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Original Article

The prevalence of endometrioma and associated malignant transformation in women over 40 years of age

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ABSTRACT

Objective: Endometriosis is an estrogen-dependent chronic disease, which is regarded as a disease of reproductive-aged women. Endometriosis is most frequently diagnosed during reproductive period. We aimed to determine the frequency of endometrioma in women over 40 years of age who were operated for adnexial mass.
Materials and Methods: A total of 1100 women over 40 years of age underwent surgery for adnexal mass were included in this cohort study between 2006 and 2016. Women who met the criteria were compared regarding the type of adnexial mass, age groups, menopausal status and malignant transformation.
Results: A total of 299 women (27.2 %) with benign ovarian mass were determined to have endometrioma. Women with endometrioma were younger and nulliparous more frequently comparing women without endometrioma. Although 20 % of the patients in the endometrioma group were postmenopausal, 70 % of the patients in the control group were postmenopausal. Endometrioma-associated ovarian tumors were developed in nearly 11 % of women with endometrioma.
Conclusions: Even though endometriosis is accepted as a disease of reproductive-aged women, it can occur over 40 years of age. Detailed anamnesis and careful gynecological examination provide key information for differential diagnosis. Accurate information about the risk of malignant transformation should be informed.

Introduction

Endometriosis is defined as the localization of endometrial stromal and glanduler cells outside the uterine cavity. Although it can be encountered in all ages, it is often diagnosed in reproductive-aged women. Its prevalence is 6–10 % in this period, while the incidence in infertile population increases up to 20–50 % [1]. The occurrence in the reproductive age and its regression with menopause indicates that endometriosis is an estrogen-dependent disease [2]. Although there is no clear consensus on which theory best explains the pathogenesis of endometriosis, endometriosis is considered to be an estrogen-dependent disease. Therefore, it is thought that the symptoms and the disease itself regress with aging. On the other hand, based on recent publications including case series and surveillance studies presenting the age distribution of endometriosis, it has revealed that advanced age women may suffer from endometriosis [3,4].

We aimed in this study to determine the frequency of endometrioma in women with adnexal mass over 40 years of age. Women with and without endometrioma were compared based on their clinical and demographic characteristics. Another interesting issue is that endometriosis and malignancy share some common features such as invasion, progression, spread to distant organs [5]. The lifetime risk of ovarian cancer for women having a history of endometriosis is about 1.9 % while this risk is about 1.4 %

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in the general population [6]. We also evaluated the differences in between women with benign ovarian tumors, malignant ovarian tumors developed and not developed on the basis of endometrioma.

Materials and methods

A total of 1100 women over 40 years of age underwent surgery for adnexal mass were included in this retrospective cohort study between January 2006 and July 2016 in the Department of Obstetrics and Gynecology at Istanbul University Cerrahpasa Medical Faculty. Our study was designed as retrospective cohort study and conducted according to the Helsinki Declaration and its later amendments or comparable ethical standards. There was not ethical approval because we collected data of the patients from the records in archive and we did not documented any personal information. Also in our hospital, informed consent is taken from every patient allowing the use of medical information in scientific publications.

Inclusion criteria were as follows: women over 40 years of age and undergoing surgery for adnexal mass. After assessment for eligibility criteria, patients were evaluated for further clinical and demographic findings from their hospital's records. The patients with endometrioma were accepted as the study group while the others without endometrioma were accepted as the control group. The patients with endometrioma were also classified by age and differences between them were determined. On the basis of tumor development, three subgroups were defined and compared regarding their clinical and demographic data.

Statistical analysis

Statistical analysis was performed using the Statistical Package for the Social Sciences version 22.0 for Windows (SPSS, Inc., Chicago, IL, USA). Differences in mean values and characteristics between groups were analyzed with independent-samples t-test, the chi-square test and one way ANOVA test. Means were presented with standard deviation (SD). $p < 0.05$ was considered statistically significant.

Results

A total of 1100 patients who met the criteria were enrolled in this retrospective cohort study. The mean age of overall population was 53.3 ± 10.1 years old. Table 1 shows the clinical and demographic findings of all participants in this study. About half of the women in the study was postmenopausal (56.4 %). The main complaint for hospital admission was pelvic pain with a rate of 60 %. While 35 % of the patients had bilateral endometriomas, 8% of the cases had a history of previous surgery for endometriosis. When adnexial masses were classified according to their malignant characteristics, malignant masses including serous papillary carcinoma, adenocarcinoma, mucinous tumor, clear cell carcinoma, granulosa cell tumor and endometrioma-associated malign tumor were detected in 276 patients (Table 2). A total of 266 women (32.3 %) with benign ovarian mass were determined to have endometrioma. Considering all benign and malignant cases, endometrioma was present in 27.2 % of the cases. Table 3 represents the comparison of women in the study and control groups regarding their demographic and clinical characteristics. Women in the study group were younger (48.9 ± 6.5 vs 54.9 ± 10.6) and nulliparous more frequently (20.1 % vs 10.5 %) and had more operative history (16.4 % vs 5.2 %). Although 20 % of the patients in the study group were postmenopausal, 70 % of the patients in the control group were in the postmenopausal period. While pelvic pain was the most common complaint in both groups, women in the study group were also admitted with infertility. Women with endometrioma often had underwent more conservative

Table 1
Demographic and clinical characteristics of the patients.

ALL PATİENTS (n = 1100)	
Characteristics	Mean ± SD or number (%)
Age	53.3 ± 10.1 (40–91)
Parity	
0	144 (13.1)
≥1	956 (86.9)
Infertility	
Absent	1005 (91.4)
Present	95 (8.6)
Menopausal status	
Absent	480 (43.6)
Present	620 (56.4)
Comorbidity	
Absent	487 (44.3)
Present	613 (55.7)
Drug usage	
Absent	579 (52.6)
Present	521(47.4)
Recurrent operation	
Absent	1009 (91.7)
Present	91 (8.3)
Complaint	
Control	313 (28.5)
Pelvic pain	655 (60.6)
Abnormal bleeding	118 (10.7)
Infertility	14 (1.3)
Operation	
Ovarian biopsy	17 (1.5)
Cystectomy	160 (14.5)
Salpingooopherectomy	200 (18.2)
Hysterectomy + salpingooopherectomy	723 (65.7)
Laterality	
Left	358 (32.5)
Right	350 (31.8)
Bilateral	392 (35.6)
Endometrial biopsy	
Absent	628 (57.1)
Present	472 (42.9)
Malignite	
Absent	824 (74.9)
Present	276 (25.1)
Tm assoc with endometriosis	33 (12)
Tm not assoc with endometriosis	243 (88)

Abbreviations: SD = standard deviation.

Table 2
Distribution of adnexial mass according to cyst type.

ALL PATİENTS (n = 1100)	
Adnexial masses	Number (%)
Benign (n = 824, 74.9 %**)**	
Endometrioma*	266 (32.3)
Cystadenoma	228 (27.7)
Simple cyst	132 (16.0)
Fibroma, fibrothecoma	100 (12.1)
Mature cystic teratoma	60 (7.3)
Abscess	20 (2.4)
Paratubal cyst	18 (2.2)
Malign (n = 276, 25.1 %**)**	
Serous papillary carcinoma	107 (38.8)
Adenocarcinoma	59 (21.4)
Mucinous tumor	35 (12.7)
Endometrioma-associated malign tumor	33 (11.9)
Clear cell carcinoma	25 (9.1)
Granulosa cell tumor	17 (6.1)

*Endometrioma cases with benign characteristics are only indicated.

surgery such as cystectomy instead of hysterectomy and/or salpingooopherectomy.

The patients in the study group were also classified by age. Fig. 1 represents the distribution of endometrioma regarding age. As many as 104 women with endometrioma (34.7 %) were observed in 40- to 45-years old patients (Fig. 1). Endometrioma was relatively more common in women aged between 40–60 years of age and its incidence decreased gradually after 60 years of age (Fig. 2). Table 4 shows the comparison of women with endometrioma in different age groups based on their demographic and clinical characteristics. Women in 40–45 age group were more infertile and had more surgery for endometrioma previously. Malignant transformation was developed more frequently in women between the ages of 60 and 69. The possibility of more radical approaches during operation was increasing as age progressed.

Endometrioma-associated ovarian tumors were developed in nearly 11 % of women with endometrioma. The comparison of the patients classified regarding the tumoral development is presented in Table 5. The women with endometrioma-associated tumors were found to be younger, nulliparous, infertile and premenopausal more frequently. As presented in Fig. 3, endometrioma-associated ovarian tumors were diagnosed most commonly in women between 40 and 45 years of age (39.4 %), whereas ovarian tumors not developed on the basis of endometrioma were most frequently encountered in 60–69 age group (28.8 %).

Table 6 presents the differences of the premenopausal and postmenopausal patients in the study group regarding their demographic and clinical characteristics. Premenopausal women with endometrioma were younger (47.4 ± 4.7 vs 54.9 ± 8.8), more nulliparous (23.1 % vs 8.2 %) and infertile (16.4 % vs 9.8 %) and had underwent more conservative surgical procedures such as cystectomy (36.6 % vs 9.8 %).

Discussion

Endometriosis is an estrogen-dependent disease defined as the presence of endometrial glandular and stromal tissue outside the uterine cavity. It is typically regarded as a disease of reproductive-aged women and the symptoms of endometriosis alleviate during menopausal period due to the decreased estrogen levels. On the other hand, further questions have been raised concerning that endometrioma may not be so rare in advanced age women and its pathophysiology and management during this period has became an interesting research topic [7]. However, there is still a small number of publications and limited evidence based on case reports proving the development of endometriosis in advanced age group.

Table 3
Comparison of the patients in the study and control groups.

Characteristics	Control group (n = 801, mean ± SD or number (%))	Study group (n = 299, mean ± SD or number (%))	*p value*[a]
Age	54.9 ± 10.6	48.9 ± 6.5	<**0.001**
Parity			
0	84 (10.5)	60 (20.1)	<**0.001**
≥1	717 (89.5)	239 (79.9)	
Infertility			
Absent	751 (93.8)	254 (84.9)	<**0.001**
Present	50 (6.2)	45 (15.1)	
Menopausal status			
Absent	242 (30.2)	238 (79.6)	<**0.001**
Present	559 (69.8)	61 (20.4)	
Comorbidity			
Absent	342 (42.7)	145 (48.5)	0.085
Present	459 (57.3)	154 (51.5)	
Drug usage			
Absent	406 (50.7)	173 (57.9)	**0.034**
Present	395 (49.3)	126 (42.1)	
Recurrent operation			
Absent	759 (94.8)	250 (83.6)	<**0.001**
Present	42 (5.2)	49 (16.4)	
Complaint			
Control	259 (32.3)	54 (18.1)	<**0.001**
Pelvic pain	474 (59.2)	181 (60.5)	
Abnormal bleeding	68 (8.5)	50 (16.7)	
Infertility	0	14 (4.7)	
Operation			
Ovarian biopsy	15 (1.9)	2 (0.7)	<**0.001**
Cystectomy	67 (8.4)	93 (31.1)	
Salpingooopherectomy	115 (14.4)	85 (28.4)	
Hysterectomy + salpingooopherectomy	604 (75.4)	119 (39.8)	
Laterality			
Left	260 (32.5)	98 (32.8)	0.432
Right	263 (32.8)	87 (29.1)	
Bilateral	278 (34.7)	114 (38.1)	
Endometrial biopsy			
Absent	421 (52.6)	207 (69.2)	<**0.001**
Present	380 (47.4)	92 (30.8)	
Malignite			
Absent	558 (69.7)	266 (89)	<**0.001**
Tumor associated with endometriosis	0	33 (11)	
Tumor not associated with endometriosis	243 (30.3)	0	

Abbreviations: SD = standard deviation.
[a] Independent samples *t*-test and chi-square test were applied.

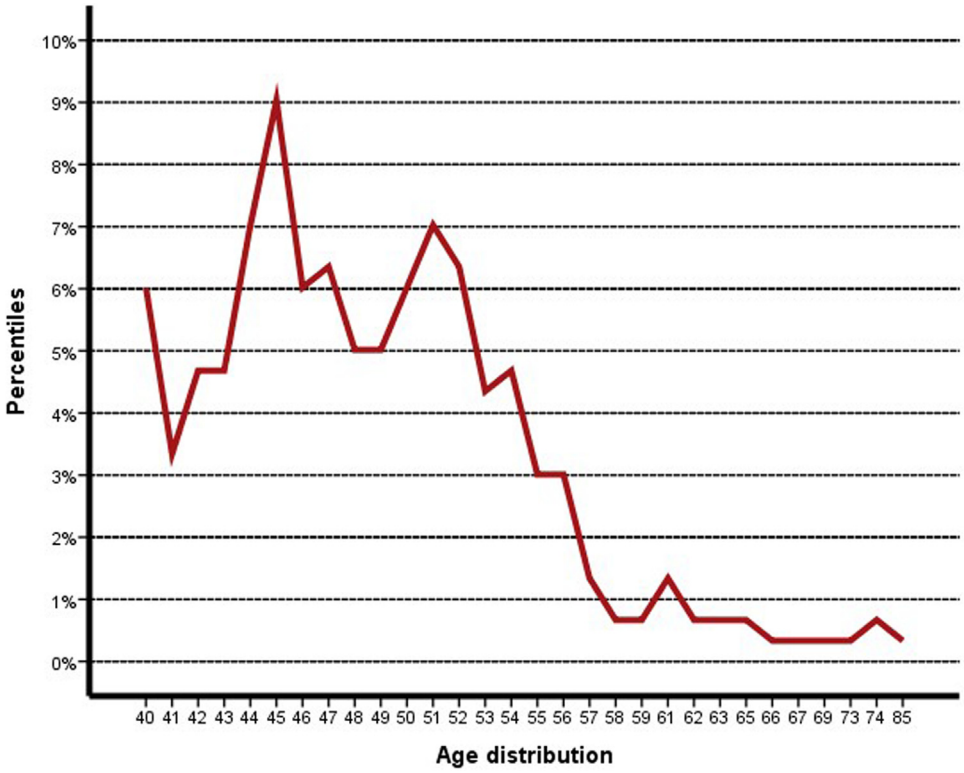

Fig. 1. Schematic representation showing the distribution of endometrioma regarding age in women over 40 years of age.

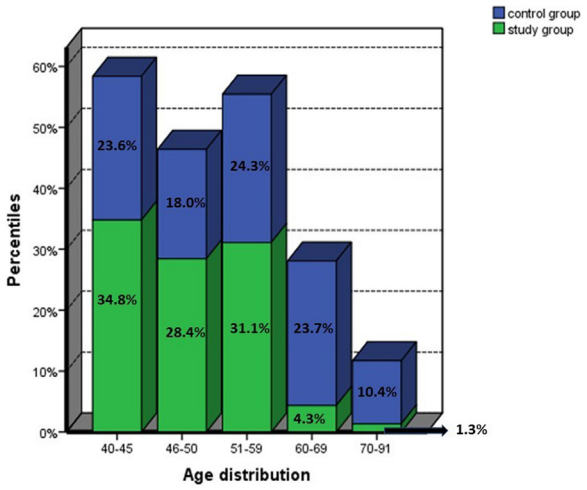

Fig. 2. Schematic representation showing the distribution of different types of adnexial mass regarding age in women over 40 years of age.

The case reports presenting the reactivation of endometrioma in women with a history of endometriosis during menopause because of the use of hormone replacement therapy or the development of endometrioma-associated malignant ovarian tumors actually revealed the fact that endometrioma can also occur in advanced age women [8]. Current study has determined the frequency of endometrioma in women with adnexal mass after 40 years of age in our population.

Adnexal mass is a common gynecologic problem defining the mass of the ovary, fallopian tube or surrounding connective tissues. Although it is mostly asymptomatic, the women with adnexal mass often present with pain or pressure symptoms. The broad spectrum of adnexal masses varies from benign gynecologic causes such as luteal cysts, ectopic pregnancy, endometriosis to malignant ovarian tumors. Detailed anamnesis, gynecologic examination, some blood tests and imaging methods are used to differentiate benign from malignant tumors [9]. Differential diagnosis is very important especially in women over 40 years due to the increased incidence of malignant ovarian tumors by age, even though the majority of adnexal masses is benign in this population [10]. Since malignant ovarian tumors are the fifth most common cause of cancer death among women and has the highest mortality rate of all gynecologic cancers, some scoring systems including ultrasound alone or in combination with serum markers have been developed. Therefore women in this age group should be evaluated carefully and referred to the gynecologic oncologists in suspicious cases for malignancy [11].

When we classified our participants regarding the type of adnexal mass, endometrioma (n:299, 27.2 %) was the most common ovarian benign tumor. The study by Ienoscu et al. evaluating the patients with adnexal mass aged 15–74 years also showed endometrioma as the most frequently encountered ovarian mass [12]. Although no clear evidence exists in the literature revealing the prevalence of endometrioma in advanced age group, around 2–4 % of postmenopausal women are estimated to have endometrioma [13,14].

To the best of our knowledge, there is no clear consensus on which the best theory explains the exact pathophysiological machanism of endometriosis. The most widely accepted theory is the Sampson's theory. The occurrence of endometriosis in advanced age could be explained with extra-ovarian production of estrogen by adipose tissue and/or endometriotic tissue itself or the exposure to iatrogenic hormones [15,16].

Endometrioma over 40 years of age develops in a state of relatively low estrogen levels. Therefore, it is expected that there

Table 4
The comparison of the patients in the study group based on different age groups.

Characteristics	40–45 (n = 104, number (%))	46-50 (n = 85, number (%))	51-59 (n = 93, number (%))	60–69 (n = 13, number (%))	70-91 (n = 4, number (%))	*p value*[a]
Parity						
0	31 (29.8)	15 (17.6)	12 (12.9)	2 (15.4)	0	**0.031**
≥1	73 (70.2)	70 (82.4)	81 (87.1)	11 (84.6)	4 (100)	
Infertility						
Absent	80 (76.9)	73 (85.9)	86 (92.5)	11 (84.6)	4 (100)	**0.038**
Present	24 (23.1)	12 (14.1)	7 (7.5)	2 (15.4)	0	
Menopausal status						
Absent	98 (94.2)	71 (83.5)	67 (72)	2 (15.4)	0	<**0.001**
Present	6 (5.8)	14 (16.5)	26 (28)	11 (84.6)	4 (100)	
Comorbidity						
Absent	65 (62.5)	35 (41.2)	39 (41.9)	6 (46.2)	0	**0.004**
Present	39 (37.5)	50 (58.8)	54 (58.1)	7 (53.8)	4 (100)	
Drug usage						
Absent	76 (73.1)	43 (50.6)	48 (51.6)	6 (46.2)	0	**0.001**
Present	28 (26.9)	42 (49.4)	45 (48.4)	7 (53.8)	4 (100)	
Recurrent operation						
Absent	78 (75)	70 (82.4)	85 (91.4)	13 (100)	4 (100)	**0.010**
Present	26 (25)	15 (17.6)	8 (8.6)	0	0	
Complaint						
Control	17 (16.3)	18 (21.2)	17 (18.3)	1 (7.7)	1 (25)	<**0.001**
Pelvic pain	67 (64.5)	57 (67.1)	47 (50.5)	8 (61.5)	2 (50)	
Abnormal bleeding	7 (6.7)	9 (10.6)	29 (31.2)	4 (30.8)	1 (25)	
Infertility	13 (12.5)	1 (1.2)	0	0	0	
Operation						
Ovarian biopsy	1 (1)	0	1 (1.1)	0	0	<**0.001**
Cystectomy	61 (58.7)	20 (23.5)	12 (12.9)	0	0	
Salpingooopherectomy	30 (28.8)	22 (25.9)	24 (25.8)	7 (53.8)	2 (50)	
Hysterectomy + salpingooopherectomy	12 (11.5)	43 (50.6)	56 (60.2)	6 (46.2)	2 (50)	
Laterality						
Left	34 (32.6)	26 (30.6)	30 (32.3)	6 (46.2)	2 (50)	0.860
Right	35 (33.7)	24 (28.2)	24 (25.8)	3 (23.1)	1 (50)	
Bilateral	35 (33.7)	35 (41.2)	39 (41.9)	4 (30.8)	1 (50)	
Endometrial biopsy						
Absent	91 (87.5)	62 (72.9)	51 (54.8)	2 (15.4)	1 (25)	<**0.001**
Present	13 (12.5)	23 (27.1)	42 (45.2)	11 (84.6)	3 (75)	
Malignite						
Absent	91 (87.5)	78 (91.8)	85 (91.4)	8 (61.5)	4 (100)	**0.018**
Tumor associated with endometriosis	13 (12.5)	7 (8.2)	8 (8.6)	5 (38.5)	0	

[a] Chi-square test were applied.

are some differences comparing to the disease that developed in previous ages. Current study shows some differences based on their demographic and clinical findings of the patients with endometrioma when classified by age. While younger women aged between 40 and 45 years of age were admitted with infertility problems more frequently, abnormal bleeding was a relatively more common complaint for older women. Multiparity and having a history of previous surgery for endometriosis became more common as the age progressed. The majority of women in the study group were premenopausal. These women were found to be younger, more nulliparous and infertile compared to postmenopausal women with endometrioma.

It is also shown in the literature that more advanced age women with endometrioma have greater predisposition to malignant change and more spread to extragonadal organs resulting in constructive and/or obstructive lesions [17]. Thus, the important issue is what the risk of developing malignant transformation is in this age group. Even though this question has not yet been fully answered due to the low prevalence of disease in that age group, it is known that the risk increases as age progresses especially after menopause. On the contrast, our findings support that the risk for ovarian tumors on the basis of endometriosis risk was inversely associated with menopausal status. In other words, the majority of women (66.7 %) who developed endometriosis associated tumors were not postmenopausal. Melin et al. also reported the malignant transformation rate in postmenopausal women as 1% [18].

Both clinical data and histopathological examination are necessary to understand that ovarian cancer originated from endometriosis. Atypical endometriosis is a pathological entity defined as atypical cells lining in endometriotic cyst and atypical endometrial hyperplasia arising in ovarian endometriosis. These atypical cells are observed on the histopathological examination of endometriosis-associated ovarian cancer [19]. When we evaluated our participants regarding the development of malignant transformation, the women with malignant ovarian tumor developed on the basis of endometrioma were younger and more often managed by salpingooopherectomy. On the other hand, patients in the malignant ovarian tumor group without endometrioma were older and managed by more radical surgical methods. Literature provides the evidence that endometrioma-associated ovarian cancer has greater tendency to be at earlier stage, lower grade and have a higher 10-year survival rate [20,21]. The most common pathological types of malignant transformation developed on the basis of endometrioma are endometrioid and clear cell carcinoma [22,23].

Table 5
The comparison of the patients with adnexal mass based on the development of malignant tumor.

Characteristics	Group 1(No tumor, n = 824) (mean ± SD or number (%))	Group 2 (Tumor on the basis of endometriosis, n = 33) (mean ± SD or number (%))	Group 3 (Tumor not on the basis of endometriosis, n = 243) (mean ± SD or number (%))	*p value*[a] (Gr 1 vs Gr 2)	*p value*[a] (Gr 1 vs Gr 3)	*p value*[a] (Gr 2 vs Gr 3)
Age	52.3 ± 9.6	48.9 ± 8.1	57.4 ± 10.6	**0.048**	<**0.001**	<**0.001**
Age groups						
40–45 years	243 (29.5)	13 (39.4)	37 (15.2)	0.520	<**0.001**	**0.032**
46-50 years	184 (22.3)	7 (21.2)	38 (15.6)			
51-59 years	216 (26.2)	8 (24.2)	64 (26.3)			
60–69 years	128 (15.5)	5 (15.2)	70 (28.8)			
70-91 years	53 (6.4)	0	34 (14)			
Adnexial mass type						
Endometrioma	266 (31.1)	33 (100)	0	<**0.001**	<**0.001**	<**0.001**
Benign mass	364 (42.6)	0	14 (6.6)			
Malign mass	205 (24)	0	198 (93.4)			
Abscess	20 (2.3)	0	0			
Parity						
0	112 (13.6)	10 (30.3)	22 (9.1)	**0.007**	0.061	<**0.001**
≥1	712 (86.4)	23 (69.7)	221 (90.9)			
Infertility						
Absent	747 (90.7)	28 (84.8)	230 (94.7)	0.266	**0.049**	**0.032**
Present	77 (9.3)	5 (15.2)	13 (5.3)			
Menopausal status						
Absent	403 (48.9)	22 (66.7)	55 (22.6)	**0.045**	<**0.001**	<**0.001**
Present	421 (51.1)	11 (33.3)	188 (77.4)			
Comorbidity						
Absent	370 (44.9)	16 (48.5)	101 (41.6)	0.685	0.357	0.450
Present	454 (55.1)	17 (51.5)	142 (58.4)			
Drug usage						
Absent	439 (53.3)	17 (51.5)	123 (50.6)	0.842	0.466	0.923
Present	385 (46.7)	16 (48.5)	120 (49.4)			
Recurrent operation						
Absent	744 (90.3)	26 (78.8)	239 (98.4)	**0.032**	<**0.001**	<**0.001**
Present	80 (9.7)	7 (21.2)	4 (1.6)			
Complaint						
Control	258 (31.3)	4 (12.1)	51 (21)	0.064	**0.003**	0.246
Pelvic pain	464 (56.3)	27 (81.8)	164 (67.5)			
Abnormal bleeding	88 (10.7)	2 (6.1)	28 (11.5)			
Infertility	14 (1.7)	0	0			
Operation						
Ovarian biopsy	9 (1.1)	0	8 (3.3)	<**0.001**	<**0.001**	<**0.001**
Cystectomy	147 (17.8)	6 (18.2)	7 (2.9)			
Salpingooopherectomy	158 (19.2)	18 (54.5)	24 (9.9)			
Hysterectomy + salpingooopherectomy	510 (61.9)	9 (27.3)	204 (84)			
Laterality						
Left	298 (36.2)	9 (27.3)	51 (21)	0.467	<**0.001**	0.358
Right	275 (33.4)	11 (33.3)	64 (26.3)			
Bilateral	251 (30.5)	13 (39.4)	128 (52.7)			
Endometrial biopsy						
Absent	535 (64.9)	13 (39.4)	80 (32.9)	**0.003**	<**0.001**	0.460
Present	289 (35.1)	20 (60.6)	163 (67.1)			

Abbreviations: SD = standard deviation.
[a] Independent samples t thest and chi-square test were applied.

The study performed by Glyfason et al. observed that age-specific incidence especially in 40–44 aged women increases recently due to accelerating awareness and diagnostic accuracy [24]. However, clinicians should be careful about the ultrasonographic appearance of endometrioma in advanced age. The atypical appearance including solid components and papillary projections replaces the typical ground glass echogenicity of the cyst [25]. The patients should be informed about the increase in the lifetime risk of ovarian cancer especially in endometrioma with atypical appearance. While the follow-up ± hormonal therapy or surgery can be preferred in the cases of small typical endometrioma, removal of ovaries, instead of cystectomy, together with bilateral salpingectomy should be recommended in the case of atypical or recurrent or long-standing endometriomas in advanced age women [6].

Presentation of new information about the incidence of endometrioma in women over 40 years of age is the strength of our study. Other studies investigating this issue have included the younger women by keeping the age range wider (Table 7). To the best of our knowledge, there is only one publication in the literature evaluating the prevalence of endometrioma in women over 40 years of age [25]. Similar to our study, they found the prevalence of endometrioma as 20.7 % in this age group. On the other hand, Haas et al. evaluated the prevalence of

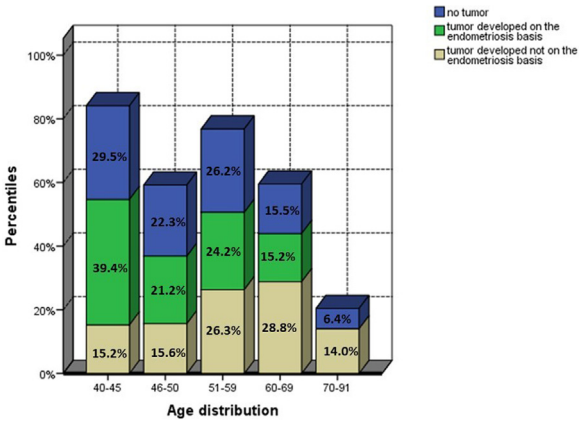

Fig. 3. Schematic representation showing the distribution of malignant transformation of adnexial masses associated with endometriosis regarding age in women over 40 years of age.

endometrioma rather than adnexial mass in all age groups and they found the frequency of endometrioma 40 % in women over 40 years of age [7]. The study performed by Van Holsbeke et al. determined the frequency of endometrioma between the ages of 9 and 94 years without further age-based analysis [26]. Another strength of our study is that the importance of malignant transformation of endometrioma in this age group was emphasized.

The present study has several limitations. First, our study was performed with a retrospective design. The association between endometriosis scores such as revised American Society for Reproductive Medicine (rASRM) and malignant transformation could not be documented becasue of inadequate hospital records. Second, the incidence rates can be underestimated due to the presence of asymptomatic endometrioma during long periods. Only women with surgically-proven endometrioma were included in our study. Third, we could not compare the severity of endometriosis regarding different age groups due to the retrospective design of our study.

Table 6
The comparison of the premenopausal and postmenopausal patients in the study group.

Characteristics	Premenopausal women with endometrioma (n = 238, mean ± SD or number (%))	Postmenopausal women with endometrioma (n = 61, mean ± SD or number (%))	*p value*[a]
Age	47.4 ± 4.7	54.9 ± 8.8	<**0.001**
Parity			
0	55 (23.1)	5 (8.2)	**0.009**
≥1	183 (76.9)	56 (91.8)	
Age groups			
40–45 years	98 (41.2)	6 (9.8)	<**0.001**
46-50 years	71 (29.8)	14 (23)	
51-59 years	67 (28.2)	26 (42.6)	
60–69 years	2 (0.8)	11 (18)	
70-91 years	0	4 (6.6)	
Infertility			
Absent	199 (83.6)	55 (90.2)	0.202
Present	39 (16.4)	6 (9.8)	
Comorbidity			
Absent	126 (52.9)	19 (31.1)	**0.002**
Present	112 (47.1)	42 (68.9)	
Drug usage			
Absent	144 (60.5)	29 (47.5)	0.067
Present	94 (39.5)	32 (52.5)	
Recurrent operation			
Absent	194 (81.5)	56 (91.8)	0.053
Present	44 (18.5)	5 (8.2)	
Complaint			
Control	40 (16.8)	14 (23)	0.326
Pelvic pain	148 (62.2)	33 (54.1)	
Abnormal bleeding	37 (15.5)	13 (21.3)	
Infertility	13 (5.5)	1 (1.6)	
Operation			
Ovarian biopsy	1 (0.4)	1 (1.6)	<**0.001**
Cystectomy	87 (36.6)	6 (9.8)	
Salpingooopherectomy	59 (24.8)	26 (42.6)	
Hysterectomy + salpingooopherectomy	91 (38.2)	28 (45.9)	
Laterality			
Left	73 (30.7)	25 (41)	0.303
Right	72 (30.3)	15 (24.6)	
Bilateral	93 (39.1)	21 (34.4)	
Endometrial biopsy			
Absent	176 (73.9)	31 (50.8)	<**0.001**
Present	62 (26.1)	30 (49.2)	
Malignite			
Absent	216 (90.8)	50 (82)	0.051
Tumor associated with endometriosis	22 (9.2)	11 (18)	

Abbreviations: SD = standard deviation.
[a] Independent samples *t*-test and chi-square test were applied.

Table 7
The comparison of the literature searching the prevalence of endometrioma in advanced age women.

LITERATURE REVIEW						
Authors	Journal	Year	Whole sample size	Endometrioma prevalence in whole sample	Number of women >40 years	Endometrioma prevalence in >40 years
Van Holsbeke et al*	Ultrasound Obstet Gynecol	2010	3511 (9–94 years)	713 (20.3 %)	–Mean age for endometrioma:34	
Haas et al**	Arch Gynecol Obstet	2012	42079 (0–95 years)	42079 (100 %)	16969	16969 (40.3)
Guerriero et al	Human Reprod	2016	3419 (>18 years)	1005 (29.3 %)	1491	308 (20.7 %)
Our study			1100 (>40 years)	299 (27.2 %)	1100	299 (27.2 %)

*No age-based analysis.
**Only patients with endometrioma were included in the study.

Conclusion

Even though it is ascertained that endometriosis is a disease of reproductive-aged women, it should be kept in mind that it can occur or recur over 40 years of age. Detailed anamnesis and careful gynecological examination provide key information for differential diagnosis. The developmental time of the endometrioma cannot be clearly determined in any patient. However, we should not forget "endometrioma" in differential diagnosis of adnexial mass during menopause in advanced age. Accurate and specific information about the risk of malignant transformation and appropriate management strategies should be shared with these women. Further research should be required to identify the differences in different age groups and to understand the link between endometrioma and malignant transformation in advanced age group.

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Declaration of Competing Interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this paper.

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