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Review Article

Cervical epidural analgesia in current anaesthesia practice: systematic review of its clinical utility and rationale, and technical considerations

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Abstract

Cervical epidural analgesia (CEA) is an analgesic technique, potentially useful for surgeries involving the upper body. Despite the inherent technical risks and systemic changes, it has been used for various surgeries. There have been no previously published systematic reviews aimed at assessing its clinical utility. This systematic review was performed to explore the perioperative benefits of CEA. The review was also aimed at identifying the rationale of its use, reported surgical indications and the method of use. We performed a literature search involving PubMed and Embase databases, to identify studies using CEA for surgical indications. Out of 467 potentially relevant articles, 73 articles were selected. Two independent investigators extracted data involving 5 randomized controlled trials, 17 observational comparative trials, and 51 case reports (series). The outcomes studied in most comparative studies were on effects of local anaesthetics and other agents, systemic effects, and feasibility of CEA. In one randomized controlled study, CEA was observed to decrease the resting pain scores after pharyngo-laryngeal surgeries. In a retrospective study, CEA was shown to decrease the cancer recurrence after pharyngeal-hypopharyngeal surgeries. The limited evidence, small studies, and the chosen outcomes do not allow for any specific recommendations based on the relative benefit or harm of CEA. Considering the potential for significant harm, in the face of better alternatives, its use must have a strong rationale mostly supported by unique patient and surgical demands. Future studies must aim to assess analgesic comparator effectiveness for clinically relevant outcomes.

Key words: anaesthesia, epidural; anaesthetics, local; analgesia, epidural; injections, epidural; pain, postoperative; systematic review

Cervical epidural analgesia (CEA) involves the administration of local anaesthetics (LA) into the epidural space resulting in the blockade of cervical nerve roots. This can be achieved by directly accessing the cervical epidural space (CES) at the cervical interspaces, or alternatively, from an upper thoracic interspace with a catheter directed cephalad. In its function, it shares similar characteristics of epidural analgesia with its counterparts at lumbar or thoracic region; however, the use of CEA in present day anaesthesiology practice is relatively limited. First reported by Dogliotti in 1933,[1] the use of CEA was perhaps much more prevalent before technical advancements made inhalation and i.v. anaesthetics safer and easier to use. Currently, cervical epidurals are predominantly performed by interventional pain physicians for patients with cervical-brachial neuraxial pain conditions. Perioperatively, CEA has been used for carotid artery, thyroid, breast, airway, upper limb and other head and neck surgeries.[2] A recent report demonstrated increased cancer free survival in laryngeal and hypopharyngeal cancer surgeries when CEA was

† The authors were MD students at Michael G. De Groote School of Medicine, McMaster University, Canada during the conduct of this review.

used.[3] There have been no published systematic reviews in English- looking at the clinical benefit of perioperative CEA and its relative effectiveness over other techniques. The literature is also unclear regarding the scope of its utilization, the rationale for its use and the appropriate surgical indications for which it can be useful.

The primary objective of this systematic review is to assess the clinical benefit (relative effectiveness) of CEA in the perioperative period. Secondary objectives of this review include: (1) to look at the rationale for the use of CEA in the perioperative period; (2) method of use of CEA [sole anaesthesia technique vs analgesic adjunct to general anaesthesia (GA)]. Being comprehensive, the review also identifies the reported surgical indications for the use of CEA, the technique of identification of CES, systemic effects of CEA, and reported complications of CEA. Our preliminary search identified few comparative studies with homogeneity in surgical population and comparator techniques; hence, we did not aim to perform a meta-analysis. We set out to summarize our findings according to each outcome considered, along with summary tables by categorizing the study reports based on its methodology. With comparative studies we also aimed to summarize the results of its effectiveness. Within the discussion section, we also provide a summary of practically relevant technical considerations and systemic effects relevant to the use of CEA.

Methods

Literature search

We performed a thorough literature search involving Ovid Medline (1946–2013) and Embase (1980–2013) databases to identify studies, which used cervical epidural analgesia or anaesthesia in a perioperative setting. Search terminology included: cervical analgesia; cervical epidural anaesthesia; cervical epidural; cervical neuraxial block. We also supplemented the above search with regional anaesthesia for breast, upper limb, carotid, airway and head and neck surgeries. Limits were applied to select only human studies. The obtained study reports were combined for a final list and imported to Refworks, and then checked for duplicates. Our search strategy is given in appendix 1.

Eligibility criteria, study selection and data extraction

We used the following inclusion criteria in our review. Types of Studies: all relevant studies, including randomized control trials (RCT), observational comparative trials (OCT) (cohort and case control), and case series or case reports (CR). Types of Participants: all human participants with no age restriction. Types of Interventions: all reports involving cervical epidural anaesthesia or analgesia, as related to perioperative use. Reports related to chronic pain treatment, or injections of cervical epidural steroid, or experiments on human volunteers were excluded. Two independent investigators (NM and AG) screened the final search results using study titles and abstracts for possible inclusion. Whenever necessary, the full report was screened, before deciding on exclusion. Whenever full reports were not available, authors were contacted. If the full report was not available, or if the article was not in English, the abstract of the report was utilized for relevant data extraction. Any disagreement was settled with the main investigator (HS) and a kappa agreement score was calculated.

Outcomes

The review does not aim to pool data, and hence the outcomes are reported as tables and important results are summarized. Comparative effectiveness of CEA was planned to be reported as either proportion of patients with successful outcomes, or as mean scores with standard deviation. Other outcomes were captured as: 1) rationale for the use of CEA- *by identifying the reasons provided for the use of CEA*; 2) surgical indications for the use of CEA- *by identifying the surgeries in which CEA was successfully used*, and 3) mode of use of CEA- *by identifying whether it was used only for analgesia or as a complete anaesthesia*. Complications were noted as either technique related, or as a result of the blockade of cervical nerves. Technical parameters of CEA were noted in terms of patient positioning, loss of resistance and image guidance.

Data analysis and interpretation of findings

Studies were grouped into randomized controlled trials (RCTs), observational-comparative trials (OCT), and case reports or series (CRs). In individual groups, the extracted data was organized in a tabular form. Data extracted for the various, pre-specified outcomes were collated, interpreted and summarized in a narrative format.

Results

The literature search yielded 545 reports; after removal of duplicates, 468 were screened, after which, 388 reports were excluded during the initial selection of title and abstracts. Out of 80 reports, 74 were finally included for this review, shown in the PRISMA flow diagram (Fig. 1). The kappa agreement score between the investigators for the selection was 0.8. A majority-72% (51/73), were either single case reports or case series.[4–54] Among the comparative studies, five were RCTs,[55–59] with the rest (n=17) being either prospective or retrospective OCTs.[3 60–75] The outcome details and study characteristics for all the RCTs are provided in Table 1. Study characteristics and outcomes for OCTs and CRs are summarized in Tables 2 and 3, respectively. If details were extracted from the abstract only, this is highlighted within the respective table. Most studies also involved small sample sizes. There were six studies involving more than 100 patients of CEA.[3 25 34 50 61 66] The RCT with the largest sample size involved 81 patients.[57]

Clinical effectiveness

The clinical parameters of effectiveness of CEA over other analgesic techniques were studied only in a few trials. Studies that compared clinical outcome measures are summarized below. Other studies which compared differential effects of LA agents, or differential systemic effects have been highlighted in respective tables. Within RCTs, the following outcomes were reported. In patients of pharyngo-laryngeal surgeries, CEA-fentanyl decreased the resting visual analogue scale (VAS) scores-expressed as mean (range) [1.75 (3.25) and 1.75 (3)], as compared with i.v. patient controlled analgesia-fentanyl [5.5 (5.25) and 3.25 (3)], at two and six hours respectively.[55] There were no changes in the pain scores during swallowing, or in the total amount of fentanyl demands and consumption.

For breast cancer surgeries, CEA was found to be equally effective as paravertebral block (PVB), with an advantage of providing full surgical anaesthesia.[59] In a Spanish report, a similar effectiveness of CEA as compared with axillary or supraclavicular block for upper extremity surgeries was reported.[58] As we could not obtain full study details, it was not clear whether they utilized the techniques for only analgesia, or a full anaesthesia. Among OCTs, only three trials looked at clinical benefits. One of