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Ferromagnetic Detector To Screen Patients For Metallic Foreign Bodies Prior To MR Imaging

Presentation Time: Wednesday, 1:08 p.m. - 1:16 p.m.
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Purpose
The purpose of this study was to test a novel new ferromagnetic detector to screen patients prior to MR imaging. Unlike conventional metal detectors, this system is able to differentiate between ferromagnetic objects and nonferromagnetic ones.

Materials & Methods
The test population consisted of nonselected, ambulatory, outpatients and inpatients who were instructed to remove all loose metallic objects prior to MR imaging. Some of the subjects chose to wear their clothes while others wore hospital gowns. Testing was done using the FerrAlert™ (Kopp Development, Florida) ferromagnetic detector which was calibrated to sound an alarm when it detected an object the size of a 2 cm x 1 mm ferromagnetic safety pin. The device was designed as a portal measuring: 61 cm (width) x 5 cm (depth) x 198 cm (height) that patients could walk through. The apparatus employed an array of Hall effect magnetic field sensors oriented to utilize the fringe magnetic field of the MR magnet or, alternatively the earth's magnetic field. The sensors were connected to a processor which analyzed their output and produced an alarm when the presence of ferrous objects affected the background magnetic field. With a positive alarm, the patients were searched for metallic objects and rescreened.

Results
Data from 228 patients is reported. 44.30% (101/228) patients were detected to have ferromagnetic object(s). Of these, 8 patients had surgical prosthesis as the cause for the alarm. In 92 patients, the ferromagnetic foreign body was identified, removed, and were rescreened. In one patient, the system failed to detect a metallic safety clothing pin during rescreening which was found as an artifact on the study. The cause of the alarm was not identified in one patient. 55.7% (127/228) patients had no ferromagnetic materials detected and had uneventful studies.

Conclusion
The apparatus shows excellent sensitivity and specificity for detecting even small ferromagnetic articles on patients prior to MR imaging. The design of the apparatus, resembling an airport metal detector allowed easy acceptance by patients. Proper screening of patients and personnel using a ferromagnetic detector may help decrease MR imaging-related adverse effects.