Portal vein imaging and flow: comparing Doppler sonography and MRI

Imagem e avaliação do fluxo da veia porta: comparação entre ultrassom Doppler e RM

***Richard C. Semelka*[1], *Jorge Elias Jr*[2]**

The diagnosis of diffuse liver disease, including characterization and quantification, has gained particular importance in recent years, reflecting in large measure advances in imaging techniques. During the same time period concern has escalated about the use of CT due to the harmful effects of radiation. The net result is that the non-invasive techniques of sonography and magnetic resonance imaging (MRI) have achieved considerable interest.

Both methods are non-invasive, innocuous and safe, but with important and noticeable differences. While sonography is a well established and widely used method, reflecting its low cost and portability, it suffers with high operator dependence variations, low sensitivity and even lower specificity. On the other hand, MRI is a comprehensive method with multiple types of data acquisition, and unmatched ability to differentiate normal from diseased tissues. The drawbacks of MRI are less availability, no portability, and higher cost.

Despite these limitations and others discussed below, both methods are progressively replacing more invasive diagnostic techniques. Portal system morphology and hemodynamics constitute suitable application areas for both Doppler sonography (DUS) and MR techniques. Clinical indications for hepatic venous pressure gradient measurements performed by angiography are: prediction of clinical events, sequential assessment of clinical evolution, assessment of pharmacologic therapy, and assessment of preoperative risk in cirrhotic patients[1]. Because of the invasiveness of the procedure and that it is unlikely to achieve more widespread use, this direct measurement technique is likely to be confined to basic research studies and not develop substantially into clinical utilization.

In this issue of **Radiologia Brasileira** Leão et al.[2] have written an interesting article testing interobserver reproducibility of DUS and MRI for the evaluation of portal blood flow in schistosomal patients[2]. An intriguing finding is the poor intermethod agreement between these two methods. It is always refreshing when authors in the scientific literature provide sobering prudent observations, rather than the usual over enthusiastic description.

The sonography evaluation of the portal system is probably adequate for the majority of patients. One major exception being the overly obese patients, as there is often the lack of appropriate sonographic window, and often, as a result, or due to coexistent fatty liver, which complicates visualization because of heterogeneous echotexture. With this caveat in mind, DUS can adequately diagnose hepatic schistosomiasis, characterize the portal vein flow, and display portal hypertension related findings, i.e., splenomegaly, ascites and varices. However, the challenge to identify patients at risk for upper gastrointestinal tract bleeding remains, and this has been the subject of other studies[3,4].

Compared to DUS, MRI is a much more comprehensive imaging method to evaluate the abdomen, and the portal system and liver, in particular. The usefulness of MRI to evaluate chronic hepatosplenic schistosomiasis[5] and portal vein disease[6] has been demonstrated. MRI displays well the tridimensional anatomy of the liver and portal venous system; and can provide portal venous flow evaluation by phase-contrast techniques. Moreover, vascular and parenchymal liver evaluation with postgadolinium

1. MD, Department of Radiology, University of North Carolina, Chapel Hill, NC, USA.

2. MD, PhD, Division of Radiology of the Department of Internal Medicine, University of São Paulo, School of Medicine of Ribeirão Preto, Ribeirão Preto, SP, Brazil.

Corresponding Author: Richard C. Semelka, MD. Department of Radiology, University of North Carolina at Chapel Hill. CB# 7510 101 Manning Drive, Chapel Hill, North Carolina 27599-7510, USA. E-mail: richsem@med.unc.edu

T1-weighted 3D techniques permits characterization of vessel patency, in concert with the diagnosis and characterization of diffuse and focal liver lesions. MRI has a higher accuracy in the survey for hepatocelular carcinoma (HCC) in chronic liver disease patients compared to other methods, and schistosomal patients may have an increased risk for HCC development[7]. Also, because of the high prevalence of hepatitis virus C (HCV), there is evidence that concomitant HCV and schistosomiasis infection may result in more severe liver disease, with a higher incidence of cirrhosis and HCC[8]. A potential danger for DUS may be, and we have observed this in our own practices, an unacceptably high false negative rate for DUS exams to detect HCC. We have encountered a few patients who have been serially followed by sonography, and during that period diffuse HCC grew undetected, until they eventually underwent the MRI which showed a large tumor but at a stage when the patient was untreatable[9].

Regarding the traditional MR limitations, of claustrophobia, movement-related artifacts, and metallic magnetic implants; many of these have been overcome by new techniques and strategies. At the same time, increase in the availability of MR systems and in the MR-related expertise of radiologists is occurring.

This study presented by Leão et al.[2] clearly demonstrates a high interobserver agreement for portal flow evaluation by DUS and by MRI. Therefore, both methods can be used successfully in the evaluation of portal flow in a serial fashion. Their findings related to low intermethod (DUS *vs* MRI) agreement are equally important and provide us a practical insight that at the present time DUS and MRI absolute portal flow values are not interchangeable. Therefore, with follow up evaluations it is important to compare portal flow values only within the same method. Their study also points the way to future research to investigate the causes of differing values for portal flow by DUS and MR, to evaluate how both compare to other invasive techniques for this measure, so that both methods can be technically modified to more clearly reflect the "truth" and thereby also become more interchangeable.

In conclusion, both methods can be used to evaluate the portal flow in schistosomal patients. MRI has probably a wider range of use regarding comprehensive liver evaluation. Other studies with DUS and MRI will be necessary to determine specific findings to identify high risk patients for upper gastrointestinal bleeding.

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