# Uterine appearance and uterine peristalsis during lactation on MR imaging

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**Introduction:**

Physiological change of the uterus is known during normal menstrual cycles on MRI. In addition, uterine peristalsis, which is wave-like movements of the subendometrial myometrium, is observed on cine MR imaging. Uterine peristalsis plays important roles such as sperm transfer in periovulatory phase, discard of menstrual blood or preservation of early pregnancy with reduced peristalsis. However reports of the postpartum uterus imaging is limited. There is no MR report regarding the uterine appearance and uterine peristalsis related with lactation (1). Purpose of this study was to evaluate the uterus on FSE T2 weighted images and uterine peristalsis characteristics on cine MR imaging during lactation, and compare with those of nulliparous women.

**Materials and Methods:**

Study population included 7 lactating (7weeks to 12 months postpartum: average 8 months, 5 amenorrheic and 2 menstruating) women (34.6±3.2 years) and 7 nulliparous women in periovulatory phase (31.6±4.3 years) as control. No women were using oral contraceptives. MRI was performed with 3T and 1.5T scanners (EXELART, Toshiba) to obtain uterine midsagittal T2 weighted fast spin echo (FSE) images (TR/TE = 5400/80msec, FOV of 300x300 mm, matrix of 512x512, slice thickness of 4mm) and T2-weighted RARE images (TR/TE = 3000/130msec, FOV of 300x300mm, matrix of 512x512, slice thickness of 5mm). Sixty serial RARE images were acquired over three minutes to create cine MRI. On FSE images, area of the uterus and thickness of the endometrium and the junctional zone were measured. Clarity of the junctional zone was graded by a six-point scale. Relative SI of the junctional zone (JZ) and the outer myometrium (OM) were calculated by measuring the signal intensity of the JZ, OM, fat and the paraspinal muscle(figure.1). On cine MR movies, frequency of uterine peristalsis (/min), dominant direction of cervico-fundal, to and fro or fundo-cervical, degrees of endometrial transformation and signal intensity change in the JZ by a five-point scale were evaluated.

**Results:**

Results were summarized in Table 1. Compared with nulliparous group, lactating group had smaller uterus, thinner endometrium and JZ, less JZ clarity, higher rSIs of the JZ and the OM on FSE images, and less frequent uterine peristalsis on cine MRI. Dominant direction of peristalsis was cervico-fundal in 6 lactating and 5 nulliparous women. One lactating woman had no peristalsis (Table 2).

**Discussion and Conclusion:**

Uterus was smaller and the endometrium was thinner in lactating group compared with those in nulliparous group. Such findings are in accordance with previous reports that prolonged postpartum lactation amenorrhea is associated with uterine involution with thin endometrium (2,3). The smaller uterus and thinner endometrium are consistent with suppression of ovarian activity during lactation. In addition, the JZ was thinner and less clear and showed higher signal intensity associated with higher outer myometrial signal in lactating group. These myometrial appearances suggest increased water content in the uterus during lactation period.

All these myometrial signal pattern along with thin endometrium during lactation is similar to the reported pattern of those with the use of oral contraceptives (4). However compared to controls, smaller uterus during lactation is opposite finding against the larger uterus of the oral contraceptive pill users. In our study, uterine peristalsis in lactating women was less frequent, as half as that in women in periovulatory phase, when most frequent peristalsis is observed. The reported frequency of uterine peristalsis in oral contraceptive users is similar than that in our lactating women (4). Such similarity in uterine appearance and the pattern of uterine peristalsis may reflect the similar hormonal pattern resulting in fertility suppression on lactating women.

**References:**

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**Table 1 FSE evaluation of uterine appearance**

| | Total area (mm2) | endometrial thickness (mm) | JZ thickness(mm) |
|---|---|---|---|
| Lactating Women | 2140 ± 735 | 4.2 ± 4.5 | 2.2 ± 1.6 |
| Nulliparous Women | 3120 ± 570 | 9.1 ± 2.3 | 6.0 ± 2.5 |
| p value | **p = 0.035** | **p = 0.023** | **p = 0.026** |
| Analysis | Student's t-test | Student's t-test | Student's t-test |

**FSE evaluation (continuing from upper colum)**

| | JZ clarity(5-0) | rSI of JZ | rSI of OM |
|---|---|---|---|
| Lactating Women | 1.4 ± 0.8 | 51.3 ± 20 | 81.2 ± 6.7 |
| Nulliparous Women | 2.9 ± 0.9 | 12.6 ± 6.5 | 47.7 ± 11.8 |
| p value | **p = 0.015** | **p = 0.0004** | **p = 0.0001** |
| Analysis | Mann-Whitney U test | Student's t-test | Student's t-test |

**Cine MRI evaluation of uterine peristalsis**

| | Frequency of peristalsis (/3min) | Endometrial transformation (4-0) | Subendometrial conduction (4-0) |
|---|---|---|---|
| Lactating Women | 3.1 ± 2.4 | 1.0 ± 1.5 | 2.7 ± 1.3 |
| Nulliparous Women | 6.1 ± 01.0 | 1.7 ± 1.1 | 2.4 ± 1.0 |
| p value | **p = 0.009** | p = 0.16 | p = 0.44 |
| Analysis | Student's t-test | Mann-Whitney U test | Mann-Whitney U test |

$p < 0.05$ is signifcantly different

**Table 2 Dominant direction of peristalsis**

| | CF | to & fro | FC | none |
|---|---|---|---|---|
| lactating women | 6 | 0 | 0 | 1 |
| nulliparous women | 5 | 1 | 1 | 0 |

cervico-fundal(CF), to and fro or fundo-cervical(FC)

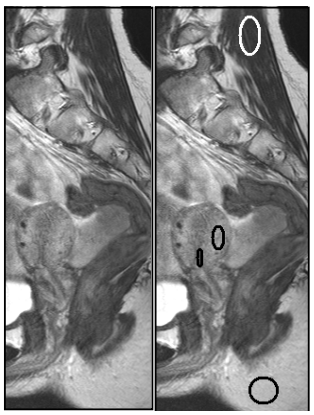

**Figure 1** Midsagittal FSE image of uterus in 35year old woman 10months after deliverty. ROIs were drown on the JZ, outer myometrium, fat and the paraspinal muscle