

# Long-term outcomes of high-intensity focused ultrasound ablation for adenomyosis: a retrospective cohort study

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Objectives To evaluate the long-term outcomes of high-intensity focused ultrasound (HIFU) ablation for patients with diffuse adenomyosis and focal adenomyosis.

Methods With a retrospective cohort study design, three hundred and eight symptomatic adenomyosis Chinese women who underwent ultrasound-guided HIFU between January 2012 and December 2014 were enrolled. All patients underwent contrast-enhanced magnetic resonance imaging (MRI) one week before and the day after HIFU ablation, and were divided into diffuse adenomyosis (Group D) and focal adenomyosis (Group F) based on preprocedural MRI.

Successful treatment with HIFU was measured by the non-perfused volume ratio (NPVR). The dysmenorrhea score and menorrhagia score were assessed before and after HIFU ablation at 3, 6, 12, 24 and 36 months follow-up. Additional intervention after HIFU treatments, such as hysterectomy, adenomyomectomy, uterine artery embolization or repeat HIFU, were recorded. The outcomes of subsequent pregnancy were also recorded.

Results Follow-up were effectively performed in 297 cases. The follow-up time was  $28.6 \pm 11.3$  months (range, 1-50 months). There were 177 cases in Group D and 120 cases in Group F. The ratio of successful treatment with HIFU among 297 patients was 99.3% (295/297). The NPVR of Group D and Group F was ( $[26.0 \pm 13.4\%]$ ) and ( $[44.3 \pm 19.9\%]$ ), respectively. The dysmenorrhea score and menorrhagia score after the procedure were significantly lower than those before the procedure in two groups ( $P \leq 0.05$ ). The total remission rate of dysmenorrhea at 3, 6, 12, 24 and 36 months after HIFU ablation was 93.0% (264/284)  $\square$  86.2% (237/275), 73.5% (197/268), 60.7% (136/224) and 46.8% (59/126), respectively. The remission rate of dysmenorrhea of Group F was higher than that of Group D in each follow-up period, and significant differences were observed at 6, 24 and 36 months ( $P < 0.05$ ). The total remission rate of menorrhagia at 3, 6, 12, 24 and 36 months after HIFU ablation were 87.4% (187/214), 83.1% (172/207), 68.6% (140/204), 63.6% (105/165) and 45.9% (45/98), respectively. The remission rate of menorrhagia of Group F was higher than that of Group D in each follow-up period ( $P \leq 0.05$ ). After HIFU procedure, 25 patients chose to accept reintervention due to unsuccessful outcomes, 83.8% patients underwent HIFU ablation alone and successfully retained the uterus. In addition, 10 patients were pregnant and had successful delivery during the follow-up period.

Conclusions HIFU ablation is feasible for both diffuse and focal adenomyosis, resulting in long-term remission of clinical symptoms. However, the long-term efficacy of focal adenomyosis are slightly better than those of diffuse adenomyosis, HIFU may increase the possibility of postprocedural pregnancy, has an application prospects.

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Keywords : adenomyosis; high-intensity focused ultrasound; ablation; efficacy; dysmenorrhea; menorrhagia

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