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Don't Call a Plumber for This Leaky Faucet:
Be Wary of Extravasation During CT Contrast Injection

Because extravasation of contrast media is thought to occur rarely, it is especially concerning that ECRI Institute PSO has seen several events involving this phenomenon. Pediatric and diabetic patients are particularly at high risk for extravasation injury. In most of the events reviewed by ECRI Institute PSO, the technologist tested the patency of the intravenous line via a test injection of saline before conducting a CT study; extravasation still occurred with contrast media leaking into surrounding tissue. Most patients only required additional monitoring, but in one case, the patient had to be admitted to the hospital for follow-up.

Contrast media for CT studies is generally delivered through power injectors. These devices deliver viscous contrast media rapidly at high pressure (e.g., 300 psi), and due to the nature of the imaging study, no direct observation of the injection site by the technologist (or nurse) is possible. Also, the technologist is overseeing many different simultaneous processes, so if a problem occurs, he or she is unlikely to notice.[1]

Safety protocols to reduce the risk of extravasation include verifying the integrity of all tubing, as well as the patency of the injection site, via the injection of saline and palpation by the technologist. The technologist should also examine the injection site after the study is done and instruct the

Key Contributing Factors

- Management/organization: Potential lack of enforced policies pertaining to contrast administration safety
- Operating environment: Limited visibility—the technician has no way to directly monitor the injection site during the imaging procedure
- Workflow: Simultaneous processes—the technician is monitoring several different processes at once

Key Recommendations

1. Strongly consider using contrast medium injectors with an extravasation detection accessory. Technologists should be trained in the accessory's use to reduce the risk of false positives.
2. Test the integrity of all tubing, catheters, and other equipment, as well as the patency of the injection site via palpation and the injection of saline.
3. Ensure that organization policies require the complete documentation of the event within the patient record. Include the following information: injection site; saline test injection results; injection port and tubing used; contrast type, volume, and concentration; injector model;

patient to return for reevaluation if pain or swelling occurs.

The organization should also consider using injectors with an extravasation detection accessory as part of the organization's CT imaging study safety protocols.[1,2] The detection device, which requires a single-use adhesive patch attached to the patient over the injection site, can stop the injection if extravasation occurs.

Most imaging facilities currently use lower-concentration contrast media. If higher-concentration solutions are used, warming of the contrast media may reduce the risk of extravasation by reducing the solution's viscosity and making it easier to inject.[2]

If extravasation occurs, the study must be stopped immediately and, depending on how much contrast media was injected, possibly postponed for at least 24 hours, and the patient should be monitored by a supervising physician. The affected limb should be elevated, and the patient should be released only when the radiologist determines that existing symptoms have improved and no new ones have presented.[2,3] In most cases, inflammation is the only aftereffect; an occasional consequence is sloughing of the skin, which may require surgical repair. The incident should be fully documented in the patient's record.[2]

extravasation detection accessory used; maximum pressure and flow rate applied; and personnel assisting with the study.

4. Remain abreast of guidelines promulgated by professional associations and regulatory agencies, such as those published by the American College of Radiology, which recommends immediately halting the procedure.[2]

Reporting to ECRI Institute PSO

ECRI Institute PSO analyzes the reports submitted by its member organizations and collaborating PSOs to identify safety concerns and trends. We share our findings about a particular hazard and lessons learned with participating organizations in our *Patient Safety E-Lert*. ECRI Institute PSO encourages its participating organizations to continue to submit their reports under the legal protection of the PSO to promote such learning. Visit your PSO portal to see an archive of previous issues of *Patient Safety E-Lert*.

Take Home Point

To lessen the risk of a mishap when the contrast medium is injected, it is important to verify that the proper catheter is used and that the catheter is correctly positioned in the vein and patent. Extravasation detectors should be considered for additional safety. If extravasation occurs, the patient should be monitored by a supervising physician, and any follow-up care as needed should be provided immediately. Because pain or swelling may not develop until 12 or more hours following the injection, patients should be instructed to watch for adverse reactions and to contact the radiologist or referring physician if a reaction occurs.

References

[1] ECRI Institute. Safety features on CT contrast injectors: enhancing patient protection [evaluation]. *Health Devices* 2010 May;39(5):150-65.

[2] American College of Radiology (ACR). *ACR manual on contrast media*. 8th ed. Reston (VA): ACR; 2012. Also available at http://www.acr.org/~/media/ACR/Documents/PDF/QualitySafety/Resources/Contrast%20Manual/FullManual.pdf.

[3] Extravasation of radiologic contrast. PA PSRS Patient Saf Advis [online]2004 Sep [cited 2013 Feb 18]. http://patientsafetyauthority.org/advisories/AdvisoryLibrary/2004/Sep1(3)/Pages/01b.aspx.

Medical Director's Note

Extravasation poses a risk to the patient and is an unwanted complication in the radiology department. However, certain protocols and procedures can help reduce the likelihood of an extravasation event—namely, warming of the contrast media, verification of the injection site and equipment, and use of an extravasation detector. If your institution has experienced an extravasation event, we can provide confidential assistance to determine why this occurred. This *Patient Safety E-lert* provides participating organizations with an additional periodic educational awareness to help prevent healthcare events from happening in their facilities. To discuss your safety concerns, please contact us at (610) 825-6000 or patientsafety@ecri.org, and we will forward your questions to our radiation safety experts.

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