an optimal method that can serve as a reference in clinical medicine. Ten interventions were evaluated according to several outcome indices: visual analogue scale (VAS) score, morphine consumption, postoperative rescue analgesic drugs, postoperative complications, hospital length of stay, sleep quality on the first night. Network analysis was also used to rank each outcome measure to provide reliable and safe references for postoperative analgesia after VATS.

METHODS

Search strategy: We systematically searched electronic database including PubMed, The Cochrane Library, Web of Science citation index, Embase from inception to February 2022 for RCTs meeting the listed inclusion criteria. According to the PICOS framework, the following terms were selected: "video-assisted thoracoscopic surgery," "video-assisted thoracoscopy surgery-lobectomy" "regional anesthesia" "Nerve Block" "paravertebral block""erector spinae plane block," "epidural analgesia" "postoperative

analgesia." We also screened references of the identified articles. There were no language restrictions on searching articles. We also searched the Grey literature by supplementary hand searching.

Participant or population: Patients age of 18-80 years old with American Association of Anesthesiologist (ASA) I-III grade scheduled for elective video-assisted thoracic surgery applied with investigated regional anesthesia method.

Intervention: Studies including treatment with at least one of the investigation regional anesthesia method.

Comparator: Studies including treatment with at least one of the investigation regional anesthesia method.

Study designs to be included: Randomized controlled study.

Eligibility criteria: All published full-article RCTs comparing the analgesic efficacy of investigated regional anesthesia technique or comparative blocks in adult patients undergoing any VATS were eligible for inclusion. There were no language restrictions. Moreover, we also excluded case reports, non-RCT studies, incomplete clinical trials, and any trials used multiple nerve blocks. We also excluded any conference abstracts which could not offer enough information about the study design, or by data request to the author.

Information sources: We systematically searched electronic database including PubMed, The Cochrane Library, Web of Science citation index, Embase from inception to February 2022 for RCTs meeting the listed inclusion criteria. According to the PICOS framework. We also screened references of the identified articles. There were no language restrictions on searching articles. We also searched the Grey literature by supplementary hand searching.

Main outcome(s): The primary outcome is accumulated opioid consumption (morphine equivalent) 24 h postoperatively.

Additional outcome(s): The secondary outcomes included postoperative pain scores, side effects and complications associated with regional anesthesia techniques, rescue analgesia drugs 24 h postoperatively and quality sleep on first night.

Quality assessment / Risk of bias analysis: The Grading of Recommendations Assessment, Development, and Evaluation (GRADE) methodology was performed to assess the quality of evidence for each outcome. The rating of evidence quality specific to outcomes and unique comparisons of interest were evaluated as , low, moderate and high. Risk of bias assessed by Cochrane Risk of Bias Tool and Egger' test.

Strategy of data synthesis: Heterogeneity among the studies was estimated by I2 statistics. Random-effect model was performed if I2>50%, suggesting the existence of high heterogeneity, whereas if I2≤50%, fixed-effect model was performed.

Subgroup analysis: The subgroup analysis according to different levels of risk of bias.

Sensitivity analysis: The sensitivity analyses were performed via the leave-one-out approach to find possible the sources of heterogeneity.

Language: English.

Country(ies) involved: China.

Keywords: video-assisted thoracoscopic surgery; Regional anesthesia techniques; postoperative analgesia; network meta-analysis; Erector spinae plane block.

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