

Strategies to Minimize Risk in Lumbar Transforaminal Injections: Digital Subtraction, Non-Particulate Steroids, and Anesthetic Test Dose

FactFinder

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Committed to providing helpful information to our members about key patient safety issues, the Spine Intervention Society's Patient Safety Committee has developed a FactFinder series. FactFinders will explore and debunk myths surrounding patient safety issues. The intent of this FactFinder is to address strategies used to minimize risks associated with lumbar transforaminal injections.

Myth #1: Neither digital subtraction nor live fluoroscopy is needed for lumbar transforaminal epidural steroid injections.

Fact: Live fluoroscopy and/or digital subtraction are recommended when performing lumbar transforaminal epidural steroid injections.

The most significant risk for a lumbar transforaminal steroid injection is an intra-arterial injection and a test dose of contrast medium is recommended before any other agent is injected.¹ Digital subtraction has been found to increase the detection of intravascular uptake of contrast,^{2,3} but DS may not be readily available and increases radiation exposure. Real time fluoroscopy has been shown to be superior to aspiration tests and static fluoroscopic images.⁴ Real time fluoroscopy and/or DS with injection of contrast medium using an AP view should be used for lumbar transforaminal epidural steroid injections before injection of any substance that could be hazardous to the patient.⁵

Myth #2: Particulate steroids should be used initially for lumbar transforaminal epidural steroid injections.

Fact: Non-particulate steroids (e.g. preservative-free dexamethasone) should be used as a first line agent for lumbar transforaminal epidural steroid injections.

For lumbar transforaminal epidural steroid injections, particulate steroids have been associated in all cases of severe neurologic complications.⁵ Laboratory studies have shown that some steroid preparations contain particles and can form aggregates which can act as emboli if injected intra-arterially and are of adequate size to block small terminal arterioles. Dexamethasone is a non-particulate steroid, which does not form particles or aggregates.^{6,7} There are two animal studies that have shown that particulate steroids injected intra-arterially (internal carotid artery or vertebral artery) can cause significant neurological injury, but in both studies there was no neurological injury when

dexamethasone was injected.^{8,9} The effectiveness of dexamethasone is not significantly less than that of particulate steroids,^{10,11} so dexamethasone is recommended as a first line agent for lumbar transforaminal epidural steroid injections.⁵

Myth #3: A local anesthetic test dose does not affect the safety of lumbar transforaminal epidural steroid injections.

Fact: The use of an anesthetic test dose for lumbar transforaminal epidural steroid injections is controversial, especially with the use of preservative-free dexamethasone.

Evidence regarding the use of an anesthetic test dose for a lumbar transforaminal epidural steroid injection is less clear, and there are few quality publications. Some physicians advocate that a local anesthetic test dose should be used, believing that when a local anesthetic is injected intra-arterially, temporary spinal cord anesthesia will occur. There is a case report of a lumbar transforaminal epidural steroid injection with the use of DS and an anesthetic test dose (0.5ml of 1% lidocaine) with resultant paraplegia.¹² This case report illustrates that use of DS does not guarantee a safe procedure and highlights the importance of attending to volume and concentration of local anesthetic used in performing a test dose in addition to use of extension tubing. This case calls into question the volume and potency of lidocaine needed for a successful test dose.

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