Review: MRI is more sensitive but less specific than ultrasonography or spiral CT for diagnosis of hepatocellular carcinoma

Colli A, Fraquelli M, Casazza G, et al. **Accuracy of ultrasonography, spiral CT, magnetic resonance, and alpha-fetoprotein in diagnosing hepatocellular carcinoma: a systematic review.** Am J Gastroenterol. 2006;101:513-23.

Clinical impact ratings: Hospitalists ★★★★★☆☆ Gastroenterology ★★★★★☆☆ Oncology ★★★★☆☆☆

QUESTION

In patients with chronic liver disease, what is the accuracy of ultrasonography (US), spiral computed tomography (CT), magnetic resonance imaging (MRI), and serum α-fetoprotein (AFP) level for diagnosis of hepatocellular carcinoma?

METHODS

Data sources: MEDLINE and EMBASE/Excerpta Medica (to 2004), Cochrane Library, CANCERLIT, conference abstracts (1995 to 2004), and bibliographies of relevant studies.

Study selection and assessment: Cohort and case–control studies in any language that assessed the diagnostic accuracy of US, CT, MRI, and AFP for diagnosis of hepatocellular carcinoma in patients with chronic liver disease (cirrhosis or hepatitis), using a reference standard of the pathologic condition of the explanted or resected liver, the histologic evaluation of focal liver lesions, or follow-up ≥ 6 months in the case of a negative result. Studies that used sequential test combinations were excluded. 30 studies (n = 10 337) met the selection criteria (some studies assessed > 1 test or > 1 AFP cutpoint level). 4 reviewers assessed the methodological quality of each study, including study design, patient selection, verification, and blinded interpretation.

Outcomes: Pooled sensitivity, specificity, and positive and negative likelihood ratios (LRs).

MAIN RESULTS

MRI and AFP with a low cutpoint (10 or 11 ng/mL) had the highest sensitivity (Table). US and AFP with a high cutpoint (100 or 200 ng/mL) had the highest +LRs, but sensitivity was poor (Table). A direct comparison of operative characteristics among the tests was precluded because no primary study assessed > 1 test in the same patients.

CONCLUSIONS

In patients with chronic liver disease, magnetic resonance imaging is more sensitive but less specific than ultrasonography or spiral computed tomography for diagnosis of hepatocellular carcinoma. The accuracy of serum α-fetoprotein varies depending on the cutpoint used.

Sources of funding: Associazione Amici della Gastroenterologia del Granelli and CARIPLO Foundation.

For correspondence: Dr. D. Conte, IRCCS Ospedale Maggiore, Milan, Italy. E-mail dario.conte@unimi.it.

Test characteristics of ultrasonography (US), spiral computed tomography (CT), magnetic resonance imaging (MRI), and serum α-fetoprotein (AFP) for diagnosis of hepatocellular carcinoma in chronic liver disease*

Test (cutpoint)	Number of studies (n)	Sensitivity (95% CI)	Specificity (CI)	+LR	–LR
US	14 (7347)	61% (44 to 76)	97% (95 to 98)	18	0.5
CT	10 (979)	68% (55 to 80)	93% (89 to 96)	6.1	0.4
MRI	9 (498)	81% (70 to 91)	85% (77 to 93)	3.9	0.3
AFP (10 to 11 ng/mL)	4 (1321)	83% (76 to 90)	73% (57 to 88)	3.1	0.2
AFP (17 to 21 ng/mL)	7 (2052)	65% (55 to 75)	86% (81 to 92)	4.6	0.4
AFP (50 ng/mL)	4 (1393)	60% (48 to 73)	85% (75 to 95)	4.0	0.5
AFP (> 100 ng/mL)	5 (866)	46% (36 to 57)	98% (94 to 100)	23	0.6

*Diagnostic terms defined in Glossary. AFP test characteristics estimated from graph in article.

COMMENTARY

Despite improved therapy for hepatocellular carcinoma over the past 2 decades, only 10% of patients are candidates for liver transplantation or surgical resection. Improved outcomes are also limited by poor diagnostic accuracy of tools used for screening and surveillance (1).

Colli and colleagues used a solid reference standard to review the accuracy of AFP, US, CT, and MRI for the diagnosis of hepatocellular carcinoma. Although literature on this topic is prolific, only 1% of the 2524 studies evaluated by the authors satisfied their inclusion criteria.

Colli and colleagues found that imaging techniques showed similar diagnostic accuracy. The –LRs of the diagnostic methods evaluated ranged from 0.2 to 0.6. With a pretest probability of hepatocellular carcinoma set at 10%, the use of imaging techniques as screening tools generates only small changes in posttest probability. MRI has the highest diagnostic sensitivity (81%), and its relatively low specificity will probably increase with future technical improvements (2). Combining AFP with an imaging technique slightly improves the diagnostic accuracy of the imaging technique alone; yet the AFP cutpoint needed to increase specificity (i.e., > 100 ng/mL) greatly reduces diagnostic sensitivity.

The wide range of sensitivity for US (30% to 100%) does not support its use as a screening tool for early hepatocellular carcinoma, and the use of other imaging techniques (CT or MRI) to confirm a suspicious lesion seen on US is challenged by similar performance characteristics.

Despite limited evidence, US (with or without concomitant AFP testing) remains the diagnostic tool most widely used in screening and surveillance programs for hepatocellular carcinoma, with CT or MRI more often used as confirmatory tools for diagnosis. Colli and colleagues remind us that there are no evidence-based data to support an effective surveillance program for early hepatocellular carcinoma with the use of US alone (3) and that high-quality, prospective, comparative studies are still needed to better determine the optimal diagnostic methods for hepatocellular carcinoma in patients with cirrhosis.

Edoardo G. Giannini, MD, PhD
University of Genoa
Genoa, Italy

References

1. **Sherman M.** Best Pract Res Clin Gastroenterol. 2005;19:101-18.
2. **Jeong YY, Yim NY, Kang HK.** AJR Am J Roentgenol. 2005;185:1024-32.
3. **Talwalkar JA, Gores GJ.** Gastroenterology. 2004;127:S126-32.