INPLASY PROTOCOL

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Corresponding author:
Sandeep Bhushan

dr.sdmch@aol.com

Author Affiliation:
Chengdu Second People's Hospital

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None declared.

Analgesic efficacy of erector spinae plane block in arthroscopic shoulder surgery: a systemic review and meta-analysis of randomised controlled trial

Sandeep, B[1]; Huang, X[2]; Xiao, ZW[3].

Review question / Objective: **Erector spinae plane block (ESPB) has been employed in arthroscopic shoulder surgery (ASS) as an alternative novel interfacial plane block. However, its analgesic efficacy is still controversial. Whether ESPB could improve analgesic efficacy in ASS is what the current meta-analysis seeks to find out.**
Information sources: **We searched different databases including the Cochrane Library, PubMed, Embase, and Web of Science from inception to November 29, 2022, using medical subject headings (MeSH) and free-text terms without language restrictions. The primary purpose of searching was for the selection of RCTs for meta-analysis but also to avoid unplanned duplication and compare reported review methods from other systematic reviews. The following search terms were used for the search of each database: "arthroscopic shoulder surgery", "shoulder surgery", "total shoulder arthroplasty", "shoulder arthroscopy", and "erector spinae plane block", "erector spinae muscle". We also searched for grey literature by supplementary hand searching.**

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 20 December 2022 and was last updated on 20 December 2022 (registration number INPLASY2022120084).

INTRODUCTION

Review question / Objective: **Erector spinae plane block (ESPB) has been employed in arthroscopic shoulder surgery (ASS) as an alternative novel interfacial plane block. However, its analgesic efficacy is still controversial. Whether ESPB could improve analgesic efficacy in ASS is what the current meta-analysis seeks to find out.**

Condition being studied: **The application of arthroscopic techniques has allowed surgeons to perform shoulder surgeries as day-case surgeries. While 54% of patients who have arthroscopic shoulder surgery (ASS) reported moderate to severe**

postoperative discomfort and poor rehabilitation, this may necessitate readmission. Early mobilization, efficient surgical rehabilitation, and shorter hospital stays are all made possible by pain relief. In clinical settings, individuals receiving ASS have preferred regional analgesia as a crucial component of multimodal analgesia. The gold standard for shoulder surgeries was recognized to be the interscalene brachial plexus block (ISB). However, a high prevalence of ISB-related problems forced researchers to look for substitutes. A recent study demonstrated that the suprascapular nerve block (SSNB) could provide efficient pain control while sparing the phrenic nerve. However, the accompanying adverse effects of opioids, ISB, or SSNB make it difficult to control pain adequately. The core of rehabilitation therapy and the ensuing improvement in functional outcomes in ASS is postoperative pain management. Therefore, efficient pain management is required to enhance the outcome following ASS.

Erectors spinae plane block (ESPB) was introduced in 2016 by Forero, et al., to manage chronic chest pain. Over the past years, ESPB gained popularity for perioperative analgesia in various surgeries as long as the appropriate spinal segment is chosen, the technically simple procedure of ESPB offers a wide dermatomal spread from T1 to L3. Forero et al. investigated the high thoracic ESPB could provide promising postoperative analgesia efficacy in chronic shoulder pain. Taysser et al compared the analgesia efficacy of ESPB with intra-articular injection (IAI) of local anesthetic and found that ESPB manages postoperative pain effectively with superiority over IAI of bupivacaine in patients undergoing ASS. Additionally, Bahadir et al, demonstrated that ESPB was superior to sham block. Whereas, a recently published comparative study compared ISB with ESPB, revealed ISB provided more effective analgesia than ESPB. Therefore, insufficient studies to draw consolidated evidence of its analgesic efficacy in ASS. Hence, several RCTs exploring the role of ESPB in ASS have recently been conducted and published.

In the current systematic review, we aimed to gather evidence from recent RCTs regarding the ESPB efficacy in reducing postoperative analgesic consumption and pain intensity in adult patients undergoing ASS compared to control (other blocks or no block or sham block). Our primary objective was to compare opioid consumption in the abovementioned groups in the first 24 h after surgery. We also assessed the pain scores, number of patients who needed rescue analgesia, time to first rescue analgesia, patient satisfaction with analgesia, and postoperative nausea and vomiting (PONV) in both groups.

METHODS

Search strategy: Web of Science database：2022/11-29.

#1：(TS=(Erector Spinae Plane Block)) OR TS=(Erector Spinae Muscle)
#2:(((TS=(Arthroscopic Shoulder Surgery)) OR TS=(Shoulder Surgery)) OR TS=(total shoulder arthroplasty)) OR TS=(shoulder arthroscopy)
#3:#1 AND #2.

Participant or population: Patients aged 18-80 years old were undergoing arthroscopic shoulder surgery under general anesthesia with American Society of Anesthesiologists (ASA) I-III.

Intervention: Patients received either single injection or continues erector spinae plane block (ESPB) as the intervention treatment group.

Comparator: Patients received other block or no block or sham block as the control group.

Study designs to be included: We only included randomized controlled trials in patients undergoing arthroscopic shoulder surgery (ASS)We only included randomized controlled trials in patients undergoing hip fracture surgeryWe only inlcuded

randomized controlled trials in elderly patients undergoing hip fracture surgery.

Eligibility criteria: The inclusion criteria for the selection of studies in our meta-analysis were as follows: (1) included patients undergoing ASS under general anesthesia, (2) received ESPB as the intervention treatment (ESPB group), and other block or no block or sham block as the control treatment (control group); (3) reported opioid consumption after surgery in the ESPB and control groups, and (4) were RCTs. Case reports and non-randomized studies, including retrospective design, ongoing study, conference abstracts and letters were excluded.

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Main outcome(s): The primary outcome of interest in this review was opioid consumption in the first 24 h after surgery; other outcomes were considered secondary outcomes.

Quality assessment / Risk of bias analysis: Quality assessment of the included RCTs was performed using the Cochrane Collaboration risk of bias tool.

Strategy of data synthesis: For continuous variables such as opioid consumption in the first 24 h after surgery, pain scores, time to first analgesia, patient satisfaction, and length of hospital stay, we calculated the standardized mean differences (SMD) with the corresponding 95% confidence interval (CI) using the inverse variance method with a random-effects model, as the effect sizes were clinically relevant. For dichotomous variables such as the number of patients who developed related postoperative complications (nausea, vomiting, respiratory depression, itching, local anesthetics-related poisoning), we calculated the risk ratios (RRs) with 95% CI using the Mantel-Haenszel method. Each analysis was assessed for statistical heterogeneity using Cochran's Q test and I2 statistics, and an I2 value >50% was considered as a cut-off for significant heterogeneity. In our analysis, a random-effects model was applied because of the inherent heterogeneous nature of the block performance by different practitioners.

Subgroup analysis: Subgroup analyses were only performed according to the primary outcome (morphine consumption at 24 h postoperatively) in a single injection of ESPB study.

Sensitivity analysis: The sensitivity analyses will be performed by excluding one study at a time to assess the influence of each study on overall results.

Country(ies) involved: China.

Keywords: Erector spinae plane block; analgesia efficacy; arthroscopic shoulder surgery; Meta analysis erector spinae.

Contributions of each author:

Author 1 - Sandeep Bhushan.
Email: dr.sdmch@aol.com
Author 2 - Huang xin.
Email: 604680675@qq.com
Author 3 - Xiao Zongwei.