

Endometrial polyps in infertility patients: the first study of their clinical characteristics

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Summary

Purpose: The study aim was to investigate clinical characteristics of endometrial polyps in women with and without infertility. **Materials and Methods:** Study included all patients of reproductive age who had a hysteroscopy due to endometrial polyps during 30 months. Patients were divided according to infertility problems. Detailed medical history was taken from all patients (age, BMI, parity, comorbidities, symptoms/signs, and polyp recurrence). On ultrasound scan, the polyp's largest diameter and endometrial thickness were assessed. During hysteroscopy localization of polyps and other intrauterine formations were registered. Removed polyps were histopathologically analyzed (size and histological type). **Results:** Study involved 257 patients (average 38.5 years of age), out of which 79 had infertility problem, while 178 patients constituted the control group. There were no significant differences regarding patient's BMI, age in decades, number of abortions, presence of comorbidities, taking hormone therapy, symptoms/signs, localization or diameters of polyps, polyp recurrence, other intrauterine findings, and histopathological types of polyps between women with and without infertility problems. **Conclusion:** Clinical characteristics of endometrial polyps are quite similar in women with and without infertility problems.

Key words: Infertility; Endometrial polyps; Clinical characteristics; Localization; Recurrence; Symptoms and signs.

Introduction

Endometrial polyps are well known factors that can have a negative impact on female fertility as they can physically disturb sperm migration through the cavity as well as embryo implantation [1, 2]. Nevertheless, while in some studies after polypectomy the fertility rate improved, in some others this association was not confirmed [3, 4]. One of the possible explanations is based on different molecular changes in uterine environment due to the presence of polyps [5, 6]. In accordance with these findings, a hypothesis was made that endometrial polyps in women with infertility have different characteristics than polyps of women that had no problems with fertility. However, according to the literature data available, no study has ever examined characteristics such as localization, diameter, symptomatology, histological type, and recurrence of endometrial polyps in women with and without fertility problems. The aim of this study was to investigate clinical characteristics

of endometrial polyps in women with and without infertility.

Materials and Methods

The study included all consecutive patients that had hysteroscopy due to endometrial polyps at Clinic of Ob/Gyn Clinical Centre of Serbia during a period of 30 months (November 1, 2012 until April 30, 2015). The main inclusion criteria was being in reproductive age (premenopausal patients) with sonographically confirmed presence of endometrial polyp. Indication for hysteroscopy was transvaginal ultrasonographic (TVUS) image implying on endometrial polyp (sharp edged, localized endometrial thickening, and protruding into uterine cavity on narrow or wide base). For the infertility group, only women with unknown infertility cause were included in the study. The largest diameter of suspected polyp and the mean endometrial thickness (mm) on TVUS were measured. Prior to surgery, all women signed an informed consent.

Preoperatively for every patient, general and gynecologic history data (age, first and last menstrual period, number of previous

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Table 1. — Descriptive parameters of women with endometrial polyps in overall sample and regarding infertility problems.

Parameters	Overall sample				Infertility group		Control group	
	Min	Max	Mean	SD	Mean	SD	Mean	SD
Patient's age (years)	24.00	47.00	38.49	5.07	37.57	4.54	38.89	5.25
Body mass index (BMI)	18.00	33.12	23.58	2.98	23.70	3.13	23.53	2.91
Endometrial TVUS diameter	2.00	22.00	8.74	3.36	8.99	3.07	8.62	3.48
Polyp TVUS diameter	3.00	30.00	10.04	4.28	9.53	4.31	10.26	4.26
Polyp macroscopic diameter	2.00	30.00	10.62	4.89	9.83	4.20	10.97	5.12

Legend: Min – minimum; Max – maximum; TVUS – transvaginal ultrasound SD – standard deviation; HP – histopathological examination.

Table 2. — Patients with endometrial polyps: frequency of analyzed parameters and significance of their differences in overall sample.

Parameters and their categories		Overall sample		χ^2 <i>p</i>	Infertility group		Control group	
		Number	%		Number	%	Number	%
Patient's age (years)	≤ 30	19	7.4	92.412; 0.001	4	5.1	15	8.4
	31 - 40	144	56.0		55	69.6	89	50.0
	> 40	94	36.6		20	25.3	74	41.6
Number of births	0	86	33.46	317.864; 0.001	76	96.2	0	0
	1	131	50.97		3	3.8	128	71.91
	2	37	14.4		0	0	47	26.42
	3	3	1.2		0	0	3	1.7
Number of miscarriages / abortions	0	219	85.2	256.371; 0.001	68	86.1	151	84.8
	1	27	10.5		7	8.9	20	11.2
	2	8	3.1		3	3.8	5	2.8
	3	3	1.2		1	1.3	2	1.1
Comorbidities	No	163	63.4	371.774; 0.001	50	63.3	113	63.5
	Hypertension	8	3.1		2	2.5	6	3.4
	Diabetes mellitus	6	2.3		1	1.3	5	2.8
	Other	71	27.6		26	32.9	44	24.7
	Carcinoma	9	3.5		0	0	9	5.1
Hormone therapy	No	225	87.5	144.938; 0.001	66	83.5	159	89.3
	Yes	32	12.5		13	16.5	19	10.7
Symptoms and signs	No	235	91.4	606.113; 0.001	74	93.7	161	90.4
	Bleeding	14	5.4		3	3.8	11	6.2
	Pain	3	1.2		1	1.3	2	1.1
	Other or all	5	1.9		1	1.3	4	2.2
Recurrent polyp	No	216	84.0	128.929; 0.001	66	83.5	150	84.3
	Yes	41	16.0		13	16.5	28	15.7
Surgeries / interventions	No	170	66.1	251.971; 0.001	40	50.6	130	73.0
	Curettage	28	10.9		8	10.1	20	11.2
	Hysteroscopy	27	10.5		14	17.7	13	7.3
	Other	32	12.5		17	21.5	15	8.4
Localization	Fundus	33	12.8	94.550; 0.001	8	10.1	25	14.0
	Isthmus	16	6.2		5	6.3	11	6.2
	Posterior wall	48	18.7		16	20.3	32	18.0
	Anterior wall	67	26.1		20	25.3	47	26.4
	Lateral walls	32	12.5		8	10.3	24	13.5
	Combined	61	23.7		22	27.8	39	21.9
Other pathologies	No	228	88.7	562.689; 0.001	70	88.6	158	88.8
	Adhesions	1	0.4		0	0	1	0.6
	Myoma	2	0.8		1	1.3	1	0.6
	Septum	6	2.3		5	6.3	1	0.6
	Endometrial thickening	20	7.8		3	3.8	17	21.7
	Cysticus	4	1.6		1	1.3	3	1.7
Histological type of polyp	Hyperplasticus	15	5.8	136.749; 0.001	5	6.3	10	5.6
	Functionalis	33	12.8		9	11.4	24	13.5
	Fibroglandularis	196	76.3		61	77.2	135	75.8
	Adenomyosus	3	1.2		1	1.3	2	1.1
	Mixtus	6	2.3		2	2.5	4	2.2

births, and abortions) were obtained. Body mass index (BMI) was calculated using the standard formula. Chronic illnesses such as hypertension (HTA), diabetes mellitus (DM), benign or malignant tumors (BT or MT), endocrinological, and other illnesses/disorders were noticed. Patients were asked if they ever used any hormonal therapy (for contraception, or as infertility, endocrinological or breast carcinoma therapy). The authors noted all symptoms and signs that women had such as prolonged menstrual or intermenstrual bleeding, pelvic and/or abdominal pain, increased vaginal secretion, fever, etc. Data regarding previous occurrence of endometrial polyps and interventions/operations on genital organs (curettage, hysteroscopy, other surgeries on uterus or adnexa), as well as their indications were registered.

During hysteroscopy the localization of polyps (uterine fundus, isthmus, anterior, posterior, left or right wall, large base spreading on more walls or multiple polyps on different uterine segments) was determined. Additionally, the authors noted if there were any other pathological formations in the uterine cavity, such as myomas, adhesions, septa or endometrial thickening. Resected polyps were sent to histopathological (HP) analysis, where their largest diameter and precise histological type were determined.

All examined patients with endometrial polyps were divided into study group with and control group without infertility problems in the previous 12 months.

Pre- and postoperatively obtained data were compared in the overall sample and separately in these two groups. Findings were analyzed by methods of descriptive (percents, frequencies, mean, standard deviation), and analytical statistics using SPSS 20 software. Correlations of infertility problems with assessed characteristics of patients and polyps were tested using Spearman correlation. Significance of differences between study and control group was examined by χ^2 test, ANOVA, and Kruskal Wallis non-parametric ANOVA.

Results

Study included 257 patients in their reproductive period that had hysteroscopy due to endometrial polyps. Out of that number, 79 women had infertility problems, while 178 women were in the control group. Patients in the overall sample were 24 to 47 years of age and were mainly of normal weight (Table 1).

Patients had one to three previous births and miscarriages/abortions. Most women did not have any comorbidities and never used hormone therapy. Neither of the infertility patients had any previous malignancies, while in the control group, one patient had malignant melanoma, one thyroid gland, and seven had breast carcinoma (Table 2).

Symptoms/signs of endometrial polyp were rare, but the present women mostly complained of irregular intermenstrual bleeding. The most frequent localization of endometrial polyp in overall sample as well as in both groups was the anterior uterine wall, while polypus on lateral walls had the lowest frequency (Table 2). Moreover, large polyps with base on more than one uterine wall, as well as multiple polyps in uterine cavity were also quite frequent. During hysteroscopy only few other pathological findings in the uterine cavity were registered. In the control group, but not in women with infertility, endometrial thickening histo-

Table 3. — Patients with endometrial polyps: significance of differences in examined parameters regarding infertility problems.

Parameters	Kruskal Wallis χ^2	<i>p</i>
Patients age (years)	6.622	0.010
Patients age in decades	3.524	0.060
Body mass index (BMI)	0.214	0.644
Births	32.988	0.001
Miscarriages/abortions	0.046	0.831
Comorbidities	0.001	0.989
Hormone therapy	1.671	0.196
Symptoms and signs	0.715	0.398
Localization	0.570	0.450
Polyp before (polyp recurrence)	0.021	0.884
Operations / interventions	14.815	0.001
Other pathologies in uterine cavity	0.095	0.758
Endometrial TVUS diameter (mm)	0.170	0.680
Polyp TVUS diameter (mm)	3.368	0.066
Polyp macroscopic diameter (mm)	2.214	0.137
Histopathological polyp type	0.109	0.742

Legend: mm – millimeters; TVUS – transvaginal ultrasound.

pathologically confirmed as hyperplasia, was a frequent finding adjacent to polyps (Table 2).

There were 41 patients that already had endometrial polyp, 13 from the study and 28 from control group. When assessing the overall sample, the majority of patients never had any gynecological interventions or operations (Table 2). However, 50% of patients in the infertility group had some surgeries on genital organs, mostly cystectomies/adnexectomies. A similar number of women with and without infertility problems had previous hysteroscopy, while explorative curettage had more women from control group (Table 2).

On preoperative TVUS scan, the average endometrial thickness was 8.59 mm. The largest polyp diameter, measured both on TVUS and during postoperative histopathological analysis, varied from couple of millimeters to 3 cm (Table 1). Histopathological analysis of resected endometrial polyps revealed six different polyp types. The fibroglandular type was the most common in both groups, while cystic and adenomyosus were the rarest (Table 2).

There were no significant differences between patients with or without infertility problems that had hysteroscopy due to endometrial polyps regarding their BMI, age decades, number of abortions women had, existence of comorbidities, use of hormone therapy, occurrence of symptoms and signs, polyp localization and recurrence, other pathological findings in uterine cavity, diameter of polyp and endometrium, as well as histopathological types of polyps (Table 3).

Infertility in women with endometrial polyps significantly and positively correlated only with previous gynecological interventions/operations and negatively with patient's age and number of births they had. Infertility patients with endometrial polyps were younger, with fewer

Table 4. — Patients with endometrial polyps: correlations of examined parameters in overall sample.

Parameters		Age	Infertil.	Polyp before	Local.	TVUS endom.	TVUS polyp	Polyp type	HPDG
Patient's age (years)	ρ	1.000	-0.216	0.168	0.016	-0.188	0.055	0.032	0.006
	p	.	0.000	0.005	0.796	0.002	0.358	0.595	0.918
Body mass index (BMI)	ρ	0.103	0.026	0.018	-0.109	-0.075	0.093	0.069	-0.008
	p	0.085	0.667	0.763	0.068	0.209	0.120	0.249	0.895
Number of births	ρ	0.472	-0.379	0.111	0.102	-0.066	0.174	0.100	-0.031
	p	0.000	0.000	0.063	0.088	0.269	0.003	0.094	0.606
No. miscarriages/abortions	ρ	0.288	-0.056	0.055	-0.024	-0.084	-0.015	-0.014	-0.051
	p	0.000	0.354	0.360	0.685	0.162	0.799	0.821	0.398
Comorbidities	ρ	0.170	0.001	-0.011	0.015	0.060	0.051	0.052	-0.002
	p	0.004	0.989	0.860	0.802	0.321	0.391	0.383	0.971
Hormone therapy	ρ	0.069	0.096	0.099	0.030	-0.054	-0.003	-0.001	0.071
	p	0.250	0.110	0.097	0.612	0.369	0.957	0.986	0.234
Symptoms	ρ	0.034	-0.059	0.103	0.127	-0.003	0.041	-0.005	0.028
	p	0.576	0.329	0.085	0.033	0.955	0.495	0.938	0.637
Localization	ρ	0.016	0.037	0.148	1.000	0.030	0.046	0.061	0.037
	p	0.796	0.542	0.013	.	0.621	0.446	0.307	0.533
Polyp before	ρ	0.168	0.003	1.000	0.148	0.000	0.059	0.104	-0.024
	p	0.005	0.959	.	0.013	0.997	0.329	0.081	0.691
Operations	ρ	0.100	0.240	0.504	0.039	0.033	-0.016	0.028	0.009
	p	0.097	0.000	0.000	0.514	0.584	0.795	0.637	0.883
Other findings in cavity	ρ	0.023	0.018	0.070	0.030	-0.020	0.062	0.027	0.013
	p	0.707	0.759	0.241	0.615	0.734	0.303	0.654	0.834
Infertility	ρ	-0.216	1.000	0.003	0.037	0.068	-0.113	-0.091	0.014
	p	0.000	.	0.959	0.542	0.259	0.059	0.131	0.812
Endometrial TVUS (mm)	ρ	-0.188	0.068	0.000	0.030	1.000	0.212	0.072	-0.048
	p	0.002	0.259	0.997	0.621	.	0.000	0.231	0.427
Polyp TVUS (mm)	ρ	0.055	-0.113	0.059	0.046	0.212	1.000	0.625	-0.016
	p	0.358	0.059	0.329	0.446	0.000	.	0.000	0.791
Polyp HP diameter (mm)	ρ	0.032	-0.091	0.104	0.061	0.072	0.625	1.000	0.006
	p	0.595	0.131	0.081	0.307	0.231	0.000	.	0.918
Polyp HP type	ρ	0.006	0.014	-0.024	0.037	-0.048	-0.016	0.006	1.000
	p	0.918	0.812	0.691	0.533	0.427	0.791	0.918	.

Legend: HP – histopathology; DG – diagnose; TVUS – transvaginal ultrasound; mm – millimeters; No – number; infertil – infertility; local – localization.

births, but more interventions/operations of genital tract (Table 4). TVUS was confirmed as a reliable method for diagnosis of endometrial polyps as the largest polyp diameter measured preoperatively significantly correlated with diameter that was found during histopathological analysis (Table 4).

Recurrent finding of endometrial polypus in the overall sample, as well as in infertility group significantly positively correlated with patients age, previous interventions/operations on genital organs, and localization of polyps (Tables 4 and 5). Recurrence of endometrial polyps in patients with infertility was also more frequent in older women ($KW\chi^2 = 9.711$; $p = 0.002$) and if polyps had large wide base or were multiple ($KW\chi^2 = 10.356$; $p = 0.001$).

Localization of polyps in the overall sample significantly positively correlated with symptoms and signs (Table 4). Wide-based polyps spreading to more uterine walls with larger diameter caused irregular intermenstrual bleeding more often in overall sample ($F = 1.908$; $p = 0.007$) as well as in infertility patients ($F = 5.554$; $p =$

0.001). Symptoms were also more frequent in infertility patients that had recurrent polyps ($KW\chi^2 = 8.365$; $p = 0.024$).

Polyps from fundal region were not recurrent regardless of their size and infertility problems, while larger polyps on lateral uterine walls were frequently recurrent ($KW\chi^2 = 9.126$; $p = 0.004$). If polyp was previously resected hysteroscopically, recurrence was significantly lower than if it was removed by curettage (curettage recurrence was 20 out of 28; hysteroscopy recurrence was 17 out of 27) ($KW\chi^2 = 7.992$; $p = 0.041$).

Histopathological polyp type in the overall sample did not correlate with any of the examined parameters (Table 4). Nevertheless, in women with infertility problems, significant positive correlations was registered with use of hormone therapy (Table 5). Patients that used hormone therapy for hypothyreosis had more often mixed polyps (with components of endometrial and cervical tissue type) arising from in the isthmocervical region ($KW\chi^2 = 11.571$; $p = 0.041$). Polypus of adenomyosus ($F = 7.935$;

Table 5. — Correlations of examined parameters in women with infertility who had hysteroscopy due to endometrial polyps.

Parameters		BMI	Polyp before	Symptoms	Localizat	TVUS polyp	Polyp type	HPDG
Patient's age (years)	ρ	0.193	0.287	0.131	0.094	-0.014	0.025	-0.063
	p	0.087	0.010	0.246	0.405	0.904	0.826	0.579
Body mass index (BMI)	ρ	1.000	0.034	-0.017	-0.005	0.409	0.345	0.186
	p	.	0.766	0.882	0.968	0.000	0.002	0.098
Number of births	ρ	-0.170	0.091	0.085	0.234	0.065	0.043	-0.096
	p	.132	0.420	0.455	0.036	0.569	0.704	0.399
Number of miscarriages	ρ	-0.044	-0.065	-0.051	-0.103	-0.088	0.004	-0.141
	p	0.695	0.567	0.654	0.364	0.439	0.972	0.213
Comorbidities	ρ	0.075	-0.101	-0.134	-0.016	0.029	0.006	0.105
	p	0.507	0.371	0.237	0.888	0.801	0.957	0.354
Hormone therapy	ρ	0.141	0.154	-0.034	-0.119	0.115	0.039	0.223
	p	0.211	0.173	0.767	0.294	0.311	0.732	0.046
Symptoms	ρ	-0.005	0.033	-0.061	1.000	-0.169	-0.157	-0.151
	p	0.968	0.770	0.589	.	0.133	0.166	0.182
Localization	ρ	-0.017	0.259	1.000	-0.061	0.135	0.058	0.082
	p	0.882	0.021	.	0.589	0.233	0.611	0.467
Polyp before	ρ	0.034	1.000	0.259	0.033	-0.007	0.004	-0.033
	p	0.766	.	0.021	0.770	0.948	0.969	0.770
Surgeries	ρ	-0.026	0.253	-0.036	0.097	-0.211	-0.157	0.134
	p	0.816	0.023	0.749	0.391	0.060	0.164	0.235
Other findings in cavity	ρ	-0.006	0.169	0.011	-0.092	0.004	-0.056	0.121
	p	0.955	0.135	0.925	0.418	0.971	0.625	0.286
Endometrial TVUS (mm)	ρ	0.098	-0.027	0.006	-0.021	0.171	0.242	-0.029
	p	0.386	0.811	0.957	0.850	0.130	0.030	0.799
Polyp TVUS (mm)	ρ	0.409	-0.007	0.135	-0.169	1.000	0.705	0.111
	p	0.000	0.948	0.233	0.133	.	0.000	0.328
Polyp HP diameter (mm)	ρ	0.345	0.004	0.058	-0.157	0.705	1.000	0.079
	p	0.002	0.969	0.611	0.166	0.000	.	0.484
Polyp HP type	ρ	0.186	-0.033	0.082	-0.151	0.111	0.079	1.000
	p	0.098	0.770	0.467	0.182	0.328	0.484	.

Legend: HP – histopathology; DG – diagnose; TVUS – transvaginal ultrasound; mm – millimeters; No – number; BMI – body mass index; localizat – localization.

$p = 0.037$) and mixed type ($F = 5.709$; $p = 0.044$) were significantly larger in diameter than cystic type.

Discussion

Endometrial polyps are localized benign hyperplastic formations of endometrium containing stroma, glands, blood vessels, and occasionally muscle tissue. They arise from basal mucosal layer forming a wider or narrower peduncle [7, 8]. Endometrial polyps are diagnosed throughout female reproductive period as well as in menopause. According to the literature data, they occur most often in women aged 40-49 years [9]. On the other hand, endometrial polyps are found before the age of 35 years in only 3% [10]. In the present study the majority of patients with endometrial polyps (56% in the overall sample) were 30 to 40 years of age.

Endometrial polyps are usually identified either due to irregular bleeding or during infertility cause assessment. Their incidence ranges from 7.8% in asymptomatic young premenopausal women up to 40% in the postmenopausal

patients with irregular bleeding [9]. Some literature data indicate that polyps occur more often (up to 32%) in women with infertility problems, which stresses the fact that there is a link between the presence of polyp and female infertility. Still, most authors believe that their true incidence is actually unknown, as the majority of polyps remain asymptomatic and some very small ones might even spontaneously disappear [8, 10]. Based on the present findings, asymptomatic nature of endometrial polyps was confirmed, as over 90% of investigated women did not have any clinical manifestation of endometrial polyp presence.

As the complete etiopathogenesis of endometrial polyps is still not thoroughly investigated, potential new risk factors are still being assessed [2]. Currently, older age, comorbidities such as hypertension, diabetes and obesity, late menopause, polycystic ovaries, use of hormone therapy or tamoxifen have all been proved in numerous studies as risk factors for endometrial polyp development [5, 11, 12]. Moreover, it seems that endometrial polyps frequently correlate with occurrence of cervical polyps or endometriosis [8]. Data regarding the association of endometrial polyps

and hormones are still contradictory. As polyps have immature or functional endometrium, they can develop in all conditions of increased estrogen levels or in patients being on tamoxifen therapy [13]. Polyps are found to have a higher expression of estrogen and lower progesterone receptors than in normal surrounding endometrial tissue. The fact that polyps are almost never diagnosed before menarche once more implies the influence of endometrial stimulation by estrogen as a key factor for growth of polyps. Obesity (BMI ≥ 30) as an independent risk factor is found to positively correlate with not only occurrence but also with polyp diameter [12].

Endometrial polyps are a frequent finding in women suffering from infertility. The mechanisms through which endometrial polyps can negatively impact fertility are mechanical and molecular [2, 8]. Polyps can mechanically distort sperm transportation. Moreover, endometrium covering polyps is unresponsive to progesterone stimulation and therefore implantation at the site of the polyp is highly unlikely. Endometrial polyps may also induce inflammatory changes in the uterine cavity with increased number of mast cells and levels of matrix metalloproteinase two and nine, rendering the endometrium unreceptive for the embryo. Some studies found that endometrial polyps decrease messenger RNA levels of HOXA10 and HOXA11, which are known molecular markers of endometrial receptivity [2, 8]. Furthermore, endometrial polyps are proven to produce glycodefin that disables binding of sperm to pellucida zone and deregulates function of endometrial NK cells, causing impairment in both fertilization and implantation [2, 8]. In such a manner endometrial polyps can be a direct cause of infertility or an additional factor that decreases fertility rates in women with other disorders such as tubal or immunological factor [11].

Previous studies demonstrated that after hysteroscopic polypectomy, spontaneous fertilization rates have improved, especially in patients with unexplained infertility [3, 7]. In infertility patients, hysteroscopic polypectomy before intrauterine insemination can increase pregnancy rate from 43% up to even 80% [3, 7]. Still, the time between polypectomy and performing ART for infertility treatment could impact ART success. However, other authors showed that there were no significant differences in achieving a pregnancy between patients after hysteroscopic resection of small polyps (< 1 cm) and large (> 1 cm) or multiple polyps [4, 14]. Based on some literature data, it seems that if the embryo manages to overcome the implantation difficulties, pregnancy progression is not impaired by the presence of small endometrial polyps. Some literature data indicate that although polyps are mostly found on the posterior uterine wall (around 30%), the pregnancy rate after polypectomy was the highest (50–60%) if the polyps from cornual regions were resected [6, 15]. Therefore, some authors believe that the decision for polypectomy before ART should be individualized according to patients' reproduc-

tive history, polyp size and localization, as well as all other factors that might influence ART [8, 16].

According to the results of the present study, there were no significant differences between the examined clinical characteristics of endometrial polyps, such as symptoms and signs, localization, polyp diameter and histopathological type in infertility patients, and women without infertility problems. The present authors investigated comparable groups of patients, as there were no significant differences in their BMI (mostly adequate), parity, comorbidities, and they were in the same age decades (usually in the fourth decade). In both groups, fibroglandular polyps were the most frequent histopathological type and the majority of polyps were localized on anterior or posterior wall. Polyps were in most cases asymptomatic, while irregular bleeding was a common sign in the control group. Only few women with infertility had any symptoms or signs and the presence of endometrial polyp was usually diagnosed occasionally, during evaluation of infertility cause. Infertility patients who had endometrial polyps were younger with fewer births and had more gynecological operations/interventions than women with endometrial polyps who did not have any infertility problems. Infertility patients who used substitution hormone therapy for hypothyreosis had more often a mixed polyp type. Nevertheless, this association of thyroid gland dysfunction, and the dosage of hormone therapy with endometrial polyps occurrence and their histological type, and response on different hormones/medications, should be more thoroughly investigated in future studies.

Recurrence of endometrial polyps after polypectomy depends on the technique used for polyp removal, experience of the surgeon, as well as the characteristics of the polyps and patients [17]. While some authors found a low rate of recurrence even after several years of monitoring patients, other studies have recorded the recurrence rate as high as 50% [18, 19]. Recurrences are especially common in women who have had breast cancer and who received tamoxifen. Multivariate logistic regression applied in some investigations showed that the most important predictor of polyp recurrence is the previously found larger number of polyps in the uterine cavity [19]. Although surgical technique of hysteroscopic polypectomy is chosen according to the surgeon's preference and expertise, some authors reported a difference of polyp recurrence related to the use of hysteroscopic scissors, bipolar electrosurgical instrumentation, or an intrauterine morcellator [20].

Recurrent endometrial polyps in the present study were relatively rare (16%). Recurrence of polyps was similar both in infertility patients and the control group. The present authors found that recurrence was most often in older women as well as in case of large or multiple polyps. The highest recurrence rate was noted for large polyps on the lateral uterine walls (in 50% of cases). Patients with recurrent polyps more commonly had symptoms such as irreg-

ular bleeding. Analyzing only women with recurrent polyps, the present authors found that the recurrence rate was higher if the polyp was previously removed by curettage than hysteroscopically.

Conclusion

According to this study, endometrial polyps were usually found on the anterior uterine wall, with an average size of approximately 1 cm. Women with endometrial polyps, regardless of their infertility problems, were found to be the most often in the fourth decade of life. The commonest histological type of endometrial polyp was fibroglandular. There was a positive association between endometrial polyp size and its clinical presentation, regardless of infertility problems: larger polyps were more often symptomatic causing irregular bleeding. In both investigated groups the recurrence of polyps was more common in older women, if the previous polyps were large or multiple, localized on lateral uterine walls, and removed by curettage. Therefore, hysteroscopy was confirmed to be the method of choice for endometrial polyp removal. On the other hand, there were no significant differences in the characteristics of polyps (localization, diameter, symptoms, recurrence, and histological type) that occurred in women with infertility and in the control group patients. In the near future, further studies on this matter are needed to investigate biochemical, hormonal, and micro-molecular aspect within uterine cavity of women with endometrial polyps that suffer from infertility, in order to achieve a deeper insight into both their pathogenesis and influence on fertility.

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