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REVIEW ARTICLES

Transversus abdominis plane block for postoperative analgesia after Caesarean delivery performed under spinal anaesthesia? A systematic review and meta-analysis

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Editor's key points

- The utility of transversus abdominis plane (TAP) block in Caesarean delivery was assessed by analysing results of previous studies.
- TAP block reduced i.v. morphine consumption and pain scores in the first day after surgery.
- TAP block can provide effective analgesia after Caesarean delivery when intrathecal morphine has not been used.

Summary. The transversus abdominis plane (TAP) block is a field block that provides postoperative analgesia for abdominal surgery. Its analgesic utility after Caesarean delivery (CD) remains controversial. This systematic review and meta-analysis examines whether TAP block can reduce i.v. morphine consumption in the first 24 h after CD. The authors retrieved randomized controlled trials comparing TAP block with placebo in CD. Postoperative i.v. morphine consumption during the first 24 h was selected as a primary outcome. Pain scores and both maternal and neonatal opioid-related side-effects were secondary outcomes. Where possible, meta-analytic techniques and random effects modelling were used to combine data. Trials were stratified based on whether or not spinal morphine was used as part of the analgesic regimen. Five trials including 312 patients were identified. TAP block reduced the mean 24 h i.v. morphine consumption by 24 mg [95% confidence interval (CI) −39.65 to −7.78] when spinal morphine was not used. TAP block also reduced visual analogue scale pain scores (10 cm line where 0 cm, no pain, and 10 cm, worst pain) by 0.8 cm (95% CI −1.53 to −0.05, P=0.01), and decreased the incidence of opioid-related side-effects. The differences in primary and secondary outcomes were not significant when spinal morphine was used. TAP block provides superior analgesia compared with placebo and can reduce the first 24 h morphine consumption in the setting of a multimodal analgesic regimen that excludes spinal morphine. TAP block can provide effective analgesia when spinal morphine is contraindicated or not used.

Keywords: acute pain, novel techniques; anaesthesia, obstetric; anaesthetic blocks, regional; analgesia, postoperative; regional blockade

Inadequate postoperative pain relief after Caesarean delivery (CD) can negatively impact ambulation, breastfeeding, and even maternal bonding,[1] while effective analgesia improves the amount of breastfeeding and infant weight gain.[2] Neuraxial anaesthesia has become the anaesthetic technique of choice in CD because of its safety and reduction in maternal mortality.[3]

The transversus abdominis plane (TAP) block, a field block[4] whose analgesic efficacy in several abdominal surgeries has been confirmed,[5–7] has also been proposed for postoperative analgesia in parturients undergoing elective CD under spinal anaesthesia.[8] However, the analgesic utility of TAP block remains controversial; some trials comparing it with placebo reported significant advantages,[8 9] while others found no analgesic benefit.[10 11] Reviews examining the analgesic effects of TAP block in various surgeries have not provided definitive answers regarding the specific role of TAP block in CD. A Cochrane review examining the efficacy of TAP block in abdominal surgeries excluded CD.[12] A recent meta-analysis supporting TAP block for its effective pain relief included only one trial in the setting of CD.[13] A 2012 qualitative systematic review[14] examined the role of TAP block across all abdominal surgeries and raised questions about its role in the setting of multimodal analgesia but stopped short of conducting any further analysis specific to CD. The purpose of this systematic review was to determine whether or not TAP block is effective in providing pain relief after CD. The primary outcome was morphine consumption in the first 24 h, an important issue for the breastfeeding woman.

Methods

The authors followed the PRISMA[15] recommendations in preparing this review.

Eligibility criteria

We searched the literature for randomized controlled trials (RCTs) that compared TAP block with placebo in patients undergoing elective CD under spinal anaesthesia. We included trials that used both ultrasound and landmark guidance for the single-shot TAP block technique.

Literature search

RCTs were retrieved from the US National Library of Medicine database, MEDLINE; the Excerpta Medica database, EMBASE; Cochrane Database of Systematic Reviews; Cochrane Central Register of Controlled Trials; and Latin American and Caribbean Health Sciences Literature, LILACS databases. The search terms TAP, TAP block, transversus abdominis, transverse abdominis, transversus abdominis plane block, transversus abdominis block, transverse abdominis plane block, transverse abdominis block, Caesarean, and C section were used in combination with the medical subject headings nerve block/abdomen/abdominal cavity/abdominal wall/abdominal muscles, and Caesarean Section (January 2007–February 2012).

In addition, we searched the bibliographies of relevant reviews and identified RCTs that fulfilled the inclusion criteria. We also searched for and reviewed published abstracts of anaesthesiology meetings that were held during the period 2007–2012 by the American Society of Anesthesiologists, the American Society of Regional Anesthesia, the Society of Obstetric Anesthesia and Perinatology, the European Society of Anaesthesiology, and the European Society of Regional Anaesthesia. Finally, we sought unpublished data at 'clinicaltrials.gov' as a measure of publication bias. No language restriction was used. The final list of qualifying studies was derived by consensus among the three authors. Excluded trials are listed in the Appendix.

Data collection and presentation

Quality of the reviewed trials was assessed independently by two of the authors (F.W.A. and C.B.M.) using the Cochrane Risk of Bias tool.[16] A final score was assigned for each trial by consensus. I.V. morphine consumption during the first 24 h after CD was defined as a primary outcome. Rest and dynamic pain visual analogue scale (VAS) scores (10 cm unmarked line in which 0 cm, no pain, and 10 cm, worst pain imaginable) at 24 h and maternal opioid-related side-effects (sedation, pruritus, nausea, and vomiting), patient satisfaction, and block-related complications were designated as secondary outcomes. A standardized data collection form was used for outcome data extraction. Data were recorded independently by two of the authors (F.W.A., C.B.M.) to avoid transcription errors; discrepancies were resolved by re-inspection of the original data.

Meta-analysis

The data were then entered into the statistical program (by C.B.M.) and rechecked (by F.W.A.). When possible, meta-analytic techniques (Revman 5.1, Cochrane Library, Oxford, UK) were used to combine the data. Random effect modelling was used in analysing continuous and dichotomous outcomes. The standardized mean difference and 95% confidence interval (CI) were calculated for continuous outcomes; while odds ratio (OR) and 95% CI were calculated for dichotomous outcomes. Differences were considered statistically significant when the 95% CI did not include 0. The I^2 statistic was used to assess heterogeneity.[17]

As the analgesic efficacy of spinal morphine in postoperative pain control is well recognized,[18–20] we hypothesized—*a priori*—that it constitutes a co-intervention that would generate significant heterogeneity among the pooled trial results. We therefore performed subgroup analysis according to administration of intrathecal morphine (ITM), where (SM−) referred to the group of RCTs where spinal morphine was not used, while (SM+) referred to the group of RCTs where spinal morphine was used.

Results

Search results, including retrieved, excluded, and reviewed RCTs, are summarized by a flowchart in Figure 1. We found five trials[5 8–11] with a total of 312 patients that met the inclusion criteria. The trials reviewed included one[11] where TAP block and placebo were compared in the presence and absence of spinal morphine, resulting in two distinct comparisons. Table 1 summarizes trial characteristics and the outcomes sought in each of the reviewed trials. The methodological quality of the included studies and the risk of bias are described in Table 2; Table 3 defines the analgesic regimens used in the reviewed trials. In addition to the published studies, we found five unpublished studies at 'clinicaltrials.gov' comprising 438 patients who potentially meet the inclusion criteria but were still in the recruitment phase.

Postoperative morphine consumption

Postoperative i.v. morphine consumption during the first 24 h in each study and pooled consumption are shown in Figure 2. When spinal morphine is excluded from the multimodal analgesic regimen (SM−), we found that TAP block, compared with placebo, reduced the mean 24 h i.v. morphine consumption by 24 mg (95% CI −39.65 to −7.78). This statistically significant reduction (P=0.004) favours TAP block. When both groups received spinal morphine (SM+), TAP block did not significantly reduce morphine consumption (mean difference 2 mg, 95% CI −3.47 to 7.46, P=0.47). The pooled morphine consumption of the SM+ and SM− subgroups was lower by 15 mg (95% CI −33.10 to 2.56) in patients receiving TAP block, although this lacked statistical significance (P=0.09). Heterogeneity among the studies in the SM− subgroup and in the pooled studies was significant (I^2=0.94 and 0.97, respectively, P<0.00001).

Rest pain scores

The 24 h rest VAS scores for individual and pooled studies are shown in Figure 3. Compared with placebo in the (SM−) setting, TAP block reduced 24 h rest VAS scores by 0.8 cm