Letter to the Editor

Precipitation of Gadolinium and Ethanol during Nerve Block

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Editor:

Procedures to palliate intractable pain are well-established in the domain of the interventional radiologist. These include neurolysis, nerve blocks, facet blocks, and even palliative radiofrequency ablation. In particular, celiac plexus blocks are safe and effective for intractable pain from metastatic disease in the abdomen (1).

There is a wide variety of celiac techniques and recipes. Some of these recipes consist of mixing contrast material and alcohol to document distribution of contrast material circumferentially around the aorta. Regardless of whether the alcohol is mixed with contrast material before injection, mixing occurs in vivo in the course of the procedure. Therefore, biocompatibility of these agents is important.

This issue was raised during celiac plexus block for regional cancer pain in a patient with advanced cancer. He had a questionable history of anaphylaxis during an earlier contrast imaging study. Therefore, gadolinium was chosen in lieu of iodinated contrast material. Although it does not attenuate as strongly as conventional contrast material, the use of gadolinium for patients with contrast allergy is well-documented for angiography and computed tomography (2).

In the course of the procedure, we were surprised to find a white precipitate when mixing gadopentetate dimeglumine (Magnevist; Berlex Imaging, Wayne, NJ) with 100% ethanol (EtOH; Abbott Laboratories, North Chicago, IL). This reaction is not listed on the manufacturer's information insert. Given the questionable history of iodine allergy and the lack of documented reaction, we chose to use conventional nonionic contrast material. Premedicating with steroids and diphenhydramine hydrochloride would necessitate rescheduling and another day of pain. The patient did not experience an anaphylactic reaction and tolerated the procedure well.

There are a number of possible clinical scenarios in which these agents could both be present, including percutaneous nerve blocks or alcohol ablation in an interventional magnetic resonance imaging suite.

First, we attempted to reproduce the observed precipitation reaction. Gadolinium was added to 100% EtOH in 1:1, 1:2, 1:3, 1:4, and 1:5 ratios of gadolinium to EtOH (**Fig**). In the 1:1 and 1:2 trials, a white precipitate formed briefly but reentered the solution on mixing. In the 1:3 trial, the white precipitate did not reenter the solution and the result was a cloudy white solution. In the 1:4 and 1:5 trials, the white precipitate clouded the solution and condensed at the bottom of the test tubes.

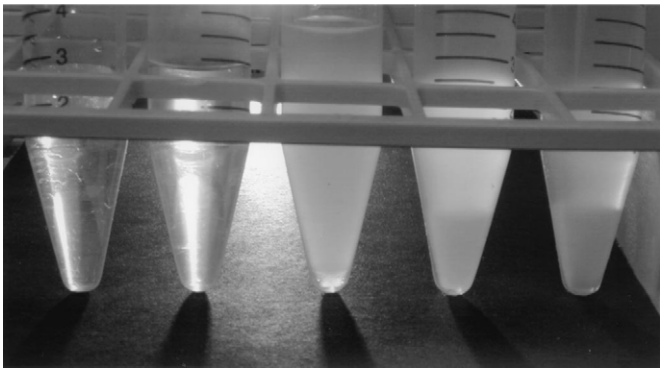

Figure. Test tubes with gadolinium plus 100% ethanol in ratios, from left to right, of 1:1, 1:2, 1:3, 1:4, and 1:5. Precipitation increases with increasing ethanol ratio.

Next, we varied the concentration of gadolinium to EtOH in 1:1, 2:1, 3:1, 4:1, and 5:1 ratios. The white precipitate formed briefly in the 1:1 trial, as in the previous experiment, but then entered the solution on mixing. In the 2:1, 3:1, 4:1, and 5:1 trials, there was no observable precipitate.

Finally, we attempted to determine whether this reaction was possible with different concentrations of EtOH. Gadolinium was added to 70% EtOH in 1:1, 1:2, 1:3, 1:4, and 1:5 ratios of gadolinium to EtOH. There was no observable precipitate in any of the trials.

There are a number of possible variables involved in the formation of this precipitate that could be further explored, such as temperature, order of mixing, and other solute concentrations. These factors need to be elucidated before the precipitate can be identified.

However, its presence could be clinically relevant in the use of gadolinium for interventional procedures such as angiography or nerve blocks. This precipitate might interfere with injection of EtOH through a standard 22-gauge needle used for celiac plexus blocks, or could even embolize during angiography. Because of these potential hazards, it is important for the interventional radiology community to be aware of the precipitation of gadolinium and EtOH to prevent avoidable consequences in their patients.

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References

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