Cutting-edge application of ultrasound elastography and superb microvascular imaging in radiofrequency ablation of uterine fibroids

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Uterine fibroids are common benign neoplasms with a higher prevalence in reproductive-age women; 20%–50% are symptomatic and require treatment⁵. Failure to treat symptomatic cases is the leading indication for hysterectomy in the USA⁶. As an alternative, conservative treatment options for symptomatic uterine fibroids are on the rise. Emerging as a safer and more effective treatment option, radiofrequency ablation (RFA) consists of ultrasound-guided insertion of a coagulator into the fibroid, leading to coagulative necrosis, which can mitigate related symptoms (Video 1)⁷. RFA is widely used to treat liver tumors and thyroid nodules⁸,⁹.

Ultrasound (US) plays a fundamental role in RFA for the treatment of uterine fibroids. The procedure not only calls for in situ transvaginal US guidance, but also requires previous evaluation for the assessment of the lesion(s) as well as subsequent follow-up to determine the success of the procedure⁹. US-guided RFA induces coagulative necrosis on viable cells or fibrous tissue, which might trigger an inflammatory response, increasing local pressure and stiffness. These histological changes occur simultaneously, altering the elasticity and vascularization of the fibroid tissue. These changes can provide qualitative and quantitative information for diagnostic and treatment purposes (Fig. 1). To this end, shear wave elastography US (SWE) can be used to evaluate the tissue’s mechanical properties by measuring its response to acoustic energy, thus determining tissue stiffness. In conjunction with superb microvascular imaging (SMI), RFA can potentially become a promising tool for the treatment of fibroids with a less invasive and cost-effective approach.

SWE is a multi-wave imaging technique that measures the speed of the shear waves propagating through tissues by combining two

Fig. 1. Ultrasound elastography of fibroid before (A) and after (B) radiofrequency ablation. A. 2D-SWE shows blue (lower stiffness). B. 2D-SWE shows the presence of red indicating higher stiffness.
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To the best of our knowledge, there are no clinical studies evaluating US associated with SWE and SMI for the treatment outcomes of RFA for uterine fibroids. Nevertheless, initial findings demonstrate that changes in the fibroid stiffness and vascularization after RFA might be an indicator of treatment outcome (Fig. 2). Moreover, SWE in conjunction with SMI can be an option for preoperative and postoperative evaluation of fibroids in conservative fibroid treatments.

Conflict of interest

Authors do not report any financial or personal connections with other persons or organizations, which might negatively affect the contents of this publication and/or claim authorship rights to this publication.

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