

DYSMENORRHEA ASSOCIATED WITH ENDOMETRIOSIS: PRE-POST TREATMENT EVALUATION OF ORAL CONTRACEPTIVES USING CINE MRI

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Target Audience: Clinical radiologists and gynecologists

Purpose: Low dose contraceptives (LOC) are considered effective in treating dysmenorrhea in patients with endometriosis. LOC decreases the activity of ectopic endometrium, but its effect on uterine function and mechanism to suppress dysmenorrhea are not well understood. Cine MRI of the uterus has been used to evaluate kinematic of the uterus among healthy women, patients with endometriosis¹, and primary dysmenorrhea². Endometrial distortion, and thick JZ is associated with pain among primary dysmenorrheic patients. However, no study assessed the treatment effect of LOC on uterine kinematics in patients with endometriosis. In this study, we evaluated **1) Characteristic cine MR findings of the uterus among patients with dysmenorrhea associated with endometriosis, 2) Changes of these findings after the treatment of LOC in the same individuals, and 3) Association between these MR findings and degree of pain.**

Methods: Study population: Seven women who suffered from dysmenorrhea associated with endometriosis (37yo in average, 28 - 45 y.o). After pre-treatment MRI(scanned within 36 hours from the start of the menstruation), participants were treated with LOC for three cycles. Post-treatment MRI was obtained after two and three cycles of LOC. **MR protocol:** MR images were obtained using 1.5T Magnet unit (Symphony, Siemens) with phased-array coil. Axial and sagittal fast spin echo T2-weighted image (T2WI) and sagittal T1-weighted images were obtained for the screening purpose. Then a total of 60 serial MR images were obtained in a midsagittal plane of the uterus for 3 minutes using HASTE sequence (TR/TE=3000/80 msec, 300-mm field of view, 5mm thickness, 256 x 256 matrix). **Image evaluation:** HASTE images were displayed in cine mode at 15 times faster than the actual speed and evaluated by two radiologists specialized in gynecologic MRI and scored for the following findings;

- (a) Thickness of JZ (the inner low-intensity layer of the myometrium)
- (b) Endometrial distortion
- (c) Presence and frequency of uterine peristalsis

Degree of pain was scored using VAS score:0 as no pain, and 100 the most severe pain ever experienced. Average number of the two readers were used for analysis.

Results:Pre-treatment cine MRI showed thicker JZ and endometrial distortion. Peristalsis was recognized but less than three in all 7 patients. After 3 cycles of treatment, score of endometrial distortion and frequencies of peristalsis were significantly decreased ($p=0.03$, Wilcoxon rank sum test). Pain score (VAS score) decreased in all patients after treatment ($p=0.02$). Mild correlation between pain score and endometrial distortion (spearman's rho 0.58, $p=0.01$), and weak correlation between pain score and frequency of peristalsis (rho 0.48, $p=0.03$) were found.

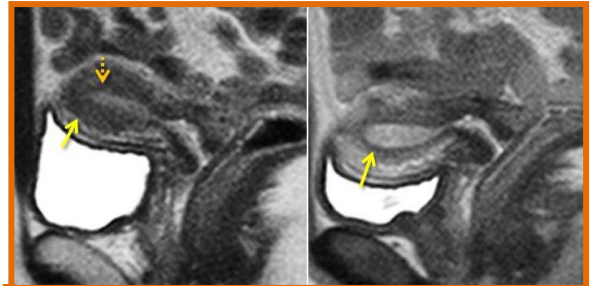


Figure 1.Sagittal HASTE image of 33 y.o women suffering from dysmenorrhea associated with endometriosis before (lt) and after 3 cycles of LOC treatment (rt). JZ is thick (yellow arrow) on pre-treatment image (lt) with endometrial distortion (orange arrow). JZ becomes thin (yellow arrow) with less distortion on post-treatment image (rt).

MR findings	Pre-treatment	After 3 cycles of treatment	P value
JZ thickness score 1: <1/2 2: ≥1/2 3: Full	2.1 ± 0.6	1.8 ± 0.9	0.54
Endometrial distortion score 1: no 2: weak 3: strong	2.3 ± 0.8	1.1 ± 0.4	0.03
Frequency of uterine peristalsis	1.9 ± 0.9	0.6 ± 0.5	0.03
Pain score			
VAS score (0~100)	49.0 ± 26	8.7 ± 10.5	0.02

Discussion & Conclusions: This is the first study to demonstrate that cine MRI of the uterus can visualize dynamic changes of the uterus after treatment of LOC. Interestingly, peristalsis was identified, although less frequent, among patients with endometriosis, which is different from previous study with primary dysmenorrhea¹. Endometrial distortion decreases significantly after LOC treatment and is associated with degree of pain measured by VAS score, more objective scale than the score used before¹. In contrast, JZ may become thinner but may not be a reliable marked of pain relief in this patient population. Our preliminary results suggest that cine MRI may be a promising tool in evaluating treatment effect for patients with secondary dysmenorrhea.

References 1. Kido A et.al. Cine MR imaging of uterine peristalsis in patients with endometriosis. Eur Radiol 2007; 17: p1813-19. 2.Kataoka M et al. Dysmeniorrhea: Evaluation with cine-mode display MR imaging-initial experience. Radiology 2005; 235: p124-31.

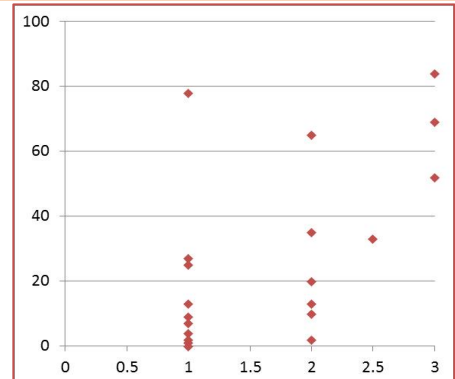


Fig2:Scattered graph showing association between degree of endometrial distortion (x axis)and pain score (VAS score: y axis)