

# Cervical Epidural Steroid Injection

## Techniques and Evidence

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### KEYWORDS

• Injections • Epidural • Neck pain • Evidence-based medicine

### KEY POINTS

- Cervical epidural steroid injections are a common interventional treatment of cervical radicular pain.
- The differing neurovascular anatomy in proximity to the route of entry for transforaminal and interlaminar epidural steroid injections must be thoroughly understood to perform safe injections.
- Use of particulate steroid and mixture with certain local anesthetics may pose increased risk for spinal cord ischemia during transforaminal epidural injection, in which inadvertent arterial injection is possible.
- Cervical epidural steroid injections are effective short-term treatment of radicular pain.
- The evidence base for cervical epidural steroid injections is limited by true placebo-controlled trials.

## INTRODUCTION

### *Epidemiology*

Neck pain is the fourth leading cause of disability in the United States. The lifetime risk of developing cervicgia approaches 50% in the general population.<sup>1,2</sup> Cervical radiculopathy is a pathologic cause of neck pain, often accompanied by radiating upper extremity pain. Mechanical compression of cervical nerve roots, usually by age-related cervical spondylosis or disk herniation results in ischemic nerve damage.<sup>3</sup>

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Furthermore, proinflammatory pathways initiated by neural ischemia perpetuate and aggravate regional pain.<sup>4</sup> Cervical radiculopathy may be self-limited, but persistent pain, weakness, or paresthesia often prompts therapy efforts.

Treatment modalities for cervical radiculopathy include oral analgesics and neuropathic pain medication, physical therapy, manipulation, local injection of medication, and surgical decompression. Epidural injection of corticosteroids and local anesthetics (LAs) achieves a high concentration of the treating agent within the epidural space to inhibit inflammation and reduce nociceptive afferent signaling. The 2 most common approaches to cervical epidural steroid injections (ESIs), transforaminal (TFESI) and interlaminar (IESI),<sup>5</sup> are reviewed. Other neck cervical needle approaches (trigger point injections, acupuncture, and so forth) are omitted.

### ***Indications for Cervical Epidural Steroid Injection***

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- Cervical radicular pain
- Cervical radiculitis
- Cervical radiculopathy

### ***Utilization***

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Cervical radiculopathy affects approximately 1 in 1000 adults per year.<sup>6,7</sup> Over the past decade, the rate of cervicothoracic ESIs has doubled (119% increase) among Medicare enrollees in the United States.<sup>8</sup> State-to-state utilization of ESIs varies from 5 to 40 interventions per 1000 Medicare enrollees.<sup>9</sup> The growth of cervical ESIs has accompanied a shift in their predominant setting from hospital-based sites to ambulatory surgery centers and outpatient physician offices.

Currently, there is lack of consensus regarding the ideal technique for Cervical ESI that balances safety and efficacy. This review outlines the 2 Cervical ESI approaches and means of optimizing safety and summarizes the highest-quality evidence for the clinical effectiveness of Cervical ESI.

## **CERVICAL TRANSFORAMINAL EPIDURAL STEROID INJECTION**

### ***Anatomy***

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A thorough understanding of cervical anatomy with particular attention to neurovascular structures is essential for the safe performance of cervical TFESI. One anterior spinal artery and 2 posterior spinal arteries provide penetrating branches that supply the cervical spinal cord. These arteries arise from radicular and spinal medullary arteries, which originate from the ascending cervical, deep cervical, and vertebral arteries. The spinal and radicular medullary arteries traverse the cervical neuroforamina, where they nourish the exiting spinal nerve root, penetrate the dura, and then anastomose with the anterior and posterior spinal arteries.<sup>10,11</sup> The vertebral arteries additionally provide blood supply to the brainstem and posterior regions of the brain. They traverse cephalad between the transverse foramina of the C2-C6 vertebrae, anterior to the cervical facet joints, and typically anterior to the ventral ramus of the cervical nerve root. Anatomic variations of their course are described.<sup>12</sup>

Given the proximity to the neuroforamina in the cervical spine, the spinal, radicular medullary, and vertebral arteries are of primary concern when approaching the transforaminal epidural space (**Fig. 1**). One cadaveric dissection study found more than 22% of cervical neuroforamina contained an arterial vessel within 2 mm of the needle trajectory using a posterior foraminal approach.<sup>13</sup> Although vertebral artery penetration itself is unlikely, anatomic variants must be considered. Furthermore, the extent to which arterial branches contribute to spinal circulation can further influence the possibility of a serious adverse event.

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