



Reclaiming confidence in cervical transforaminal epidurals: Dispelling myths and ensuring safety

Neck pain is a highly prevalent condition that results in significant pain, disability, and economic burden. Neck pain is one of the leading causes of disability. In 2017, the global point prevalence rate of neck pain was 3551.1 per 100,000 people, the incidence rate was 806.6 per 100,000 people, and the rate of years lived with disability due to neck pain was 352.0 per 100,000 people [1]. A recent systematic review from 2020 reported the prevalence of cervical radiculopathy to be from 1.21 to 5.8 per 1000 subjects [2].

Cervical epidural steroid injection is an effective treatment for managing severe neck pain and radiculopathy when conservative therapies have failed. Cervical transforaminal steroid injection (CTFESI) stands apart from the interlaminar epidural access as it involves placing corticosteroids directly into the intervertebral foramen, in close proximity to the cervical nerve root and dorsal root ganglion. This targeted approach aims to maximize therapeutic impact by placing the steroid precisely at the site of neural tissue irritation or compression. About 55 % of patients with cervical radiculopathy experience more than a 50 % reduction in pain three months after undergoing CTFESI [3].

In 2014, the FDA issued a drug safety warning about rare but serious neurological adverse events associated with epidurals, most of which were linked to CTFESIs involving particulate steroids. While there have been no reports of severe neurological complications associated with CTFESIs when non-particulate steroids were administered. As a result, some practitioners have shifted away from the CTFESI method, opting for the interlaminar approach under the belief that CILESIs are deemed “safer” than CTFESIs. However, this perception might not hold true.

The 2011 ASA malpractice claims report revealed that most cervical epidural malpractice claims were related to cervical ILESIs [4]. Over 3 years, there were 51 cervical procedure related complications, the majority (33/51 cases) were attributed to cervical ILESIs. These included 20 cases of needle trauma to the cord, 4 dural punctures, 3 hematomas with cord compression, 3 infections/abscesses, and 3 high total spinal blocks. In contrast, there were only nine cases (9/51 cases) from cervical TFESIs related to embolic infarcts. All these cases involved the use of particulate steroids, which might have been prevented by using non-particulate steroids.

The Doctors Company in 2005 reported an alarming incidence of major claims related to cervical interlaminar epidural steroid blocks [5]. There were 7 claims for spinal cord injury over a 3-year period. All cases had MRI evidence of trauma to the cervical cord at or near the level of the attempted CILESI.

Recently, there has been a surge in reports concerning spinal cord injury [6–11] and epidural hematoma associated with CILESI [12,13]. I want to stress that the risks of epidural hematoma and spinal cord injury

after CILESI are underestimated, given that such cases are often underreported for obvious reasons. Personally, I have reviewed one or two such cases each year for the past few years.

Since the epidural space at C7-T1 is only 1–3 mm with midline gaps in the ligamentum flavum, a meticulous technique is crucial to avoid spinal cord injury [14]. This involves using appropriate image guidance and limiting sedation and local anesthetic injections. However, cervical epidural hematoma after CILESI may not be entirely preventable. This is due to the specific anatomical features and vascular supply in this region which pose higher risks. Large diameter thin-walled epidural venous plexus exits at C6-7 and the cervicothoracic region [15]. This, coupled with a narrow cervical epidural space (which becomes further compromised in elderly individuals and those with spinal stenosis), can result in significant cord compression with even a minor hematoma.

On the other hand, several safety measures were suggested by a multisociety working group and national organizations to avoid complications with CTFESIs [16]. The most critical measures are the use of non-particulate steroid and real-time contrast injection to recognize any vascular flow. Digital subtraction angiography (DSA) is an alternative method that offers higher sensitivity in detecting vascular flow [17].

To identify the variable anatomy of the vertebral artery in relation to the neuroforamen, some experts advised to review MRI images before the procedure [18]. Alternatively, others suggest ultrasound-guided or ultrasound-assisted CTFESI to visualize other critical vessels in the vicinity of the cervical neuroforamen [19]. Following the implementation of these guidelines and the adoption of non-particulate steroids, there have been no reported instances of major neurologic complications arising from CTFESI.

In the latest edition of the *Interventional Pain Medicine Journal*, Beckworth WJ and colleagues presented findings on the safety of CTFESIs with non-particulate steroids in a substantial cohort comprising around 6200 patients [20]. Not a single case of major neurological complications was recorded. This study confirms the safety of cervical TFESIs when non-particulate steroids are utilized.

This should reignite interest in utilizing CTFESI and debunking misconceptions regarding its safety. It's recommended to include CTFESI in the treatment arsenal for cervical radiculopathy, particularly if there's apprehension about the potential for epidural hematoma with CILESI.

Declaration of interests

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

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Samer Narouze reports a relationship with ShiraTronics that includes: consulting or advisory. Samer Narouze has patent Ultrasound guided cervical sympathetic stimulation lead placement issued to ATI. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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