

# Catheter-Assisted Interlaminar Approach for Cervical Epidural Steroid Injection in Patient with Cervical Stenosis Caused by Ossification of Posterior Longitudinal Ligament: A Case Report

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## Abstract

We present the case of a 64-year-old man with cervical ossification of the posterior longitudinal ligament (OPLL) experiencing chronic neck pain and radiculopathy for 6 months. A catheter-assisted interlaminar Cervical Epidural Steroid Injection (CESI) was performed under fluoroscopic guidance, targeting the affected C2-C6 levels. Significant improvement was observed after this procedure, with decreased pain scores (visual analogue scale (VAS) 8 to 2) and improved mobility. This technique not only enhances the effectiveness of CESI but also reduces the likelihood of complications such as stroke or epidural hematoma and thus provides an alternative treatment option for patients with multiple stenotic levels who are unsuitable for surgery or are unresponsive to conservative therapy such as medication or physical therapy.

## Keywords

Catheter-Assisted Interlaminar Cervical Epidural Steroid Injection, Ossification of Posterior Longitudinal Ligament, Cervical Stenosis

## 1. Introduction

Cervical epidural steroid injections (CESIs) are widely used for the management

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of pain in the neck and upper extremities stemming from conditions such as cervical disc herniation, spinal stenosis or radiculopathy. Traditionally, CESIs have predominantly been used to target lesions at lower cervical levels due to technical constraints [1]. However, a recent case report described its use for the management of post-operative cervical radiculopathy by using a catheter-assisted technique, which involves inserting a catheter inside the epidural needle after it has reached the epidural space (confirmed by loss of resistance technique) and then up to the desired higher cervical level under fluoroscopic guidance. And this extends its use to lesions at higher cervical levels [2]. This article aims to present a detailed case study involving a 64-year-old male patient who underwent CESI utilizing a paramedian interlaminar approach with a catheter directed upwards thereby facilitating access to and treatment of higher cervical levels.

## 2. Case Presentation

Mr. C is a 64-year-old man who presented with chronic axial neck pain and radiculopathy symptoms radiating into both his upper extremities for 6 months. Conservative management including physical therapy and oral medications provided limited relief. The patient reported that neither oral gabapentin (150 mg per day) nor tramadol (300 mg per day) relieved his symptoms. Magnetic resonance imaging (MRI) revealed ossification of the posterior longitudinal ligament (OPLL) at the C2-C6 level with compression of the spinal cord and nerve roots (**Figure 1**). Surgery was recommended by the patient's neurosurgeon but he was hesitant and expressed concerns about potential surgical risks and complications associated with a multilevel OPLL. He was referred to our hospital's pain clinic to explore alternative treatment options for his pain. Given the persistence of his symptoms despite 3 months of conservative treatments, the patient was considered a candidate for CESI. However, because the location of the pathology involved multiple cervical spine levels (C2-C6), traditional CESI techniques might have been insufficient to adequately target the affected stenotic levels. With traditional epidural injections, the spreading of the contrast would be blocked by stenosis at lower cervical levels, so the insertion of a catheter through the stenosis would allow for better spreading of medication. Instead, a catheter-assisted interlaminar approach was chosen to gain access to the higher cervical levels [2]. Under fluoroscopic guidance, a catheter was inserted upwards through the interlaminar space at the C7-T1 level with a paramedian approach. This technique allowed for a precise advancement of the catheter towards the target area at the high cervical level. Contrast dye injection confirmed adequate positioning and a mixture of corticosteroid and local anesthetic (10 mg of dexamethasone and 10 cc of 0.25% lidocaine) was administered through the catheter into the epidural space surrounding the affected nerve roots (**Figure 2**). Following the procedure, the patient reported significant improvement in his neck pain and radiculopathy symptoms. VAS scores decreased from 8 to 2 and functional mobility also improved at 1 week and 3 months follow-up.



**Figure 1.** T2-weighted Magnetic Resonance Imaging (MRI) (sagittal view) showed multiple levels of stenosis, which would limit the spread of the contrast medium from a traditional C7-T1 insertion of the epidural injection. It also showed ossification of the posterior longitudinal ligament at the C2-C6 level with significant compression of the spinal cord.



**Figure 2.** Oblique view of the fluoroscopic image showed contrast media flowed through the catheter into the epidural space of the C2 level, after navigating the catheter through the Tuohy needle at the C7-T1 level.

### 3. Discussion

When considering the site of insertion, cervical epidural steroid injection (CESI) is commonly administered at the C7-T1 level to minimize the risk of neurological complications that may arise from the procedure. As described by Kim *et al* [3] and Lee *et al* [4], the clinical outcome of CESI is correlated with the extent of contrast medium spread. Current studies suggest that using approximately 5 ml of injectate is typically effective in treating upper cervical stenosis [3]. However, performing CESI for patients diagnosed with symptomatic multilevel OPLL presents a significant clinical challenge. This difficulty stems from the complexity of achieving proper distribution of medication to the higher cervical levels, primarily due to blockages in fluid flow observed at the lower levels of the cervical spine. Thus, ensuring adequate dispersion of the steroid solution to alleviate symptoms in these patients remains a critical concern in clinical practice. One limitation of the described patient is that it is a single case report. Further studies with a larger study population or randomized controlled studies are needed to confirm the efficacy of this method.

The advent of catheter-assisted interlaminar cervical epidural steroid injection (CESI) represents a significant advancement in the realm of managing cervical spine disorders, particularly when addressing stenotic lesions located at higher cervical levels or across multiple segments. This technique facilitates the meticulous delivery of medication directly to the site of pathology, as corroborated by the widespread distribution of contrast medium during fluoroscopic imaging studies. By ensuring precise targeting of affected areas, this approach not only boosts the therapeutic effectiveness of CESI but also diminishes the likelihood of adverse effects. Furthermore, catheter-assisted interlaminar CESI emerges as a compelling therapeutic option for individuals who exhibit suboptimal responses to conventional medication therapy or who are unsuitable candidates for surgical interventions. However, there were no prior studies that have compared the efficacy between traditional and catheter-assisted approaches. Only case reports have addressed the successful use of a catheter-assisted approach for CSEI after the failure of adequate contrast spread with the traditional method. By providing a potentially prolonged period of pain relief, this method might offer a valuable alternative that addresses the diverse needs of patients navigating complex cervical spine conditions.

### 4. Conclusion

This case report described the efficacy and use of catheter-assisted interlaminar CESI in the management of axial neck pain and radiculopathy caused by OPLL in a 64-year-old man. Both the patient's pain and mobility showed sustained improvement at 3 months follow-up in this patient. This technique might provide clinicians with a valuable tool for delivering targeted pain relief to lesions on higher cervical levels, thereby improving patient outcomes and quality of life. Further research and clinical experience are warranted to validate its long-term

efficacy and safety profile.

### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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