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Editorial

HIFU: Effects and Clinical Effectiveness of Non-surgical Therapy for Uterine Fibroids

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Uterine fibroids the most common benign gynecological tumors that can cause abnormal menstrual bleeding, menstrual cramps, pelvic discomfort, infertility, urinary frequency and others. Although surgical removal of the uterus is the definitive treatment, some patients choose to keep their uterus in place. For this reason, minimally invasive treatment options have been suggested such as uterine artery occlusion, high-frequency ablation and others.[1] However, these interventions are still in the experimental phase.

In recent years, high intensity focused ultrasound (HIFU) has attracted much attention in obstetrics and gynecology as a non-surgical modality for treating uterine fibroids. In the early years, HIFU technique determined the therapeutic range of fibroids using magnetic resonance imaging (MRI) and monitored the degree of cauterization.[2~8] Nowadays, ultrasound-guided HIFU is generally performed. According to the analysis of treatment results from several investigations, ultrasound-guided HIFU is very safe and effective.[9~11] This article aimed to review the clinical effectiveness and therapeutic effects of ultrasound-guided HIFU for the management of uterine fibroids.

The mechanism of HIFU is to selectively cauterize target lesions with minimal damage to adjacent organs by focusing a beam of ultrasound energy into the focused point. Fibroids are ablated by thermal effect, shock waves, direct destruction of tumor vessels and others. MR-HIFU decides the degree of ablation of fibroids by sensing real-time temperature of lesions. On the contrary, ultrasound-guided HIFU uses grayscale or echogenicity changes to determine the adequacy of therapeutic effect.

There is no standard guidelines for selecting appropriate patients to receive treatment with HIFU. The selection criteria for HIFU therapy vary depending on the experience and know-how of medical institutions. The inclusion criteria of Queen Mary Hospital are as follows: 1) Premenopausal women with no further plans for pregnancy 2) Those with severe pain associated by with fibroids 3) Those with a fibroid in size of less than 20 weeks' gestation and less than 10 cm without areas of necrosis and suspicious of malignancy 4) Those with no evidence of pelvic adhesions caused by endometriosis, pelvic inflammatory disease or other conditions 5) Those with an abdominal wall thickness of less than 5 cm. It is anticipated that accumulation of experience could loosen these criteria and accommodate more patients eligible for the therapy.

Prior to HIFU, MRI of the perineum is performed to examine the size, number, and exact location of fibroids and evaluate the likelihood of uterine sarcoma.[12] In this way, the anatomical structures of the uterus and surrounding organs can be accurately identified. Intravenous conscious sedation was conducted to the patient to minimize their movement

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during the procedure. Clearer images can be obtained by inserting a Foley catheter in the urinary bladder. During the treatment, the whole fibroid is divided into slices of 3 to 5 mm and each slice is ablated by high-intensity ultrasound beam. After the treatment, the position of the patient needs to be frequently rotated up and right, down and right to cool down the pelvic area. MRI is re-performed to evaluate the treatment outcomes. Through this process, the degree of tissue necrosis and subsequent treatment plan can be precisely determined.

The author reviewed 8 articles (3 from English journals and 5 from Chinese journals) on the treatment outcomes of HIFU published between 2005 and 2012.[8~10,13~17] Of these, 6 articles reported the decrease in degree of fibroid volume,[9,10,13,15~17] and 4 confirmed improvement in symptoms.[9,10,13,15]

On average, fibroid volume was reduced to half at 3 months, 1/3 at 6 month, and 1/4 at 12 months in size after the treatment. Moreover, patients were found to experience symptom improvement from 3 to 6 months on average.

The nonperfusion area, the percentage of the fibroid volume being ablated, on contrast-enhanced T1-weighed MRI was found to show substantial symptom improvement.[5,8] MR-HIFU has a mean nonperfused volume of 16% to 67%, whereas that of ultrasound-guided HIFU ranges between 80% and 89%.[10,11,18]

When using ultrasound-guided HIFU, the most crucial factors are accurate control of the beam power and exposure time. The beam of HIFU is about 400 W which is approximately 800 times stronger than that of a usual diagnostic probe. Therefore, the urinary bladder and nerves close to the uterus have potentially a greater risk of damage than the bowel and skin. The possible side effects from therapy are vaginal bleeding, pain in lower limb, hip pain, pelvic pain and others.[9~11,13,14,16]

HIFU was first approved for premenopausal women with no further plans for pregnancy. However, the use of this therapy was excluded from the absolute ban policy since 2009, as successful child-bearing and vaginal birth had been proved multiple times. In Europe, HIFU using approved devices is allowed for patients who wish to preserve their fertility.[19]

Since HIFU is still an unfamiliar modality in obstetrics and gynecology, there are difficulties in fully informing patients about its therapeutic effects. The purposes of this review are to provide a reference data for patients about the effectiveness of HIFU for managing uterine fibroids and optimal treatment options to select from.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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