ence of the pathologically proved, unsuspected renal cell carcinoma in the right kidney, perhaps because of the presence of multiple cysts, some of which contained old blood at pathologic examination.

Since this patient required a nephrectomy for the originally suspected left renal tumor, it was fortuitous that the unsuspected lesion in the right kidney was amenable to a partial nephrectomy, sparing this patient hemodialysis.

In summary, gadolinium-enhanced MR imaging can be extremely valuable when a renal mass is not clearly a cyst at sonography and iodinated contrast media cannot be intravenously administered.

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■ Patient and Physician Radiation Exposure during Fluoroscopy

From:
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Editor:

The March 1991 issue of *Radiology* contained a number of articles concerning radiation exposure to patients during fluoroscopy (1–5), an area of increasing concern to the Center for Devices and Radiological Health of the U.S. Food and Drug Administration (FDA). Because fluoroscopic examinations have been estimated to contribute close to one-half of the total effective dose equivalent to the U.S. population from diagnostic radiology (6), the radiation exposure aspects of fluoroscopic examinations need increased attention to ensure that exposures are kept to the minimum required for the procedures. We are pleased to see this concern receiving attention and encourage further investigations and discussion.

As mentioned in the article by Cagnon et al (2) and in the editorial by Wagner (1), the FDA is currently developing a proposal to revise the section of the federal performance standard for diagnostic x-ray systems that addresses exposure rate limits for fluoroscopic x-ray systems (7). An FDA advisory committee, the Technical Electronic Product Radiation Safety Standards Committee, has concurred with the proposal to establish exposure rate limits during the high-level-control mode of operation. The proposed change to the performance standard will address some of the issues raised by Cagnon et al (2).

Contrary to the self-limiting situation with radiography, where overexposure results in dark radiographs, fluoroscopic images appear to improve in quality with increasing radiation exposure to the patient. This fact most probably explains the high values of entrance exposure rates seen by Cagnon et al. In addition to the question of exposure rate limits for systems with high-level controls, users, manufacturers, and regulatory agencies need to focus additional attention on other aspects of fluoroscopy. These include the question of appropriate exposure rates during recording of fluoroscopic images, especially during digital recording; methods of limiting occupational exposures to medical staff during fluoroscopy; changes in equipment design that would further optimize fluoroscopic equipment; and improved training and supervision of those performing fluoroscopic procedures.

We are also concerned about recently introduced and currently developing interventional and therapeutic procedures that utilize fluoroscopy for guidance and visualization. A number of unverified, but disturbing, anecdotal reports have reached the FDA regarding procedures that are alleged to have resulted in very large radiation exposures to limited portions of the patient's body, producing radiation-related symptoms. Some procedures, involving very long fluoroscopic exposure times, may have been performed without attention to or consideration of the resulting cumulative radiation exposure. Because many of the recently developed interventional procedures are alternatives to surgical treatment or may not have alternatives, the radiation dose considerations are different from those during diagnostic procedures. A different approach may be required in assessing risks versus benefits in these situations, and further discussion of this question is needed.

The article by Rudin et al (4) illustrates the substantial reduction in patient dose that can be achieved by some rather simple technologic changes. This work shows the reduction in exposure that is possible when the entrance exposure rate and image quality are adjusted to meet the requirements of the procedure. There appear to be a number of such changes that, if generally available on fluoroscopic systems and used when appropriate, could have a substantial impact in reducing radiation exposure to patients and staff. Among these are equipment features such as an easily removable antiscatter grid to permit gridless procedures, an adjustable operator-controlled aperture between the image intensifier and the video camera, and freeze frame or last image hold capability. Although it might be feasible to require some of these features by means of the federal performance standard, we encourage manufacturers and users to explore implementation of these features without regulatory action.

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■ Potential Hazard of Metal-filled Sandbags in MR Imaging

From:
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Editor:

A recent incident in our magnetic resonance (MR) imaging suite serves as a sharp reminder that overlooked metallic particles in a high-field-strength area can represent potentially serious problems for patients and attendant personnel in and around the MR units.

Damaged metal-filled 5-lb (2.25 kg) "sandbag" (resealed) and the cup containing ferromagnetic pellets retrieved from the severely damaged MR unit.

A 38-year-old woman entered the emergency room of our hospital after being involved in a motor vehicle accident. When a weakness of the left hand was found at physical examination, an emergency MR examination of the cervical spine was ordered. A 5-lb (2.25 kg) sandbag from the emergency room was placed alongside the patient's neck as a precaution against involuntary movements. The patient was transported to the MR imaging suite where she was screened for metal objects; her clothing was not removed out of concern for the possible spine injury.

The instant the patient was placed on the MR imaging table, the "sandbag" shot out from alongside the patient's neck, hurtled through the entire imager bore, overshot the end to strike and break the metal fan, burst its seams, and literally exploded into a small black cloud of tiny metal pellets, which flew into the imager bore. There they fractured the plastic inner housing and underlying body coil antenna. All of this occurred in the space of a few seconds. No one was injured in any way.

The imager became inoperative immediately because of the damage to the blower and the antenna. Servicemen were forced to ramp down the magnet to retrieve the thousands of metal pellets that were adhered tenaciously to the surface of the housing and even infiltrated the cracks into the underlying antenna. The pellets were mostly identical—black, round, regular, and approximately 1 mm in diameter. They resembled tiny bird shot.

We began an investigation to determine the source of these metal-filled weights that masqueraded as sandbags. Members of the emergency room staff were surprised when told that the black vinyl bags did not contain sand. They had been used in the emergency room as both stabilizing weights and as orthopedic traction weights (Figure) as far back as anyone could remember. Two identical bags discovered in the emergency room were opened and were also found to be filled with metal pellets. The orthopedic staff members also denied any knowledge that these bags, which are traditionally used for traction weights, contained anything except sand. Screening of radiographic accessory catalogs proved unsuccessful because all weights sold for radiographic or imaging purposes are specifically nonmetallic. It was among the orthopedic accessories that we found a number of traction/weight bags filled with small metallic shot. Two of the four major suppliers, including the vendor of our ruptured bag, had already begun to label their products with precautionary warnings about the metallic contents. The other two were contacted and agreed to place a warning label on all metallic bags sold in the future. The problem addressed in this letter is that thousands of such nonlabeled bags are in hospitals, emergency rooms, and diagnostic imaging departments throughout the world.

There are two published accounts of similar occurrences, one in the orthopedic literature (1) and the other in a radiologic technologist journal (2). In both instances, an identical black vinyl 5-lb (2.25 kg) "sandbag" was involved. In one case (1), a traction bag flew off the orthopedic device in the MR imaging suite, striking a nurse in the shoulder and pinning her to the imager housing. In the other case (2), the bag, which was being used to support an intravenous catheter in an infant, was pulled into the imager bore. Fortunately, neither bag burst, and there was no injury or damage. Last, there is also the inclusion of "sandbags" in a long list of potentially dangerous metallic apparatuses published by Kanal et al (3).

After this serious accident, which was costly both in terms of extremely expensive repairs and imager downtime, we purchased an inexpensive metal detector similar to the type used by airport security personnel. It cannot, however, help distinguish between magnetic and nonmagnetic metals. We now use this detector routinely on all emergency patients and in all nonroutine examinations. However, even these devices may be used in a haphazard fashion or may fail for lack of attention to battery strength. There is no substitute for careful inspection of patients, their clothing, and other accoutrements before performing MR examinations.

Since it appears that these metal-filled vinyl traction "sandbags" are found in emergency and orthopedic departments throughout the world, we suggest that MR imaging personnel be warned of the existence of these potentially dangerous implements and that every effort be made to screen for them.

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■ Attitudinal Expressions as a Measure of Reviewer Fairness

From:
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Editor:

In your article "Assassins and Zealots: Variations in Peer Review," which appeared in the March 1991 issue of *Radiology* (1), you stated that there were no objective factors in your study by which to identify "assassins" and "zealots" other than their ratings of the manuscripts. Another pertinent factor might be the expression of attitude as reflected in words or phrases a reviewer uses. Frequency of attitudinal expression may be a more appropriate measure of reviewers' sense of fairness, or ability to be objective, than ratings, because ratings are intended to measure the merit of a manuscript, not a reviewer. Further, noting attitudinal expressions may be especially applicable to judging reviewers in that a goal of science is objectivity.