

REGIONAL ANAESTHESIA

Comparison of contrast flow and clinical effectiveness between a modified paramedian interlaminar approach and transforaminal approach in cervical epidural steroid injection

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Abstract

Background: The different methods of cervical epidural injection include the median or paramedian interlaminar (PI) approach and the transforaminal (TF) approach. We hypothesized that the modified PI (mPI) approach could deliver drugs suitably and safely into the anterior epidural space compared with the TF approach.

Methods: A total of 62 patients were randomized into either the mPI group ($n=31$) or the TF group ($n=31$). Contrast to the anterior epidural space (primary outcome, grade 1–3), vascular uptake and discomfort were assessed. Furthermore, pain intensity in the arm and neck [numeric rating scale (NRS)] and the degree of symptoms (5-point Likert scale) before the procedure and 2 weeks, 1 and 3 months following the procedure were compared between two groups. Effectiveness (a secondary outcome) was defined as a $\geq 50\%$ reduction on the NRS for arm and neck pain and a result of 3 or 4 on the Likert scale at 3 months following the procedure.

Results: Contrast to the anterior epidural space in the mPI group was significantly greater than that in the TF group ($P=0.036$). Vascular uptake and discomfort in the mPI group were significantly lower than those in the TF group ($P<0.001$, respectively). Of the patients in whom the procedure was effective, 24 (77.4%) were from the mPI group and 20 (64.5%) were from the TF group ($P=0.263$).

Conclusion: This result suggests that the mPI approach allows for suitable and safe delivery of drugs into the anterior epidural space.

Trial registry number: Institutional Review Board of Seoul National University Bundang Hospital (B-1206/159-004) and Clinical Research Information Service (KCT0000626).

Key words: epidural, contrast media; injections

Cervical epidural steroid injections (CESIs) are used for the treatment of cervical spinal pain or radiculopathy.^{1,2} CESIs are largely categorized according to two differing methods, based on the final needle location: an interlaminar (median or paramedian approach) or a transforaminal (TF) approach (Fig. 1). While an

interlaminar approach involves targeting the posterior epidural space, the TF approach is administered to the anterior epidural space. The TF approach has an advantage in that the drug can be delivered directly into the site of pathology in patients diagnosed with an extrusion of the cervical disc or foraminal stenosis.^{3,4} In addition, it has been reported that the TF approach is

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Editor's key points

- Epidural injection may be useful for radicular pain, although the optimal approach is unclear.
- This prospective randomized study compared a modified paramedian to a transforaminal approach.
- The modified paramedian approach demonstrated good anterior spread and effectiveness and less discomfort than the transforaminal approach.
- Further studies of the modified paramedian approach to the cervical epidural space are required.

particularly effective for the relief of radicular symptoms caused by nerve root compression.^{4 5}

However, safety issues regarding the TF approach have emerged and catastrophic complications such as cerebral or spinal cord infarct and transient ischaemic attack have been reported on numerous occasions.^{6–10} These complications cause serious neurologic sequelae to the patient; thus it has become difficult for physicians to decide whether to continue with or withdraw the TF approach. However, direct trauma to the spinal cord or nerves has been reported during the interlaminar approach, although only a few cases of minor complications have been reported following the procedure. Accordingly, the interlaminar approach of CESI has been accepted as a relatively safe method.^{11 12}

The key to a successful CESI is thought to be in delivering drugs suitably into the anterior epidural space at the site of pathology without causing any complications. In our centre, the paramedian

interlaminar (PI) approach is mainly used for the treatment of unilateral axial neck pain or radicular symptoms. In this procedure, the optimal needle entry site is made on the opposite side of the target (i.e. if the symptoms are on the left, the needle entry is on the right) in order to deliver drugs more efficiently to the anterior epidural space and the neural foramen (Fig. 1). We have named this method the modified paramedian interlaminar (mPI) approach in order to distinguish it from the existing PI approach.

We hypothesize that the mPI approach can deliver drugs as suitably into the anterior epidural space as the TF approach. The primary outcome of this study was the analysis of contrast flow under fluoroscopic guidance in the TF and mPI groups. In addition, we attempted to compare differences in vascular uptake and discomfort during the procedure between the two groups. In addition, clinical effectiveness, as determined by pain intensity and the degree of symptom change following the procedure, was measured as a secondary outcome.

Methods**Patients**

We conducted a prospective, randomized, comparative study. This study was approved by the Institutional Review Board of Seoul National University Bundang Hospital (B-1206/159-004) and was registered in the Clinical Research Information Service (KCT0000626). All participants were given written and verbal information about the trial before providing written consent. The inclusion criteria were as follows: (1) age 20–65 yr, (2) unilateral cervical radicular pain and/or axial neck pain caused by herniated nucleus pulposus

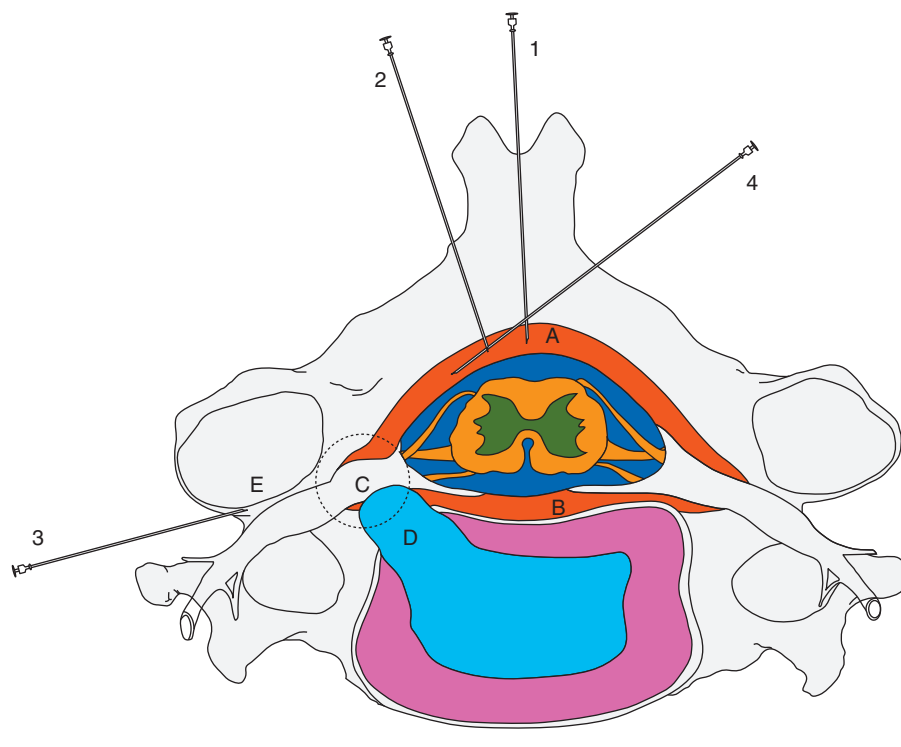


Fig 1 Approach methods of cervical epidural steroid injection. Dotted circle indicates compression of a spinal nerve root (c) by a herniated disc. 1: Interlaminar approach; 2: paramedian interlaminar approach; 3: transforaminal approach; 4: modified paramedian interlaminar approach: needle entry site is on the opposite side of the target for approach to the anterior epidural space and spinal nerve root. (A) Posterior epidural space, (B) anterior epidural space, (C) compressed spinal nerve root, (D) herniated disc, (E) posterior aspect of the intervertebral foramen.

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