Microwave Ablation for the Treatment of Hypersplenism: Short Waves, Low Cost, Big Results

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Hypersplenism, a commonly encountered clinical problem in cirrhotic patients, has limited treatment options since current medical regimens can only target the effects of cytopenias, whereas definitive therapies including splenectomy and splenic embolization, while useful, have separate challenges and are associated with potentially serious complications. Surgical removal of the hyperfunctioning spleen in the setting of cirrhosis, even with less invasive laparoscopic techniques, carries a significant risk of morbidity and mortality, with 25 % of splenectomy patients developing portal vein thrombosis [1] and a small number forming subphrenic abscesses. Although less invasive, endovascular splenic volume reduction carries its own procedural risks including a painful post-embolic syndrome requiring considerable opioid therapy, infarction with abscess formation, and splenic rupture. Since the extent of ablation must conform to a narrow range to ensure efficacy on the one hand and to avoid complications on the other, endovascular splenic volume reduction, reliant on the imprecise estimation of the volume of tissue based on contrast enhancement of 2D angiographic projections, is frequently associated with over or under embolization [2].

Well studied in the treatment of solid tumors of the liver, lungs, and kidney, percutaneous radiofrequency ablation (RFA) represents an important step forward as a minimally invasive technique with low complication rates. Its application in the treatment of splenic disease, however, is

primarily limited to trauma, tumor, and infection [3]. Matsuoka et al. [2] initially reported the feasibility and safety of performing CT-guided percutaneous RFA of the hyperfunctioning spleen in a porcine model. In a small series, Liang et al. [4] demonstrated the effectiveness of microwave ablation (MWA), a similar thermal ablation technique, with both a laparoscopic and percutaneous approach.

In this issue of *Digestive Diseases and Sciences*, Jiang et al. [5] in limiting the ablation technique to a purely percutaneous approach will likely promote its more widespread use due to its lower complication rate and brief recovery times. The authors report few minor and self-limited complications including fever, left upper quadrant pain, and a small pleural effusion. Transient hemoglobinuria was also reported but was not associated with renal dysfunction. These findings, similar to those reported by Liang et al. [4], mirror the experience with MWA in the treatment of solid tumors such as hepatocellular carcinoma and are remarkable for their lack of any major complications, though both studies are limited to a small number of enrollees. Since many MWA cases can be performed under moderate sedation, cost and exposure to anesthesia-related complications are minimized. Furthermore, MWA probes are generally smaller than RFA devices and unquestionably smaller than laparoscopes.

In one of the key endpoints to this study, Jiang et al. [5] reported a statistically significant improvement in white blood cell and platelet counts for up to 2 years, through a mean splenic ablation volume of 47.2 ± 7.0 %, exceeding the threshold of > 40 % described by Liang et al. [4] to achieve sustained long-term platelet recovery, further echoed by Liu et al. [6], and close to the 50 % target described by Feng et al. [7]. Since percutaneous MWA has a more predictable and consistent ablation volume than

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RFA and splenic embolization, more precise treatment planning is possible. Automated volumetric analysis of post-ablation CT imaging can also be helpful to maintain uniformity of outcomes.

Future refinement of MWA techniques can further improve the safety and efficacy of this procedure. For example, limiting the number of percutaneous access sites may reduce the rate of hemorrhage and decrease overall procedure time. Since the total radiation dose to patients undergoing serial MWA may be higher than that of newer endovascular techniques of total splenic artery embolization as described by He et al. [8], limiting the number of image acquisitions during ablation should also reduce total radiation dose. Newer treatment techniques such as high frequency ultrasound splenic ablation, which uses no ionizing radiation exposure at all, compete with MWA as well. In addition to standardizing therapeutic indications, a larger number of patients with longer-term follow-up are needed. In the setting of cirrhotic hypersplenism, the ablated splenic remnant may enlarge over time requiring repeat therapy if thrombocytopenia recurs [4].

The results of this study by Jiang et al. demonstrate that ultrasound-guided percutaneous MWA is both a safe and effective treatment for secondary hypersplenism in cirrhotic patients without any of the serious complications seen in other treatment modalities. Goals of future studies should include refinement of MWA techniques, determination of ideal ablation volume, the standardization of indications/contraindications, and appropriate post-ablation follow-up management. Furthermore, future larger studies following patients over longer periods post-ablation would

be beneficial to estimate MWA's impact on disease-specific morbidity and mortality, to allow MWA to emerge as a frontline therapy in the management of cirrhosis-related secondary hypersplenism.

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