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REVIEW

General anaesthesia versus thoracic paravertebral block for breast surgery: A meta-analysis

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Summary *Background:* Thoracic paravertebral block (TPVB) offers an attractive alternative to general anaesthesia (GA) for ambulatory breast surgery. The aim of this meta-analysis was first to evaluate the safety and efficacy of TPVB for breast surgery, and second to compare TPVB with GA with regard to postoperative pain, nausea and vomiting, opioid consumption and length of hospital stay.

Methods: An electronic and manual search of English- and French-language articles on TPVB in breast surgery (published from January 1980 to June 2010) yielded 41 citations. Two levels of screening identified 11 relevant studies. The Mantel–Haenszel method (fixed effect) was used to perform the meta-analysis.

Results: Eleven studies were retained for analysis. When TPVB was used instead of GA, pain scores were significantly decreased at 1 and 6 h postoperatively (mean difference of 2.48 (95%confidence interval (CI): 2.20–2.75) and 1.71 (95%CI: 1.64–1.78), respectively). Furthermore, postoperative analgesic consumption was significantly lower in patients who received TPVB compared with GA (relative risk (RR) 0.23, (95%CI: 0.15–0.37)). TPVB was also associated with significantly less postoperative nausea and vomiting (RR 0.27 (95%CI: 0.12–0.61)). Increased patient satisfaction and a shorter hospital stay also favoured TPVB over GA.

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Conclusions: TPVB provides effective anaesthesia for ambulatory breast surgery and can result in significant benefits over GA. However, further studies are required to determine whether these advantages would still be present if an optimal technique for outpatient GA is employed. Adjunctive ultrasonography may contribute to improve the safety of TPVB in breast surgery and requires further investigation.

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With the rapid evolution of plastic surgery towards outpatient and same-day surgery, the focus is increasingly being placed on efficiency and patient recovery. In response to the undesirable side effects of general anaesthesia (GA), regional anaesthesia has become an attractive alternative. In the past decade, thoracic paravertebral blocks (TPVBs) have emerged as an innovative anaesthetic technique for breast surgery.

Previous studies comparing TPVB to GA in oncological breast procedures have demonstrated that TPVB can provide adequate surgical anaesthesia while decreasing postoperative pain, opioid consumption, narcotic-related side effects (such as nausea and vomiting) and hospital stay.^{1–12} The complication rate, <2.6% in most studies,^{2,5,10–15} includes hypotension, pneumothorax as well as epidural spread of local anaesthetic agents. Despite the low incidence of adverse events and numerous benefits, the use of TPVB remains limited in breast surgery. Furthermore, compared with oncological procedures, its application seems even less frequent in plastic surgery. To date, only two studies have investigated the use of TPVB in breast plastic surgery. Both trials reported favourable results in breast augmentation as well as aesthetic and reconstructive surgery.^{3,10}

Is there enough evidence to support the use of TPVB as an alternative to GA? This meta-analysis aims to compare TPVB and GA for breast surgery.

Methods

Data sources

We searched the Medline, PubMed and EMBASE databases as well as the Cochrane library and *Current Contents* and *Science* citation for original articles published from January 1980 to June 2010. Our keywords included 'paravertebral block' and 'breast'. We limited our search to studies published in either English or French. The bibliographies of all selected articles were manually checked for relevant references.

Study selection

Two researchers (YT and JB) independently selected the articles for review.

Articles were included if they met the following criteria:

- Population: Human adults (18 years and over) who underwent breast surgery;
- Intervention: TPVB alone or compared with GA; and
- Outcomes:
 - efficacy (additional anaesthetic/sedation needed and conversion to GA);

- intra- and postoperative complications;
- length of hospital stay (LOS);
- postoperative pain;
- postoperative narcotic use; and
- postoperative nausea/vomiting (PONV).

Study selection was performed through two levels of screening.

In the first level, abstracts were reviewed for the following exclusion criteria:

- studies combining both GA and TPVB;
- letters, comments and editorials;
- languages other than French and English;
- publication of abstracts only; and
- animal or cadaveric studies and physiologic or anatomic studies.

In the second level, all articles filtered through the first level were read in their entirety and further triaged according to the above inclusion and exclusion criteria.

Only studies that successfully passed both levels of screening were included in our analysis.

Data extraction

Data extraction was performed according to the guidelines outlined by the Meta-analysis Of Observational Studies in Epidemiology (MOOSE) statement.¹⁶ Two researchers with training in biostatistics and epidemiology (YT and JB) independently reviewed selected studies using standardised forms and collected data about lead author, publication year, study design, patient demographics, inclusion/exclusion criteria, type of surgery, method of anaesthesia, LOS, postoperative pain, PONV, postoperative analgesic use and intra- or postoperative complications. Any difference with regard to findings was resolved through discussion.

Data synthesis and analysis

A meta-analysis was performed, if two or more randomised controlled trials (RCTs) reported data for comparable outcomes. The Mantel–Haenszel fixed effect method was used to synthesise pooled estimates from the results of individual studies.¹⁷ For dichotomous outcomes, relative risks were calculated using a fixed-effects model with a 95% confidence interval (CI). All calculations were performed using Review Manager (RevMan (Computer program). Version 5.0, Copenhagen: The Nordic Cochrane Centre, The Cochrane Collaboration, 2008). The rest of the data was reported in a narrative manner.

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