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CLINICAL PERSPECTIVES

Fact Finders

Are Gadolinium-Based Contrast Media Safe Alternatives for Spine Procedures?

Myth: Gadolinium-based contrast media are as safe to use in spine injections as standard iodinated contrast agents.

Fact: The safety of gadolinium-based contrast media is unknown. They appear to be safe if spine procedures are performed accurately, but the published studies have had small sample sizes. Adverse effects can occur if gadolinium-based contrast media are injected intrathecally, and intravascular injections of large volumes can potentially cause complications.

Contrast medium is used during image-guided spinal procedures in order to show where the injectate flows and to avoid unwanted intrathecal or intravascular injection of subsequent agents. Whereas some patients are allergic to iodinated nonionic contrast media, others may misinterpret physiologic reactions to corticosteroids (such as facial flushing) as allergic reactions. The latter patients need to be recognized, lest they be falsely regarded as allergic to contrast media.

For patients with known allergies to iodinated nonionic contrast, many providers use gadolinium-based contrast medium (GBCM) as an alternative. However, when used in fluoroscopy-guided procedures, GBCM produces a dispersal pattern that is less distinct than that provided by iodinated contrast media. The temptation arises to use more GBCM in order to get a better picture, but this should be avoided because the complications of GBCM are dose related.

Severe, life-threatening anaphylactoid reactions to GBCM are rare. For spinal procedures, GBCM appear to be safe, but the available studies have had small sample sizes. The potential for complications increases if needles are placed in unwanted sites.

No complications were encountered in a study of 92 patients allergic to iodinated contrast media who underwent 127 procedures performed with GBCM. The doses used ranged from 1.5 to 7.5 mL for discography and 1 to 5 mL for epidural steroid injection, to 0.2 to 1 mL per level for nerve blocks, 0.2 to 0.5 mL per level for zygapophysial joint blocks, and 0.5 mL for intercostal blocks. No complications occurred in 38 patients who had interlaminar epidural steroid injections in an interventional radiology department using 1 to 3 mL of nondiluted GBCM. In five cases, imaging was augmented with subtraction fluoroscopy to improve visualization of injected gadolinium.

There are no reports in the literature of complications following fluoroscopically guided transforaminal epidural steroid injections, medial branch blocks, or sacroiliac joint injections performed using GBCM, nor are there are any substantial studies that have addressed the safety of GBCM for these procedures.

In the conduct of interlaminar epidural injections, there is a 0.5% risk of unintended dural puncture, despite fluoroscopic guidance and loss of resistance technique. GBCM are not FDA approved for intrathecal use. So, physicians need to be alert to the possibility of intrathecal placement of needles when using GBCM. Studies have reported encephalitis, chemical meningitis, and seizures with residual optic nerve involvement following intrathecal administration of large doses of gadolinium, but there are no reports of complications following intrathecal administration of GBCM in doses of 1 to 3 mL.

Nephrogenic systemic sclerosis has been reported after intravenous administration of gadolinium, resulting in severe chronic or acute renal failure. However, the volume injected far exceeds 5 mL; the usual dose is 0.2 mL/kg. A growing body of evidence also documents that intravenous GBCM during magnetic resonance imaging studies is associated with deposition of GBCM in the brain, even in patients with relatively normal renal function, but the clinical significance of this phenomenon is unclear at this time.

Recommendations

As with every medication used, the spine interventionalist should have a thorough knowledge of the body of literature related to GBCM. Physicians should use the lowest volume of GBCM necessary. This should not exceed 3 mL, and the procedure should be abandoned if the dispersal pattern of contrast medium is not clear with less than 3 mL. The physician should abort the injection if, at any time, intrathecal uptake is suspected. If vascular uptake is encountered or suspected, the

physician should consider a different approach, or reposition the needle if the volume of injection was less than 2 mL of GBCM.

An alternative to using GBCM is to avoid the use of any contrast medium. Whereas this might be reasonable for procedures with a low risk of vascular uptake, such as medial branch blocks or intra-articular injections, precautions should be implemented for procedures in which vascular uptake is more likely or potentially more hazardous, such as transforaminal injections or epidural injections. Safeguard measures would include administration of a local anesthetic test dose, use of a nonparticulate steroid for an epidural steroid injection, and fluoroscopic guidance of the needle to the ideal target, with live digital substraction fluoroscopy when available, with repeated negative aspiration throughout the injection. More fundamentally, the physician should consider recommending against the procedure after weighing the risks for the individual patient.

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An extended version of this FactFinder with complete references is available on the Spine Intervention Society Website at http://c.ymcdn.com/sites/www.spineintervention.org/resource/resmgr/factfinder/FactFinder_2017-04-17_Gadoli.pdf.

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