

HCC IN FOCUS

Current Developments in the Management of Hepatocellular Carcinoma

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Detection of Early-Stage Hepatocellular Carcinoma Using Abbreviated Magnetic Resonance Imaging



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G&H How does abbreviated magnetic resonance imaging differ from conventional magnetic resonance imaging?

NP Several protocols exist for abbreviated magnetic resonance imaging (MRI), but in general this modality involves fewer sequences than conventional MRI, which means that patients spend less time in the scanner. Conventional liver MRI can take 45 minutes to an hour. In contrast, abbreviated MRI is confined to a few sequences

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and usually takes approximately 15 to 20 minutes to complete, which is a significant reduction in time in the scanner for patients. Although abbreviated MRI decreases the number of sequences compared with a conventional MRI, it may be a useful tool for the purpose of screening patients at risk for hepatocellular carcinoma (HCC).

G&H What is the sensitivity of abbreviated MRI for early-stage detection of HCC?

NP There have been no prospective studies at this point looking at this issue. Researchers have reconstructed

abbreviated MRIs from conventional MRIs and used those as surrogates to determine screening effectiveness. Abbreviated MRI is estimated to have a sensitivity of greater than 85%. Performance based on these simulated examinations looks very good.

In contrast, the sensitivity of ultrasound for early-stage detection of HCC is around 45%, which is not as high as abbreviated MRI. There are plans for a Veterans Affairs trial comparing abbreviated MRI with ultrasound for early-stage detection of HCC, which will provide prospective comparative data. In the *Journal of Hepatology*, a meta-analysis recently reported that abbreviated MRI had a sensitivity of 86% for early-stage HCC, whereas the sensitivity of ultrasound plus alpha-fetoprotein was 63%.

G&H How does the specificity of abbreviated MRI compare with that of ultrasound in this setting?

NP Specificity is very high for abbreviated MRI, typically around 94% depending on the series or study. Specificity is lower for ultrasound. Up to one-quarter of patients can receive a false-positive ultrasound result. False-positive results on ultrasound can lead to additional testing, including abdominal computed tomography scans or MRIs, and can lead to patient anxiety and increased costs. How the specificity of abbreviated MRI translates to real-world practice patterns, however, is not known because adequate prospective studies on abbreviated MRI are not available. With the higher specificity of abbreviated MRI, there may be fewer questionable findings that require additional imaging.

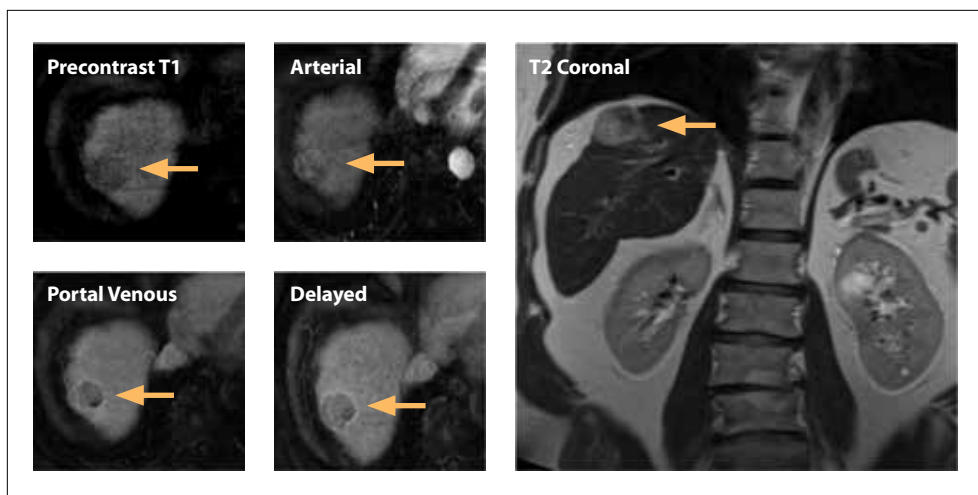


Figure. Examples of early-stage hepatocellular carcinoma seen on abbreviated magnetic resonance imaging protocols.

G&H Which patients benefit most from undergoing abbreviated MRI for the detection of early-stage HCC?

NP Abbreviated MRI-based screening may be most useful in patients in whom ultrasound does not work well, such as those with metabolic liver disease or central obesity, or in patients at high risk of developing HCC, such as older patients and males. Several serum and plasma biomarkers are in development to help risk-stratify populations for HCC risk. If such biomarkers become validated, there may be potential to use abbreviated MRI in the patients who are designated as having higher risk for HCC.

G&H How well does abbreviated MRI perform specifically in the setting of cirrhosis or obesity, compared with ultrasound?

NP Patients with cirrhosis and obesity make up the target populations for using abbreviated MRI in clinical practice. Most of the patients being screened for HCC have cirrhosis, and ultrasound is known to perform poorly in patients with central obesity or metabolic liver disease in general. Early research has looked at subgroups of patients, such as obese patients with cirrhosis, but research overall has not been robust examining the performance of abbreviated MRI in these populations in particular.

G&H What are the key differences of the various protocols for abbreviated MRI?

NP The Figure depicts examples of early-stage HCC seen on abbreviated MRI protocols. There is no consensus

on the optimal protocol for abbreviated MRI. Most protocols use contrast, whereas others are noncontrast examinations. Most of the protocols typically consist of T2 and diffusion-weighted sequences, but some protocols include a T1 sequence. Specific protocols have not been fully validated at this time.

The aforementioned meta-analysis looked at all of the different abbreviated MRI protocols. A subgroup analysis comparing contrast- with noncontrast-enhanced protocols did not find any differences in performance; these protocols appeared to be fairly comparable.

In addition, the different protocols have similar image quality. Because image quality is largely governed by patient factors such as motion as well as the presence of ascites in the abdomen, it should not differ much regardless of which protocol is used.

G&H How should a provider determine which abbreviated MRI protocol and interval to use for early-stage detection of HCC?

NP The optimal protocol remains an open question and still needs to be standardized. Nevertheless, most centers, including my own, use a contrast-enhanced protocol. Which specific sequences should be obtained should be discussed with the radiology team. As mentioned, there does not appear to be large differences among the protocols based upon the data currently available; the key point is that liver visualization can be better with abbreviated MRI than with ultrasound.

The appropriate screening interval for this population is not yet known. The default for HCC screening tests has been every 6 months based upon tumor growth rates and doubling times. Whether the interval can be extended to once a year when using a tool with enhanced

visualization such as abbreviated MRI alone or alternating it with ultrasound on specific patients warrants further investigation. Data are not currently available to answer this question.

G&H Overall, what are the biggest advantages of using abbreviated MRI to detect early-stage HCC, compared with ultrasound?

NP As noted, abbreviated MRI certainly appears to be more sensitive, which is important to patients. It can also provide better and more consistent visualization of the liver, especially in patients who have a high risk of ultrasound failure. In addition, there are a number of operator-dependent challenges associated with ultrasound-based surveillance, such as making sure that the entire liver is visualized. This is not an issue with abbreviated MRI because it visualizes the entire liver.

G&H What are the biggest disadvantages or limitations of using abbreviated MRI in this setting?

NP Currently, there is no separate billing code for abbreviated MRI. Therefore, even though it is shorter than conventional MRI, it does not necessarily save any money, which is the key to making it a cost-effective method for screening. There are also capacity issues in terms of obtaining an MRI. There are only a certain number of MRI machines available, and it can be difficult to obtain the time and space to perform abbreviated MRI. In addition, some patients have clear contraindications to undergoing an MRI or cannot use an MRI machine (eg, because of claustrophobia or back problems), even if abbreviated MRI takes less time than conventional MRI. Finally, better evidence needs to be generated for wider implementation of abbreviated MRI in clinical practice.

G&H Has any cost-effectiveness research been performed yet in this area?

NP There have been cost-effectiveness analyses looking at MRI in general. Because there is no separate billing code for abbreviated MRI at this time, it is currently not considered a cost-effective method of screening for HCC, especially given the decreasing incidence of HCC in metabolic populations. The annual rate of HCC development in patients with viral hepatitis is 2% to 5%. This rate is closer to 1% to 2% in patients with fatty liver disease and alcohol-associated liver disease, which have recently increased in prevalence in the United States. The lower the incidence, the more screening needs to be performed

to find cancers, and that is where cost-effectiveness truly makes a difference. In this situation, driving down the cost of abbreviated MRI will be key to making it a cost-effective screening solution.

G&H Do you use abbreviated MRI to detect early-stage HCC or recommend the use of this tool in clinical practice?

NP I use abbreviated MRI sparingly, but have used it on an annual basis in patients who have poor visualization on ultrasound and who have a high risk of HCC (eg, older male patients). Abbreviated MRI is a tool that can be very effective in certain patients but may not be widely adopted owing to the issues previously mentioned.

G&H What are the most important next steps in research in this area?

NP It is important to generate robust prospective data on the effectiveness of abbreviated MRI using standardized protocols in the HCC screening setting. The only sensitivity data, which suggest that abbreviated MRI is a very effective early-stage detection strategy, are based on reconstructed scans of patients who underwent an MRI and an ultrasound. Therefore, prospective data need to be generated to definitively determine whether abbreviated MRI is an effective, acceptable, and viable screening strategy.

Disclosures

Dr Parikh has no relevant conflicts of interest to disclose.

Suggested Reading

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