CT Versus MRI in the Audit of Liver Cirrhosis

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Liver cirrhosis has a variety of causes starting with chronic liver infections with C virus, B virus and continuing with alcohol abuse and biliary cirrhosis. From the anatomico-pathological point of view, hepatic cirrhosis is represented by an irreversible diffuse hepatic fibrosis, accompanied by regeneration nodules; all these morphological changes lead to the reduction of the hepatic function and cause a series of complications, due mainly to the portal hypertension and the hepato-renal syndrome. It is also well known that hepatocellular carcinoma, which is the 6th most common cancer worldwide, occurs in 90% of cases on a cirrhotic liver. In terms of regeneration nodules, cirrhosis has two forms: micronodular and macronodular. Also, the localization of fibrosis at the liver level subdivides the disease into cirrhosis with periportal fibrosis and cirrhosis with central zonal fibrosis. Hepatic fibrosis has a determining score after liver puncture, the most widely used being the METAVIR-score; according to this type of score the last degree of fibrosis corresponds to cirrhosis. ISHAK-score is a much more complex staging system that determines the activity/necrosis grades, which is why many authors consider it unnecessary. There are many other ways to determine the degree of liver cirrhosis, actually liver fibrosis.

Imaging by CT and MRI is especially important in the early diagnosis of liver cirrhosis, but also in determining the occurrence of a possible hepatocarcinoma superimposed on the liver cirrhosis. Of course, the existence of portal hypertension can be extremely easily evidenced by either of the two methods mentioned above.

The question that remains is: which of the two CT/MRI imaging methods should be used as the first intention in the correct audit of liver cirrhosis with all its complications. With regard to CT, the examination must first be performed correctly, this involves the use of a multi-slice equipment, injection of intravenous contrast substance in a sufficient quantity (1.5 mg/kg body) and performing a set of acquisitions that will include a native one, and post contrast, an arterial, portal and a late time. As for MRI, this should be done with a minimum of 1.5 Tesla equipment, with a body antenna, with native acquisition that must compulsory include the diffusion sequence and ADC. Also, the native acquisition should include in a minimum protocol T2 weighted sequences with and without fat suppression and in-phase and out-of-phase T1-weighted sequences. The section thickness should not exceed 5 mm. In order to be able to make an accurate diagnosis, it is mandatory to make a pre-contrast and dynamic gadolinium-enhanced T1-weighted GRE acquisition. It is preferred that the dynamic acquisition be of the 3D-GRE type, which allows a section thickness of less than 5 mm, possibly, if it is technically possible, to make a post-contrast acquisition with sections with thicknesses of 1 mm. Also in the case of the MRI examination, post-injection of contrast, several phases are required: arterial phase, possibly late artery in which the portal branches are seen with contrast, while the hepatic veins do not contain contrast substance inside, the portal phase to be performed at an interval of 35 - 55 seconds after the start of the arterial phase and the late phase 2 - 3 minutes after the injection is started. The matrix must be asymmetric, at least 128 x 256. In the case of MRI, to avoid motion artifacts due to the inability of the patient to maintain the apnoea for a long time, dynamic sequences should last for a maximum of 20 seconds. Each of the two CT and MRI exams have their advantages and disadvantages. In ideal conditions,

in which the risks are zero, we should consider which of the two methods brings us the most diagnostic information and which one does not in any way harms the patient.

CT by its extremely high addressability, short acquisition time, absence of major contraindications of MRI (e.g. pacemaker presence or other ferromagnetic metal devices in the body) or relative ones should be considered the first imaging method to be used in the audit of a cirrhosis; for example CT has the ability to detect with very high accuracy the vascular changes, especially the changes determined by portal hypertension. It can also highlight and characterize the regeneration nodules, especially those with dimensions over 1 cm. MRI is considered by the literature as having a sensitivity of up to 90%, as opposed to CT which has only 78% sensitivity in detecting and characterizing hepatocellular carcinoma. Also, the entire literature considers that the detection of HCC nodules less than 1 cm is a matter of MRI examination. Another problem is the differentiation of a dysplastic nodule from a regeneration one; the dysplastic nodule is histopathologically a premalignant lesion, having atypical cells in its structure. Achieving this differentiation requires intravenous contrast substance administration regardless of the CT/MRI imaging method; In either of these two methods, the dysplastic nodule presents either an intense contrast enhancement in the arterial phase, but without a wash-out phenomenon, or it may be hypovascular. Regenerative nodules that are benign, consisting of the proliferation of normal liver cells around a fibrous stroma, have a dominant portal vascularization and have a contrast enhancement similar to that of the normal liver, but do not show a hypersignal in the diffusion sequence and ADC hyposignal. Unfortunately, not even MRI can differentiate with certainty a dysplastic nodule that has arterial loading in time and an HCC nodule that also has intense arterial loading [1-3].

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