Portable Magnetic Resonance Imaging

- Embolization of a high cervical pial arteriovenous fistula resulting in respiratory insufficiency due to diaphragmatic paralysis: A case report
- Mixed reality holographic navigation for intracranial lesions using HoloLens 2: A pilot study and literature review
- Near-Infrared Spectroscopy to Assess Covert Volitional Brain Activity in Intensive Care
- Detecting pseudo versus true progression of glioblastoma via accurate quantitative DCE-MRI using point-of-care portable perfusion phantoms: a pilot study
- Intraoperative MRI Utilization by Moving Patients to the Magnet: Results From a Prospective Series of Brain Tumor Operations
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Portable magnetic resonance imaging (MRI) refers to MRI machines that are designed to be compact, lightweight, and mobile, allowing for greater flexibility in where and how they can be used. Traditional MRI machines are large, immobile systems found in hospitals or specialized imaging centers. Portable MRI devices, on the other hand, can be transported to different locations, such as the patient's bedside, clinics, or remote medical facilities. Here are some key points about portable MRI:

Design and Size: Portable MRI machines are typically smaller and more lightweight than their traditional counterparts. They are designed to be easily transported and set up in various clinical or field settings.

Ease of Use: These devices are often designed to be user-friendly and may have simplified interfaces to make operations easier for medical personnel who may not be MRI specialists.

Applications:

Bedside Imaging: Portable MRI can be used for bedside imaging of critically ill patients who cannot be moved to a traditional MRI suite.

Remote or Rural Healthcare: They are valuable for providing MRI services in remote or rural areas where access to large medical facilities is limited.

Emergency Medicine: Portable MRI can be used in emergency situations to quickly assess injuries or conditions that require immediate attention.

Military and Disaster Relief: They can be deployed in military settings or disaster relief scenarios to assess injuries and health conditions in the field.

Veterinary Medicine: Portable MRI is also used in veterinary medicine for imaging animals in various locations. Magnetic Field Strength: Portable MRI machines may have lower magnetic field strengths compared to high-field MRI scanners found in hospitals. The lower field strength can affect image quality but is often sufficient for specific clinical purposes.

Limitations: Portable MRI machines may have limitations in terms of image quality and the types of studies they can perform. High-field MRI scanners are still preferred for complex and detailed imaging.

Cost and Accessibility: Portable MRI machines can be more cost-effective and accessible for smaller healthcare facilities or those in resource-limited areas, making MRI services more widely available.

Ongoing Development: Research and development in the field of portable MRI continue, with efforts to improve image quality, reduce size, and increase portability.

In summary, portable MRI machines offer a practical solution for extending MRI services to various clinical and remote settings, making this valuable diagnostic tool more accessible and versatile. However, they are best suited for specific clinical scenarios where the benefits of portability outweigh potential compromises in image quality

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Neuroimaging is essential for detecting spontaneous, nontraumatic intracerebral hemorrhage (ICH).

Data suggest intracerebral Hemorrhage can be characterized using low-field magnetic resonance imaging (MRI). Our primary objective was to investigate the sensitivity and specificity of ICH on a 0.064T portable MRI (pMRI) scanner using a methodology that provided clinical information to inform rater interpretations. As a secondary aim, we investigated whether the incorporation of a deep learning (DL) reconstruction algorithm affected ICH detection.

The pMRI device was deployed at Yale New Haven Hospital to examine patients presenting with stroke symptoms from October 26, 2020, to February 21, 2022. Three raters independently evaluated pMRI examinations. Raters were provided the images alongside the patient's clinical information to simulate the real-world context of use. Ground truth was the closest conventional computed tomography or 1.5/3T MRI. Sensitivity and specificity results were grouped by DL and non-DL software to investigate the effects of software advances.

A total of 189 exams (38 ICH, 89 acute ischemic stroke, 8 subarachnoid hemorrhage, 3 primary intraventricular hemorrhage, 51 no intracranial abnormality) were evaluated. Exams were correctly classified as positive or negative for ICH in 185 of 189 cases (97.9% overall accuracy). ICH was correctly detected in 35 of 38 cases (92.1% sensitivity). Ischemic stroke and no intracranial abnormality cases were correctly identified as blood-negative in 139 of 140 cases (99.3% specificity). Non-DL scans had a sensitivity and specificity for ICH of 77.8% and 97.1%, respectively. DL scans had a sensitivity and specificity for ICH of 96.6% and 99.3%, respectively.

These results demonstrate improvements in ICH detection accuracy on pMRI that may be attributed to the integration of clinical information in rater review and the incorporation of a DL-based algorithm. The use of pMRI holds promise in providing diagnostic neuroimaging for patients with ICH [1)].

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pMRI can be used to obtain excellent images at the bedside in patients with an intracranial bolt (ICB), providing useful information for better management of patients with neurological injuries [2)].

Portable, low-field imaging could be useful for identifying moderate to severe white matter hyperintensity (WMH) [3].

1)
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2)
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