



Thoracic paravertebral blocks in abdominal surgery – a systematic review of randomized controlled trials

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Abstract

Thoracic paravertebral blocks (TPVBs) have an extensive evidence base as part of a multimodal analgesic strategy for thoracic and breast surgery and have gained popularity with the advent of ultrasound guidance. However, this role is poorly defined in the context of abdominal surgery. We performed a systematic review of randomized controlled trials, to clarify the impact of TPVB on perioperative analgesic outcomes in adult abdominal surgery. We identified 20 published trials involving a total of 1044 patients that met inclusion criteria; however there was significant heterogeneity in terms of type of surgery, TPVB technique, comparator groups and study quality. Pain scores and opioid requirements in the early postoperative period were generally improved when compared with systemic analgesia, but there was insufficient evidence for any definitive conclusions regarding comparison with epidural analgesia or other peripheral block techniques, or the benefit of continuous TPVB techniques. The reported primary block failure rate was 2.8% and the incidence of complications was 1.2% (6/504); there were no instances of pneumothorax. TPVB therefore appears to be a promising analgesic technique for abdominal surgery in terms of efficacy and safety. But further well-designed and adequately powered studies are needed to confirm its utility, particularly with respect to other regional anaesthesia techniques.

Key words: analgesia; nerve block; regional anaesthesia

There has been a resurgence of interest in thoracic paravertebral block (TPVB) in recent years, particularly with the introduction of ultrasound-guided techniques which have made it more accessible to the wider anaesthesia community.¹ There are a multitude of applications for TPVB in anaesthetic practice, including acute pain,² chronic pain,^{3–5} surgical anaesthesia^{6–10} and perioperative analgesia in both breast¹¹ and thoracic surgery.¹²

Although most work on TPVB has focused on its application to breast and thoracic surgery, it is a potentially useful technique in abdominal surgery as well. The abdominal wall is innervated by the lower thoracoabdominal nerves (T6–T12) and anaesthesia or analgesia can be provided by TPVB performed at these levels. There is however relatively little evidence for TPVB in this setting. A recent systematic review of TPVB for intraoperative surgical anaesthesia identified eight studies, of which only

two were directed at abdominal surgery.⁸ Another systematic review for TPVB in abdominal surgery focused only on a single surgical procedure (open inguinal herniorrhaphy) in adult and paediatric populations.¹³ The role of TPVB in patients undergoing abdominal surgery therefore remains poorly defined. The goal of the present systematic review was to determine the efficacy of TPVB in providing postoperative analgesia for abdominal surgery when compared with either systemic analgesia alone or alternative analgesic strategies.

Methods

A systematic review of the literature was performed following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement (PRISMA) guidelines.¹⁴

Search strategy

We defined a comprehensive search strategy to identify studies that used TPVB in adult (>18 yr of age) patients undergoing abdominal surgery of any type (Supplementary data, Appendix S1). The following databases were searched: *Medline* (1946 – January 2016), *Medline In-Process* (January 2016), *Embase* (1947 – January 2016), *Cochrane Central Register of Controlled Trials* (January 2016), *Cochrane Database of Systematic Reviews* (2005 – January 2016) and *NHS Economic Evaluation Database* (1st Quarter 2016). Reference lists of selected articles were also hand-searched for additional studies.

Eligible studies

Two authors independently screened the results of the literature search and selected studies that fulfilled the following inclusion criteria: *adult subjects, randomized controlled trial (RCT); postoperative pain scores and/or postoperative analgesic consumption reported; analgesic effect of TPVB distinguishable from other concomitant analgesic modalities*. Studies that did not meet inclusion criteria and abstracts that were not available as English full-text articles were excluded at this stage. Any disagreements regarding article inclusion was resolved by discussion amongst all authors.

Data extraction

Data collection was performed using a standardized form and analysed using Microsoft Excel 2016 (Microsoft Corp,

Redmond, WA). The following data was extracted from the selected studies: patient characteristics, type of surgery, study methodology, anaesthetic and analgesic techniques and outcomes assessed. The primary outcomes of interest for this systematic review were postoperative pain scores and/or analgesic intake. Secondary outcomes included length of hospital stay and all adverse events, including nausea and vomiting, vascular puncture, epidural or intrathecal spread, pleural puncture, or pneumothorax. Subgroup analyses based on the type of surgery and comparator technique were performed. Methodological bias of each RCT was assessed independently using the both the modified Jadad five-point scale¹⁵ (which focuses on adequacy of randomization and blinding) and the Cochrane Collaboration risk of bias assessment tool,¹⁶ and tabulated using Review Manager version 5.3 (RevMan; Cochrane Collaboration, Oxford, UK).

Results

Description of studies

Results of literature search

913 citations were retrieved by the initial database search with one additional study identified by hand searching. 158 duplicates were found, leaving 756 records. Of these, 20 studies involving a total of 1044 participants met our inclusion criteria (Fig. 1).

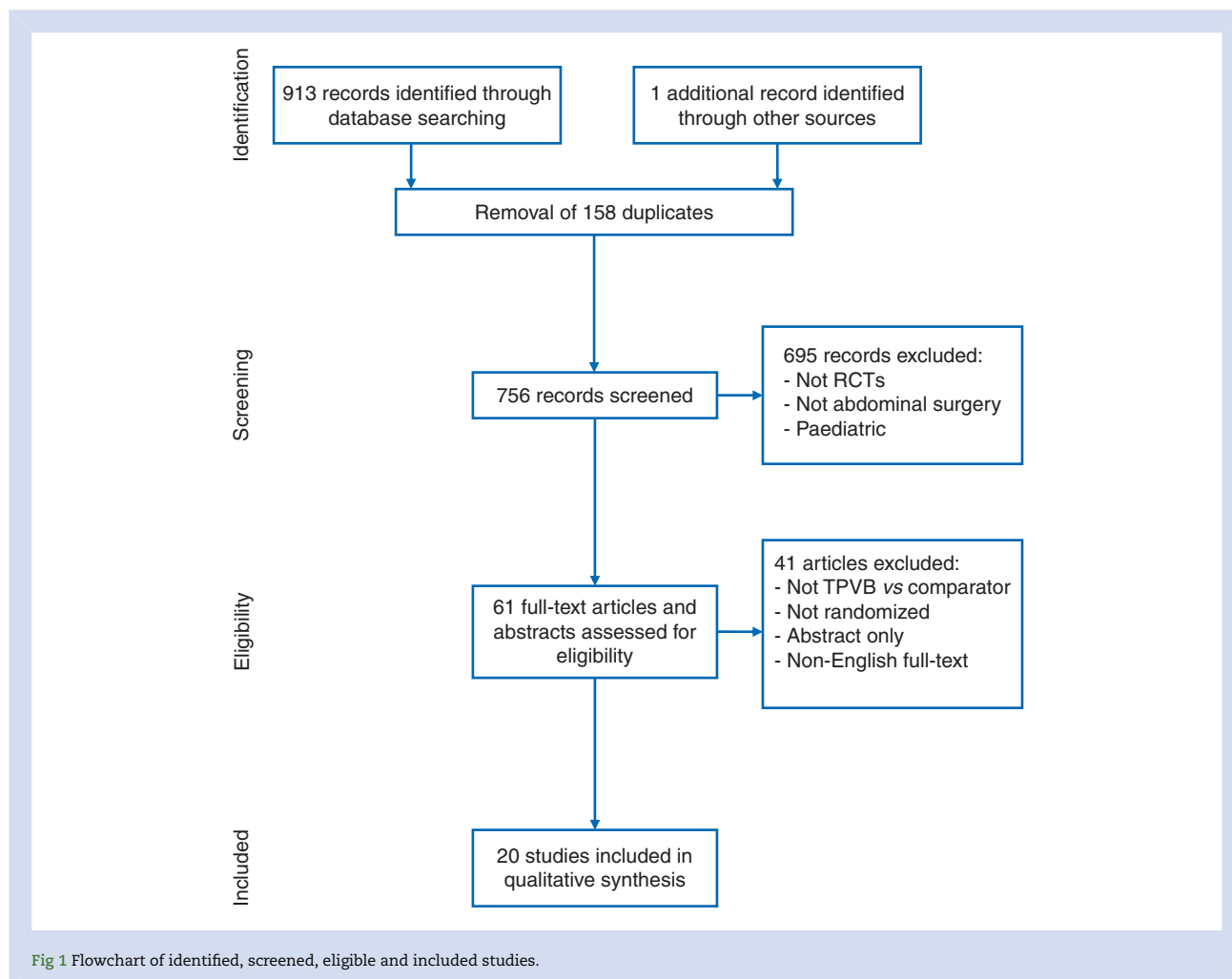


Fig 1 Flowchart of identified, screened, eligible and included studies.

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