Clinical effectiveness of transversus abdominis plane (TAP) block in abdominal surgery: a systematic review and meta-analysis

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CRD summary
The review concluded that transversus abdominis plane block was safe and reduced postoperative morphine requirements, nausea and vomiting. Potential for bias, wide confidence intervals and high levels of statistical heterogeneity limit the reliability of the pooled results. The authors’ conclusions should be viewed with caution.

Authors’ objectives
To determine the effectiveness of transversus abdominis plane block in abdominal surgery.

Searching
Cochrane Central Register of Controlled Trials (CENTRAL), PubMed, EMBASE and CINAHL were searched to October 2011 for articles in English. Search terms were reported. Conference proceedings and reference lists were searched.

Study selection
Randomised controlled trials (RCTs) of transversus abdominis plane block versus placebo or no transversus abdominis plane in adults who underwent abdominal surgery were eligible for inclusion. The primary endpoint was morphine use in the first 24 hours after surgery. Secondary endpoints were morphine use in the first 48 hours, incidence of postoperative nausea and pain and visual analogue pain scores 24 hours after the operation. The method of placement included ultrasound guidance and open transversus abdominis plane block insertion. Comparisons with other analgesic modalities and measuring of anaesthetic agent concentrations were excluded. It appeared that trials with fentanyl as the patient controlled analgesia were excluded.

The included trials studied transversus abdominis plane mostly compared with placebo 0.9% saline solution; three studies used no placebo. Types of surgery included caesarean, colorectal, total abdominal hysterectomy, laparoscopic cholecystectomy, gynaecological cancer, large bowel resection and open appendectomy. Seven studies were ultrasound guided, one study was surgically placed and one study was no ultrasound used. Different local anaesthetics were used (for example ropivacaine). Some studies allowed use of diclofenac, ibuprofen and paracetamol.

The authors did not state how many reviewers undertook study selection.

Assessment of study quality
Quality assessment was undertaken using a combination of the Jadad scale and the Chalmers tool.

The authors did not state how many reviewers undertook quality assessment.

Data extraction
Data were extracted on primary and secondary outcomes and used to calculate mean differences and odds ratios (ORs), together with 95% confidence intervals (CIs). Trial authors were contacted for missing data.

The authors did not state how many reviewers extracted data.

Methods of synthesis
DerSimonian and Laird random-effects meta-analysis was used to calculate pooled odds ratios and weighted mean differences (WMDs), together with 95% CIs. $I^2$, $X^2$ and $T^2$ statistics were used to assess statistical heterogeneity. Substantial statistical heterogeneity was considered to be present where $I^2$ values were greater than 50%.

Results of the review
Nine RCTs were included in the review (413 patients, range 32 to 65). Trial quality ranged from 10 to 14.
Compared with control, transversus abdominis plane was associated with statistically significant reduced use of morphine over 24 hours (WMD -23.71mg, 95% CI -38.66 to -8.76; I²=99%; nine trials), reduced use of morphine use over 48 hours (WMD 38.08mg, 95% CI 18.97 to 57.19; I²=83%; two trials), and reduced incidence of postoperative nausea and vomiting (OR 0.41, 95% CI 0.22 to 0.74; I²=9%; eight trials). There was no significant difference in visual analogue pain scores at 24 hours (three trials).

Authors' conclusions
Transversus abdominis plane block was safe and reduced postoperative morphine requirements, nausea and vomiting.

CRD commentary
Inclusion criteria for the review were defined. Four relevant databases were searched. There was potential for language bias as only trials in English were included. Publication bias was not assessed and could not be ruled out. The authors did not state that they made attempts to reduce reviewer error and bias during the review. Quality assessment was undertaken using a combination of two standard checklists. The authors did not provide sufficient detail (such as the maximum quality rating) to enable interpretation of the quality assessment.

Data were combined using meta-analysis but there was evidence of substantial statistical heterogeneity in some of the analyses. The authors noted differences across the trials in terms of surgical procedures and transversus abdominis plane techniques. The side-effect profile of this technique was not considered. Some outcomes had wide confidence intervals.

Potential for bias, wide confidence intervals and high levels of statistical heterogeneity limit the reliability of the pooled results. The authors' conclusions should be viewed with caution.

Implications of the review for practice and research
Practice: The authors stated that transversus abdominis plane block should be considered as part of a multimodal approach to anaesthesia and enhanced recovery in patients undergoing abdominal surgery.

Research: The authors stated that future studies could compare the type, dose and final volume of anaesthetic used to reach a consensus about the best regime for transversus abdominis plane block.

Funding
Not stated.

Bibliographic details

PubMedID
22632762

DOI
10.1111/j.1463-1318.2012.03104.x

Original Paper URL

Indexing Status
Subject indexing assigned by NLM

MeSH
Abdomen /innervation /surgery; Analgesics, Opioid /therapeutic use; Humans; Models, Statistical; Morphine /therapeutic use; Nerve Block /methods; Odds Ratio; Pain Measurement; Pain, Postoperative /drug therapy /prevention & control; Postoperative Nausea and Vomiting /prevention & control; Treatment Outcome
AccessionNumber
12012046314

Date bibliographic record published
31/10/2012

Date abstract record published
23/01/2013

Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.