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Review Article

Analgesic efficacy of bilateral superficial cervical plexus block for thyroid surgery: meta-analysis and systematic review

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Abstract

Background: Thyroid surgery is moderately painful, but is increasingly being considered as a day-case procedure. Bilateral superficial cervical plexus block (BSCPB) provides an adjuvant technique to facilitate this approach, but there is great evidential heterogeneity in randomised controlled trials (RCTs) about its use.
Methods: A systematic search, critical appraisal, and analysis of RCTs was performed. Trials investigating preoperative or postoperative BSCPB compared with control in patients undergoing thyroid surgery via neck incision were included. Odds ratio (OR) and 95% confidence interval (95% CI) were calculated for dichotomous data, whilst continuous data were analysed using standard mean difference. Primary outcome was rescue analgesic requirement in the first 24 postoperative hours. Secondary outcomes were visual analogue scale (VAS) scores at 0, 4, and 24 h, time until first analgesic request, intra-operative analgesic requirements, length of hospital stay, and incidence of postoperative nausea and vomiting (PONV).
Results: Fourteen RCTs published between 2001 and 2016 including 1154 patients were included. The overall effect of BSCPB compared with control showed a reduction in analgesic requirement (OR 0.30; 95% CI 0.18, 0.51; $P<0.00001$). There was improvement in VAS scores ($P<0.002$) and time to first analgesic requirement in the BSCPB group ($P<0.00001$). Length of hospital stay was reduced by 6 h by use of BSCPB. There was no significant change in the incidence of PONV with its use (OR 0.82; 95% CI 0.49–1.37; $P=0.44$).
Conclusions: BSCPB offers analgesic efficacy in the early postoperative period for up to 24 h after thyroid surgery, with reduced length of hospital stay, but without any beneficial effect on PONV.

Keywords: bilateral cervical plexus block; cervical plexus; nerve block; postoperative pain; thyroidectomy

Thyroid surgery is a common short-stay procedure associated with mild to moderate postoperative pain of short duration.[1] It has been reported that up to 90% of patients require morphine during the first postoperative day.[2] The concept of pre-emptive analgesia is hypothesized to include pre-incision administration of local anaesthetics to prevent central sensitization and therefore improve postoperative pain management.[3] It has been demonstrated that the efficacy of pre-emptive analgesia varies with surgical site.[4] Bilateral superficial cervical plexus block (BSCPB) has been utilized for

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Editor's key points

- The authors systematically reviewed the literature relating to the use of bilateral superficial cervical plexus block in providing analgesia after thyroid surgery.
- Meta-analysis revealed that analgesic requirements and length of hospital stay were reduced in the 14 studies (1154 patients) examined, while postoperative vomiting appeared not to be.

postoperative pain management of neck surgeries because of its ability to block the emerging branches of the superficial cervical plexus (lesser occipital, greater auricular, transverse cervical, and supraclavicular nerves).

BSCPB is a procedure with a low serious complication rate.[5–7] The risks of phrenic nerve palsy and total spinal anaesthesia from injection into a dural cuff are restricted to blockade of the deep cervical plexus only; diffusion of local anaesthetic is not sufficient to account for these phenomena with a superficial technique.

There have been several randomised controlled trials (RCTs) investigating the analgesic efficacy of BSCPB for thyroid surgery, with conflicting results. Hence, the use of a regional technique to manage acute postoperative pain has remained controversial for this type of surgery. The aim of this meta-analysis is to further investigate the effect of BSCPB on postoperative pain after thyroid surgery.

Methods

The meta-analysis component of this systematic review was performed according to the criteria of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement.[8]

Literature search

The systematic search was conducted in the Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE (1966 to present), EMBASE (1980–2016), Google Scholar, and Scirus according to the current recommendations of the Cochrane Collaboration. The search strategy consisted of a combination of the following terms: 'bilateral cervical plexus block', 'cervical plexus'; 'nerve block'; 'postoperative pain'; and 'thyroidectomy'. The search was performed without language restrictions. Retrieved article lists were checked for relevant publications. In addition, we searched for and reviewed published abstracts from relevant anaesthetic meetings including the American Society of Regional Anesthesia and Pain Medicine (ASRA 2002–2016), the European Society of Regional Anaesthesia (ESRA 2006–2016), American Society of Anesthesiologists (ASA 2000–2016), and the European Society of Anaesthesiology (ESA 2008–2016). Searches were last performed on October 28, 2016.

Eligibility criteria

All RCTs investigating the analgesic efficacy of preoperative or postoperative BSCPB block using local anaesthetic with or without additives (clonidine, epinephrine), compared with a control group using saline/no block, in patients undergoing thyroid surgery via neck incision were included in this review. Trials comparing BSCPB with deep cervical plexus block were excluded.

Selection of included studies

Four authors (D.M., A.B., R.K., N.S.) scanned the article titles and abstracts retrieved by the initial search to exclude obvious irrelevant studies. These authors independently collected data using a standardized data sheet. This included title, author, study groups used, type of block and local anaesthetic used, types of surgery, premedication, timing of block, intraoperative and postoperative analgesic use, incidence of postoperative nausea and vomiting (PONV), and length of hospital stay. Authors were contacted by telephone or email to obtain or clarify data when necessary.

Critical appraisal

The Jadad score (1–5) provides an independently validated method of describing trial quality and was used to assess the included RCTs.[9] Three of the authors (D.M., R.K., N.S.) scored each trial independently using the five-point validated quality index. These three authors reviewed the articles and assigned a final score by consensus when the initial scores differed. Authors A.B. and D.M. then repeated the risk of bias assessment using the internal processes within the RevMan software package (Review Manager (RevMan). Version 5.3. Copenhagen: The Nordic Cochrane Centre, The Cochrane Collaboration, 2014). This is a risk-of-bias tool that assesses to the QUADAS-2 standard and produces the risk of bias summary table that can be seen in Figure 1.

Study outcomes

All outcomes were described *a priori*, according to the principles of the PRISMA statement.[8] The primary outcome variable for the meta-analysis was incidence of postoperative rescue analgesic requirement in the first 24 h after operation as described by the authors, with prospective subgroup analysis of preoperative *vs* postoperative blockade, two-point *vs* three-point injection technique, and saline *vs* no block administered. The BSCPB was administered either before operation; just after induction of anaesthesia and before skin incision, or immediately after the operation. The selection of studies was dependent on how authors described the timing of the administration of the block.

Two-point *vs* three-point injection techniques

Three-point injection as described by the authors blocked the lesser occipital, greater auricular, transverse cervical, and supraclavicular nerves compared with a two-point technique that excluded blocking the supraclavicular nerves. Selection of studies based on a three-point or two-point injection technique was dependent on how the authors described the procedure. The three-point injection trials describe a well-established landmark technique where local anaesthetic is subcutaneously infiltrated cranially and caudally along the posterior border of the sternocleidomastoid muscle, supplemented with an s.c. injection in the antero-posterior direction in order to anaesthetize the transverse cervical nerve.[10–16] The two-point injection trials describe heterogenous techniques.[17–19] Shih and colleagues[17] describe a horizontal injection and a caudal injection, Herbland and colleagues[18] describe a traditional cranial and caudal injection strategy, and Kesisoglou and colleagues[19] describe a cranial and medial pattern.

The secondary outcomes were visual analogue scale (VAS) scores at 0, 4, and 24 h post-procedure, time interval until first