

# Dilatation and Curettage Effect on the Endometrial Thickness

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## ABSTRACT

**Background:** Endometrial receptivity is required for successful implantation and pregnancy. Despite the remaining controversy, many studies have shown that ultrasonographic endometrial thickness can be considered as an indicator of endometrial receptivity.

**Objective:** The study objective was to investigate the effect of dilatation and curettage on the endometrial thickness.

**Materials and Methods:** Enrolled in the study were 444 patients visited in Obstetrics & Gynecology clinic of Shahid Sadoughi hospital between Jan. 2011 to Sep. 2012. Only patients whose menstrual cycle was regular were included in study. Patients with myoma, adenomyosis, endometrial polyps or other uterine anomaly, those who smoked, whose BMI was greater than 30 and who were taking medications that could affect endometrial thickness were excluded. Endometrial thickness was measured one day before ovulation (n = 444) and 5-7 days after it (n = 444) using transvaginal ultrasonography. The endometrial thicknesses were correlated to the patients' history of dilatation and curettage. Data analysis was done through SPSS software version 16 and using descriptive statistics, independent T-test and Anova.

**Results:** Endometrial thickness in patients who had 0, 1, 2, 3 and 4 D&C were  $10.00 \pm 0.58$ ,  $9.83 \pm 0.47$ ,  $8.90 \pm 0.92$ ,  $7.42 \pm 0.18$  and  $7.40 \pm 0.07$ , respectively one day before ovulation (spearman's correlation coefficient = -0.33) and  $10.62 \pm 0.68$ ,  $9.64 \pm 0.49$ ,  $8.48 \pm 0.96$ ,  $6.32 \pm 0.15$  and  $6.90 \pm 0.04$ , respectively, 5-7 days after ovulation (spearman's correlation coefficient = -0.66) estradiol and progesterone levels, measured in the day of 2nd ultrasonography had not statistic relation with endometrial thickness (P = 0.27 and 0.31). The relation of endometrial thickness and age was not significant (P = 0.54 and 0.06).

**Conclusions:** Dilatation and curettage has a significant effect on the endometrial thinning.

**Keywords:** Dilatation and Curettage; Endometrial Thickness; Transvaginal Ultrasonography

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## 1. Background

Human endometrium is a fascinating, dynamic, steroid-responsive tissue that undergoes repeat cycles involving sequential proliferation, differentiation, breakdown and repair (1, 2). These changes are regulated in the presence of estradiol and progesterone (3). Its sole purpose is to enable implantation of an embryo during a relatively short window of opportunity in the menstrual cycle (1). Endometrial receptivity is required for successful implantation in natural and IVF cycles (4, 5). There are still no accepted criteria for evaluating endometrial receptivity (5) but as endometrial morphology may reveal its readiness,

endometrial morphologic features have all been evaluated as markers of receptivity and consequently implantation and pregnancy. (6). Endometrial thickness is one of these features that has been utilized as an indirect indicator for endometrial receptivity (7). Endometrial thickness has been said to affect the successful outcome pregnancy (8). Numerous studies have focused on determining uterine receptivity through sonographic evaluation of the endometrial thickness but have been unable to reach a consensus (9). Some investigators have demonstrated a positive correlation between endometrial thickness and

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►Implication for health policy/practice/research/medical education:

This research is suggested clinicians to avoid intrauterine procedures in reproduction age because such procedures same as dilatation and curettage can be led to endometrial thinning that responsible for pregnancy rates and outcome.

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pregnancy rates, (3, 7, 10-21) while others have not found such an association (22-28), or only in association with other parameters (4, 29).

Researchers who believe this correlation exists acknowledge that there are conflicting findings as to the minimum thickness required to support a pregnancy (9). The endometrial thickness found to correlate with a positive pregnancy outcome varies between 6 mm and 10 mm, although studies have reported pregnancies with a thickness of as little as 4 mm. (3, 8, 11-13, 15, 16, 19, 30-33) Also, data in the literature are scant regarding the maximum endometrial thickness that will correlate with pregnancy rates and implantation rates (9). Various investigators have been reported the maximum endometrial thickness of 12 to 16 mm that allows the successful implantation and pregnancy, although studies have been reported pregnancies with thicknesses of 19 and 20 mm (9, 12, 27, 31, 34). However, all these differences may be in part attributed to different patient populations, stimulation protocols used or measurement timing (5, 9). But, even studies suggesting that there is no correlation between endometrial thickness and pregnancy and implantation rates have reported that no pregnancy occurred if the endometrium measured < 7 mm (9). Therefore it is known that abnormally thin endometrium leads to low pregnancy rates and existent absolutely few studies indicate that curettage (D&C) could be a cause of scant endometrial tissue (5, 35). Dilatation and curettage, a blind procedure, is the most frequent surgical procedure performed throughout the world routinely by many gynecologists (36, 37). It can be used as a diagnostic test or as a form of treatment for a range of health conditions affect women. These problems include abnormal menstrual bleeding, Polyps, uterine infection, incomplete abortion, surgical abortion, heavy bleeding after childbirth, investigations of female infertility, benign tumors, malignant cancer or suspicion of uterine cancer, adenomyosis and pelvic inflammatory disease (38). Although, D & C was the traditional gold standard for endometrial evaluation for many decades (39), and it said that a D&C procedure is very safe, but there are several possible risks and complications. These are very unlikely but possible (38). Some of the possible complications of D&C include risks of general anesthesia and reactions to the medications used, cervical damage due to dilation or the passage of instruments, puncture or perforation of the uterus wall that could potentially lead to injury of other pelvic structures such as the intestines, the bladder or the blood vessels and nerves, hemorrhage, infection of the uterus or other pelvic organs, scar tissue within the uterus if the scraping done too vigorous, synechiae or intrauterine adhesions (Asherman's syndrome) and adverse future reproductive outcome, uterine fistulae and death (36-38, 40-43). Even in the absence of these complications, the

cost, in terms of hospitalization and absenteeism from work, is substantial (37). Although few studies have been reported the role of D&C in the etiology of thin endometrium (5, 35) but the precise relation between D&C and ultrasonographically thin endometrium remains controversial (35).

## 2. Objectives

Therefore, this research was aimed to investigate the effect of D&C on the endometrial thickness.

## 3. Materials and Methods

Enrolled in the study were 444 patients visited in Obstetrics & Gynecology clinic of Shahid Sadoughi hospital between Jan. 2011 to Sep. 2012. Only patients whose menstrual cycle was regular were included in study. Patients with myoma, adenomyosis, endometrial polyps or other uterine anomaly, those who smoked, whose BMI was greater than 30 and who were taking medications that could affect endometrial thickness were excluded. Endometrial thickness (ET) was measured one day before ovulation (n = 444) and 5-7 days after it (n = 444) using transvaginal ultrasonography. Estradiol and progesterone level were measured in the day of 2nd ET measurement. Endometrial thicknesses were correlated to number of previous performed D&C. Also, endometrial thicknesses were compared between categories of age (< 20, 20-30, and ≥ 30 years). Estradiol level was categorized to 3 categories (< 44, 44-196 and ≥ 196 pg/ml). Progesterone level also was categorized to 3 categories (< 2, 2-25 and > 25 mg/ml). Endometrial thicknesses were compared between categories of estradiol and progesterone levels. All data were collected through designed forms. Data analysis was done through SPSS software version 16 and using descriptive statistics, independent T-test and ANOVA.

## 4. Results

A total of 444 patients participated in the study. Endometrial thicknesses were measured as  $9.80 \pm 0.80$  and  $10.13 \pm 1.17$  mm, one day before ovulation and 5-7 days after it. 5% (n = 20) and 4% (n = 19) of patients had a thin endometrium (< 7 mm) in two measurements, respectively. Only, 0.9% (n = 4) patients had a history of infertility (Table 1).

Endometrial thicknesses in patients with D&C history were  $10.00 \pm 0.58$  and  $10.62 \pm 0.68$  mm in two measurements, respectively. Patients with history of D&C had thinner endometrium in booth measurements. The differences between endometrial thicknesses of two groups (with and without D&C history), were statistically meaningful in booth measurements. Those, without D&C history had thicker endometrium, one day and 5-7 days after ovulation (Table 2).

**Table 1.** Descriptive Statistics of Research Sample

Variable	No.	Minimum	Maximum	Mean ± SD
Age, y	437	18.00	39.00	27.42 ± 4.45
Gravidity	444	1.00	7.00	2.13 ± 1.20
Parity	439	0.00	5.00	1.34 ± 1.11
BMI	423	23.00	25.20	24.34 ± 0.56
Endometrial thickness (one day before ovulation, mm)	444	7.20	11.70	9.80 ± 0.80
Endometrial thickness (5-7 days after ovulation, mm)	444	6.10	12.80	10.13 ± 1.17
Estradiol, pg/ml	412	23.90	415.00	169.40 ± 64.05
Progesterone, mg/ml	419	0.20	50.00	7.31 ± 6.90

**Table 2.** Mean ETS in Each Group of D&C Incidence

D & C History	ET (1st measurement), Mean ± SD	Significant	ET (2nd measurement), Mean ± SD	Significant <sup>a</sup>
<b>With D &amp; C history, No. (%)</b>	9.33 ± 1.02	0.000 <sup>a</sup>	8.98 ± 1.28	0.000
1	92 (20.70)			
2	20 (4.50)			
3	16 (3.60)			
4	4 (0.90)			
Total	132 (20.70)			
<b>Without D &amp; C history, No. (%)</b>	312 (70.30)		10.62 ± 0.68	

<sup>a</sup> Sig at P < 0.01

We correlated the mean endometrium thicknesses with number of previous performed D&C. Spearman's correlation coefficient were -0.33 AND -0.66 for two mea-

surements, respectively. This finding shows a negative correlation between number of D&C and endometrial thicknesses (Table 3).

**Table 3.** Correlation of ETs with Number of Previous Performed D & C

D&C Number	0	1	2	3	4	Significant <sup>a</sup>	Spearman's Correlation coefficient
<b>ETs, Mean ± SD</b>							
1st measurement	10.00 ± 0.58	9.83 ± 0.47	8.90 ± 0.92	7.42 ± 0.18	7.40 ± 0.07	0.000	-0.33 <sup>b</sup>
2nd measurement	10.62 ± 0.68	9.64 ± 0.49	8.48 ± 0.96	6.32 ± 0.15	6.90 ± 0.04	0.000	-0.66 <sup>b</sup>

<sup>a</sup> Sig. at P < 0.01

<sup>b</sup> Correlation is significant at the 0.01 level (2-tailed)

Endometrial thickness of 5-7 days after ovulation in patients with estradiol levels of < 44, 44-196, ≥ 196 pg/ml were 10.40 ± 0.06, 10.07 ± 1.25 and 10.34 ± 0.59, respectively. Endometrial thickness of 2nd measurement in patients with progesterone levels of < 2, 2-25, ≥ 25 mg/ml

were 10.55 ± 0.23, 10.09 ± 1.21 and 10.02 ± 0.42, respectively. Endometrial thickness of 5-7 days after ovulation had not a statistical difference between patients with different estradiol and progesterone level (P value = 0.27 and 0.31) (Table 4).

**Table 4.** ETs Differences Based on Estradiol and Progesterone Level

	Estradiol Level			Progesterone Level		
	Sum of squares	Mean square	P value	Sum of squares	Mean square	P value
<b>Endometrial thickness (5-7 days after ovulation)</b>	3.69	1.84	0.27	3.28	1.64	0.31

Endometrial thicknesses in both measurements showed an increasing when patient's age were increased

from < 20 to 20-30 years but decreased twice in age group of ≥ 30 but ANOVA test did not showed a statisti-

cal difference between endometrial thickness and age in booth measurements. (P value = 0.54 and 0.06) (Table 5).

**Table 5.** ETS Differences Based on Age Group

Age group, y	< 20 (n = 13)	20-30 (n = 288)	> 30 (n = 136)	P value
<b>ETs, mm, Mean ± SD</b>				
ETs (1st measurement)	9.55±1.22	9.81±74	9.76±90	0.54
ETs (2nd measurement)	9.50±1.49	10.21±1.10	9.99±1.31	0.06

## 5. Discussion

Transvaginal ultrasonography (TVUS) is a noninvasive and relatively inexpensive diagnostic procedure to detect endometrial pathology (44). As a result of its low procedure risk, lack of complications and high patient acceptance, and due to limited resources and need to limit costs, transvaginal ultrasound has gained increased worth, recently (45). TVUS can provide serial information about the characteristics of the endometrium (32). It can reliably measure ETh (46). Transvaginal ultrasound with measurement of endometrial thickness can be used to discriminate between normal and pathological endometrium (47). In this study we used TVUS for measuring ETs in a sample of 444 patients visited in our department. The mean age of our sample was  $27.42 \pm 4.45$ . ETh was  $9.80 \pm 0.80$  and  $10.13 \pm 1.17$  mm, one day before ovulation and 5-7 days after it. If we use 7mm as the cut of limit for distinguishing between thin and normal endometrium, about 5% and 4% of our sample had thin endometrium, in 2 measurements. Various investigators have been reported that a minimum endometrial thickness ( $> 7$ mm) is required for successful pregnancy (9). The incidence of thin endometrium in natural cycles had been reported to be 5% in women  $< 40$  years of age and 25% in 41 to 45 years old women (5). Our sample, all had  $< 40$  years of age., we cannot have any conclusion from this finding. Also, some studies have been reported the detrimental effect of increased endometrial thickness ( $> 14$  mm) on the pregnancy rates. In this study we had not the same thickened endometrial. In our patients the maximum endometrial thicknesses were 11.70 and 12.80 mm in one day and 5-7 days after ovulation, respectively. Among our patients sample a total of 132 patients had the history of dilatation and curettage. They had a total of 199 D&C, 172 for incomplete abortion, 16 for ectopic pregnancy and 11 for hydatidiform mole. Endometrial thicknesses in patients with and without D&C history in first and second measurement were  $9.33 \pm 1.02$ ,  $10.00 \pm 0.58$  and  $8.98 \pm 1.28$ ,  $10.62 \pm 0.68$ . This findings show that endometrial thickness in each time of cycle were lower in patients with D&C history. Independent sample T-test confirmed these differences where P value was  $< 0.01$  in booth measurements. Endometrial thicknesses in patients who had 0, 1, 2, 3 and 4 D&C were  $10.00 \pm 0.58$ ,  $9.83 \pm 0.47$ ,  $8.90 \pm 0.92$ ,  $7.42 \pm 0.18$  and  $7.40 \pm 0.07$  in 1st measurement and  $10.62 \pm 0.68$ ,  $9.64 \pm 0.49$ ,  $8.48 \pm 0.96$ ,  $6.32 \pm 0.15$  and  $6.90 \pm 0.04$  in 2nd

measurement. Spearman's rank correlation coefficient of -0.33 and -0.66 indicated a negative relationship between history of D&C and endometrial thickness. Also, endometrial thicknesses of patients with different number of previous D&C were statistically different. (P value = 0.00 and 0.00 for two measurements). Thus the endometrium showed significant thinning after repeated D&C. these finding are in consistent with those of Azomaguchi et al. (2011) (35). They reported the first examination of the relation between endometrial thickness and patient's history of D&C. In fact we repeated their investigation in our department. Spearman's correlation coefficients were -0.34 and -0.39 in Azomaguchi et al. study that confirmed with ours. Also, Moon et al. (2009) has been reported the effect of D&C on the subsequent endometrial development in patients undergoing in vitro fertilization (46). Shufaro et al. (2008), in their study have been indicated that thin, unresponsive endometrium could be a possible complication of surgical curettage (5). All these findings strengthen our findings about the relation of endometrial thinning and D&C history. Other findings of our study demonstrated that the serum estradiol and progesterone levels have not a significant relation with endometrial thickness. (P value = 0.27 and 0.31) This findings, also in consistent with those of Azomaguchi et al. (35). The same findings have been reported in some another investigations (48), however some another studies have been indicated that there is a positive relation between serum estradiol concentration and endometrial thickness (14, 19, 28). Our observation regarding the age indicated that there is not a significant relationship between age and endometrial thickness. The study of Azomaguchi et al. has reported a same result regarding the effect of patients' age on the endometrial thickness. (35). In conclusion, our study revealed the effect of D&C history on the endometrial thinning. Its clinical application could be that the intrauterine invasive procedures such as D&C are devastating to the future endometrial development and reproductive. Therefore, the alternatives should be considered in women of child bearing age. It is notable that, although normally, the endometrium possesses regeneration ability (49) but studies demonstrated that the patients have a poor pregnancy outcome even if some endometrial thickening occur after its' damage (5). So, avoiding from blind D&C procedure, as much as possible could be suggestible.

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## Authors' Contribution

Dr. Robab Davar and Dr. Raziheh Dehghani Firouzabadi contributed at study designing, data analyzing and paper writing. Dr. Kefayat Chamanara contributed at study designing, data collection, data analyzing and paper writing.

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