Computed Tomography Scout: Expediting Magnetic Resonance Imaging in Stroke Patients

R. Singh, G. Virador, A. Ahmed, M. Oei, N. Gopal, C. Overfield, C. Rowell, A. Desai, A.A. Bhatt, S.J.S. Sandhu
Mayo Clinic Jacksonville

PURPOSE

To investigate the utility of CT scout images in detecting potentially MRI-unsafe implants, devices, and objects.

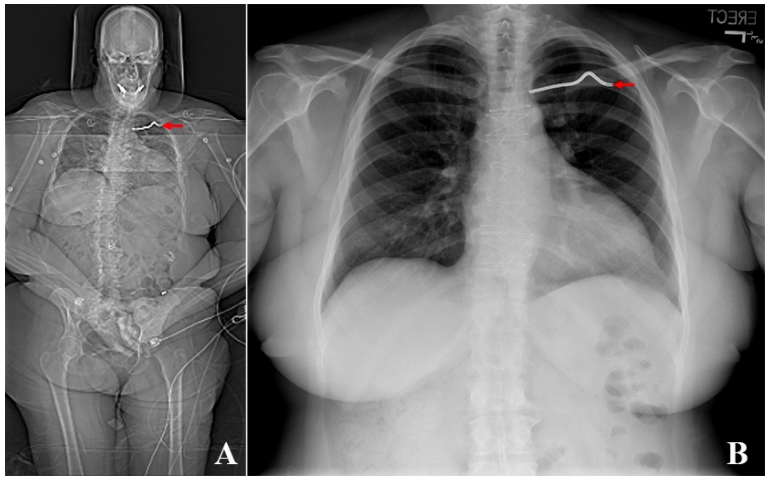

Figure 1. An illustrative case of a subject with an MRI-unsafe implant (a retained pacemaker lead). (A) Full-body scout image demonstrates the MRI-unsafe implant (red arrow) (B) X-ray demonstrates the MRI-unsafe implant (red arrow)

METHODS

- A study was conducted with 100 subjects with potential MRI-incompatible objects (MIOs) and a control group of 100 individuals without MIOs, both groups were matched by gender, age, and body mass index (BMI).
- A total of 408 imaging studies were analyzed, including 92 full-body CT scout images, 108 regional CT scout images, and 208 x-rays, to detect the presence of potential MIOs. Each imaging modality's sensitivity, specificity, and accuracy were calculated with standard deviations (SD) and confidence intervals (CI).
- The imaging studies were blindly interpreted by a team of six radiology professionals, including two board-certified neuroradiologists, one neuroradiology fellow, and three radiology residents. A "true positive" was recorded when the potential MIO was correctly identified, and its location was reported. The potential MIOs included a range of objects such as joint prostheses, cardiac devices, vascular stents, bullets, embolization coils, aneurysm clips, and nerve stimulators, among others

RESULTS

- For full-body CT scout images, the sensitivity was 82.54%, specificity 98.55%, and accuracy 90.56% (95% CI 89.65%, 91.47%).
- For regional CT scout images, the sensitivity was 83.64%, specificity 99.69%, and accuracy 91.65% (95% CI: 89.48%, 93.82%).
- For x-rays, the sensitivity was 88.78%, specificity 99.84%, and accuracy 94.30% (95% CI: 92.76%, 95.85%). (Table 1)

Full-Body CT Scout (n=96)			
	Sensitivity (%)	Specificity (%)	Accuracy (%)
Attending 1	84.78	95.65	90.22
Attending 2	82.61	100.00	91.30
Neuroradiology Fellow	82.22	100.00	91.21
Resident 1	78.26	100.00	89.13
Resident 2	82.61	100.00	91.30
Resident 3	84.78	95.65	90.22
Mean± SD	82.54 ± 2.39	98.55 ± 2.24	90.56 ± 0.87
Regional CT Scout (n=104)			
	Sensitivity (%)	Specificity (%)	Accuracy (%)
Attending 1	87.04	100.00	93.52
Attending 2	75.93	100.00	87.85
Neuroradiology Fellow	87.04	100.00	93.52
Resident 1	83.33	100.00	91.67
Resident 2	83.33	100.00	91.67
Resident 3	85.19	98.15	91.67
Mean± SD	83.64 ± 4.13	99.69 ± 0.76	91.65 ± 2.07
X-rays (n=208)			
	Sensitivity (%)	Specificity (%)	Accuracy (%)
Attending 1	93.27	100.00	96.63
Attending 2	88.46	100.00	94.17
Neuroradiology Fellow	89.42	100.00	94.71
Resident 1	89.42	100.00	94.71
Resident 2	84.62	100.00	92.31
Resident 3	87.50	99.04	93.27
Mean± SD	88.78 ± 2.83	99.84 ± 0.39	94.30 ± 1.47

CONCLUSION

Full-body or regional CT scout images can be employed in CT head protocols for acute stroke to detect potentially MRI-unsafe implants, devices, and objects, which can help expedite MRI in stroke patients.