LI-RADS Lexicon for MR Imaging: Interreader Variability Based on the Major Features in Patients with Liver Cirrhosis Induced by HBV Infection

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Target audience

Radiologist, hepatologist and hepatobiliary surgeons who try to choose apply the LI-RADS for patients in suspicion of HCC.

Purpose

To retrospectively evaluate the interreader variability between radiologists by using the major features of the Liver Imaging- Reporting and Data System (LI-RADS)[1] version 2014 in patients with liver cirrhosis induced by HBV infection.

Methods

Subjects: A total of 35 patients (27M/8F; mean age, 50y; age range, 28-67y) who met the following criteria were enrolled in this study: a) The patient was confirmed with cirrhosis induced by HBV infection; b) The patient had 1-3 lesions suspected of HCC by a previous ultrasonographic examination, or was suspected of HCC on the basis of an elevated AFP level; c) The patient had undergone partial hepatectomy. A total of 36 HCCs were confirmed by partial hepatectomy. Image assessment: The images were qualitatively analyzed by 2 radiologists respectively and independently. The readers recorded the major features (arterial phase enhancement, the washout appearance and the capsule appearance) for each lesion, and categorized all detected lesions based on the major features by using the criteria of LI-RADS v.2014. Statistical analysis: The κ statistic was used to assess interreader agreement for all descriptor variables. The guidelines of Landis and Koch[2] were followed in interpreting κ values: 0.00–0.20, slight agreement; 0.21–0.40, fair agreement; 0.41–0.60, moderate agreement; 0.61–0.80, substantial agreement; and 0.80–1.00, almost perfect agreement.

	κ value	Interpreting of κ value
Major features		
Arterial phase enhancement	0.842	Almost perfect agreement
Washout appearance	0.787	Substantial agreement
Capsule appearance	0.518	Moderate agreement
Final LI-RADS category	0.736	Substantial agreement

Table 1: Interreader agreement in the major features based on LI-RADS 2014

Results

In describing the arterial phase enhancement, overall agreement was almost perfect (κ =0.842). Agreement was substantial (κ =0.787) when assessing the presence of washout appearance. In evaluating the presence of capsule appearance, agreement was fair (κ =0.518). And for the final categories, the agreement was substantial (κ =0.736).

Discussion

Hepatocellular carcinoma (HCC) has becoming a global health problem, especially in Asia since the high incidence of HBV infection[3]. Patients who are at risk for developing HCC are advised to undergo routine imaging surveillance, and once a suspected lesion is detected, further evaluation by multiphasic CT or MR imaging is necessary[4]. MR imaging are playing increasing role, not only in the diagnosis, but also in the staging of HCC. Thus, to improve standardization and consensus regarding performance, interpreting and reporting of the liver, the liver Imaging- Reporting and Data System (LI-RADS) was published in 2011, and had updated several versions[5]. While as a standardized criteria published recent years, few research had been done to investigate the interreader variability.

Our results show a high degree of agreement in describing lesions on MR imaging, thus demonstrating the appropriateness of the terms chosen and describing in LI-RADS (Figure 1). Our result corroborates the results of a recent study by Nicholas et al[6], which also showed a good interreader agreement of a similar category system. For the 3 major features, the capsule appearance showed a slightly lower agreement than arterial phase enhancement and washout appearance, which may suggests that readers had difficulty in making these categorizations. In some of the cases, the capsule appearance may be confused with the subtype of the mosaic architecture "septated solid mass" (Figure 2), which may lead to confused final categorization. While the factors that may influence the interreader agreement are various, and further study are expected in the validation of LI-RADS.

Conclusion

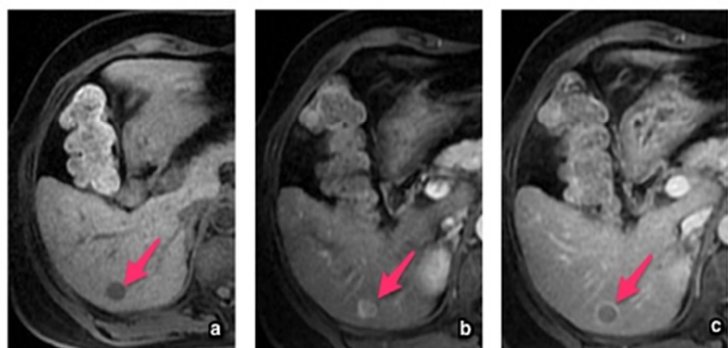Interreader agreement with the new LI-RADS 2014 is good and validates the MR lexicon.

Figure 1: A 45-year-old female with a small HCC in S6 (arrow) showed on unenhanced combined enhanced MR imaging (a: unenhanced T1 weighted image, b: arterial phase, c: delayed phase). Both of the 2 readers categorized this lesion as an arterial phase hyper-enhanced lesion, with washout and capsule appearance, and with a diameter of 1.3cm. Thus, according to LI-RADS 2014, both of the 2 readers categorized this lesion as LR 5.
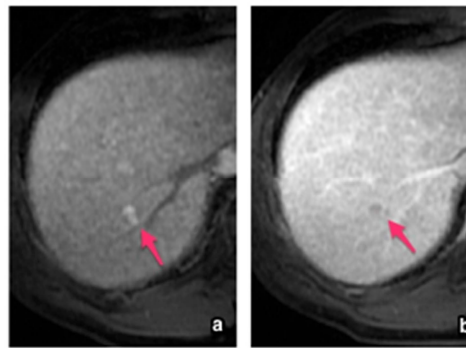

Figure 2: A 50-year-old male with a small HCC in S7 (arrow) showed on unenhanced combined enhanced MR imaging (a: arterial phase, b: delayed phase). Both of the 2 readers categorized this lesion as an arterial phase hyper-enhanced lesion. While one reader categorized the peripheral delayed enhancement as part of the septated solid mass, and the other reader categorized it as capsule appearance. Thus, according to LI-RADS 2014, the 2 readers categorized this lesion as LR4 and LR 5.

References

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