Original article

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Surgical Management Of Benign Uterine And Adnexal Masses

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Hysterectomy is the most frequently performed gynecological procedure, and adnexal removal is associated with increased health risks and shortened life expectancy. Transvaginal sonography is essential for the diagnosis of adnexal masses, which can be functional, inflammatory, benign, or malignant. Myomas are the most common benign tumors of the reproductive age and can significantly affect the quality of life.

The aim of the study was to examine differences regarding the management of benign adnexal masses and uterine fibroids by comparing current surgical approaches with those employed a decade ago and to assess the potential iatrogenic impact of these surgical interventions on women's reproductive health.

This retrospective observational cohort study was conducted at two time points. Operative records of patients surgically treated form 2012 - 2013 and from 2021 - 2023 were reviewed. They were divided into group undergoing surgery for benign adnexal pathology and group with uterine fibroids surgery.

Among patients operated on between 2021 and 2023, histopathological findings showed functional cysts in 14 (13.73%) patients, compared to 23 (22.12%) patients in the 2012–2013 period. Significantly more surgeries were performed by laparotomy in the 2021–2023 period, whereas minimally invasive approaches were more frequent in 2012–2013 ($p < 0.001$). Myomectomy was performed in younger patients in both periods ($p < 0.05$). Significantly more hysterectomies were performed in 2012–2013 ($p < 0.001$).

There was a trend toward a reduced number of hysterectomies for uterine fibroids and more frequent preservation of the adnexa during hysterectomy. Adnexal surgeries should be critically

indicated to avoid unnecessary procedures and potentially harmful iatrogenic effects on women's health and fertility.

Key words: ovarian neoplasms, ovarian cysts, leiomyoma, hysterectomy

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Hirurško lečenje benignih masa materice i adneksa

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Histerektomija je jedna od najčešći operativnih procedura. Histerektomija sa odstranjenjem adneksa dovodi do povećanja zdravstvenih rizika i skraćenja života žene. Transvaginalna sonografija je najznačajnije dijagnostičko sredstvo za dijagnostiku cističnih adneksalnih masa, koje se mogu podeliti na funkcionalne ciste, inflamatorne procese, benigne i maligne tumore. Miomi su najčešći benigni tumori uterusa kod žena u fertilnom periodu i oni mogu imati veliki uticaj na kvalitet života žene.

Cilj ovog istraživanja je bio da se utvrdi da li postoji promena u pristupu lečenja benignih adneksalnih masa i mioma uterusa poređenjem aktuelnog pristupa i u periodu pre deset godina, kao i postojanje potencijalno štetnih jatrogenih uticaja na reproduktivno zdravlje operisanih žena. Načinjen je pregled baze pacijentkinja koje su lečene operativno u periodu od 2012. do 2013. godine i od 2021. do 2023. godine. Prvu grupu su činile pacijentkinje operisane zbog benignih promena na adneksama. Druga grupa se sastojala od pacijentkinja iste starosne strukture, operisanih zbog miomatozno izmenjene materice.

Od ukupnog broja operisanih pacijentkinja u periodu od 2021 do 2023, histopatološki nalaz pokazao je funkcionalne ciste kod 14 (13,73%) pacijenata, a u periodu od 2012 do 2013. bilo je 23 (22,12%) pacijenta. Utvrđeno je da je 2021-2023. godine statistički značajno više operacija rađeno laparotomijom, dok je 2012-2013. godine više operacija ovarijalnih cisti rađeno minimalno invazivnim pristupom ($p<0,001$). Dobijeni podaci pokazuju da je kod mlađih pacijentkinja rađena miomektomija u oba ispitivana perioda ($p<0,05$). Značajno više histerektomija rađeno je 2012-2013. godine ($p<0,001$).

Postoji trend smanjenja broja histerektomija zbog mioma na uterusu kao i češćeg očuvanja adneksa prilikom histerektomije. Operacije na adneksama moraju se kritički sprovoditi uz pažljivo biranje indikacija radi izbegavanje nepotrebnih zahvata.

Ključne reči: tumori ovarijuma, ovarijalne ciste, histerektomija, miomi

Introduction

Hysterectomy is one of the most frequently performed surgical procedures. (1) This procedure is often accompanied by removal of the adnexa, which can lead to premature surgical menopause, increased risk of cardiovascular, metabolic and osteoporotic diseases, as well as shortened life expectancy. (2)

Benign changes on the ovaries are the most common finding in women of reproductive age and significantly exceed the frequency of malignant lesions. (3) Transvaginal ultrasonography is a key diagnostic method in the evaluation of adnexal masses. Most ovarian cystic lesions, especially simple unilocular cysts measuring less than 5 cm in premenopausal women, have a benign nature, while complex and multilocular formations with septa and papillary growths are significantly more often associated with malignancy. (4,5) In order to standardize ultrasound evaluation, the American College of Radiology developed the O-RADS system, which includes a standardized lexicon and evidence-based risk stratification, allowing high accuracy in assessing the probability of malignancy, especially in the early stages of the disease. (6) Adnexal masses may be classified as functional cysts, inflammatory processes, benign tumors, and malignant tumors. (7,8)

Uterine fibroids (*leiomyoma uteri*) represent the most common benign tumors of the uterus in women of reproductive age and can significantly impair the quality of life, as well as reproductive health, being associated with infertility, repeated spontaneous abortions and premature birth. (9) The therapeutic approach is individualized and depends on the size, number and localization of fibroids, the clinical presentation, the patient's age and the desire to preserve fertility. (10) Treatment can be medical or surgical, with hysterectomy remaining a common therapeutic option in women who have completed their reproductive period, with significant influence of physician preferences on therapeutic decision-making. (11,12)

The Aim

To determine changes in the management of benign adnexal masses and uterine fibroids by comparing current surgical approaches with those employed a decade ago and to assess the potential iatrogenic impact of these surgical interventions on women’s reproductive health.

Materials and Methods

This retrospective observational cohort study was conducted at two time points. Operative records of patients surgically treated at the Clinic of Gynecology and Obstetrics from January 2012 to December 2013 and from February 2021 to February 2023 were reviewed.

Inclusion criteria were: age at the time of surgery (18 to 45 years), histopathological diagnosis of a benign ovarian mass, with emphasis on functional ovarian cysts, or an uterine fibroid (made after the surgery). Group one included patients operated on for benign adnexal pathology (surgical approach - cystectomy, adnexectomy, ovarian resection). A second group included patients of the same age structure operated on for uterine fibroids. Procedures included myomectomy and hysterectomy with or without adnexal preservation. Surgical approach (minimally invasive vs. open) was also analyzed. Exclusion criteria were malignant diseases of the uterus and adnexa, incomplete data and patients older than 45 years.

Categorical data were analyzed using the Chi-square and Fisher's exact tests. Continuous data were analyzed using the t-test, with $p < 0.05$ considered statistically significant.

Results

The study included 171 patients operated on between 2021 and 2023 and 206 patients operated on between 2012 and 2013, all for benign tumors of the adnexa or uterus. Mean age was 35.64 ± 6.38 years (2012–2013) and 38.76 ± 7.54 years (2021–2023).

In the 2021–2023 period, 102 surgeries for benign adnexal masses were performed. Adnexectomy was performed on 32.35% of patients, cistectomy on 57.84% and ovarian resection on 5.88% of patients. Histopathological findings showed functional cysts in 14 (13.73%) patients, with the mean age of 38.13 ± 4.43 years. (Table 1)

Table 1. Surgical treatment of benign ovarian cysts in the period from 2022 to 2023.

operation	years of age	Operative approach laparotomy/laparoscopy			number/percent
Adnexectomy	35.52+6.07	2	31	*p=0.00*¥*	33 (32.35%)
Cystectomy	32.45+7.01	32	27	*p=0.00**	59 (57.84%)
Ovarian resection	35.0+4.52	2	4	*p=0.57¥*	6 (5.88%)

*statistical significance *p<0,05; ¥ - Fisher's exact test*

In the 2012–2013 period, 104 adnexal surgeries were performed, of which 36.92% adnexectomy, 69.23% cystectomy and 3.85% ovarian resection, with functional cysts identified in 23 (22.12%) patients, whose mean age was 31.75 ± 7.87 years. (Table 2)

Table 2. Surgical treatment of benign ovarian cysts in the period from 2012 to 2013.

operation	years of age	Operative approach laparotomy/laparoscopy			number/percent
Adnexectomy	37.44+7.31	9	19	*p=0.00**	28 (36.92%)
Cystectomy	30.53+-5.08	49	23	*p=0.00**	72 (69.23%
Ovarian resection	34.25+2.22	1	3	*p=0.49¥*	4 (3.85%)

*statistical significance *p<0,05; ¥ - Fisher's exact test*

There was no statistically significant difference in the number of surgeries for functional cysts between the two periods (p = 0.12), but patients operated on between 2021 and 2023 were significantly older (p = 0.02). Significantly more surgeries were performed by laparotomy in 2021–2023, whereas minimally invasive approaches were more common in 2012–2013 (p < 0.001). (Table 3)

Table 3. Surgical treatment of functional ovarian cysts in the period from 2021 to 2023 and from 2012 to 2013.

	2021-2023	2012-2013	
operation	number/percent	number/percent	
Adnexectomy	6 (5.88%)	11 (10.58%)	
Cystectomy	4 (3.92%)	9 (8.65%)	
Ovarian resection	4 (3.92%)	3 (2.88%)	
total	14 (13.73%)	23 (22.12%)	*p=0.12*

*statistical significance *p<0,05;*

In the 2021–2023 period, 69 surgeries for uterine fibroids were performed: myomectomy in 78.26% of patients, hysterectomy with adnexectomy in 7.25%, and hysterectomy with adnexal preservation in 14.49%. (Table 4) In the 2012–2013 period, 102 fibroid surgeries were performed: myomectomy in 52.94%, hysterectomy with adnexectomy in 34.31%, and hysterectomy with adnexal preservation in 12.75%. (Table 5)

Table 4. Surgical treatment of uterine fibroids in the period from 2022 to 2023.

operation	years of age	Operative approach laparotomy/laparoscopy			number/percent
Myomectomia	37.35+5.09	9	45	*p=0.00**	54 (78.26%)
Histerectomia cum adnexectomiam bill	41.7+1.83	0	5	*p=0.01*¥*	5 (7.25%)
Histerectomia cum conservatio adnexae	40.88+3.09	0	10	*p=0.00*¥*	10 (14.49%)

*statistical significance *p<0,05*; ¥ - *Fisher's exact test*

Table 5. Surgical treatment of uterine fibroids in the period from 2012 to 2013.

operation	years of age	Operative approach laparotomy/laparoscopy			number/percent
Myomectomia	37.06+5.66	15	39	*p=0.00**	54 (52.94%)
Histerectomia cum adnexectomiam bill	45.49+3.66	0	35	*p=0.00*¥*	35 (34.31%)
Histerectomia cum conservatio adnexae	41.2+2.82	1	12	*p=0.00*¥*	13 (12.75%)

*statistical significance *p<0,05*; ¥ - *Fisher's exact test*

More procedures were performed using open surgery compared to minimally invasive approaches in both periods ($p < 0.001$). Myomectomy was performed in younger patients in both periods ($p < 0.05$), with no significant age difference between periods ($p = 0.39$). Significantly more

hysterectomies were performed in 2012–2013 ($p < 0.001$). In relation to the total number of HTAs performed, in the period 2021-2023 there were more HTAs with adnexal conservation compared to the period 2012-2013 ($p<0.05$), while there was no difference in the age of patients who underwent surgery with adnexal conservation ($p>0.05$).

Discussion

This study provides a deeper insight into the dynamics of operative treatment of ovarian and uterine benign diseases across two time-separated periods, suggesting significant changes in clinical decision-making and therapeutic priorities. Comparative data analysis shows that the evolution of surgical practice is not linear, but rather conditioned by the interaction of demographic, diagnostic, surgical and institutional factors.

One of the key findings is a statistically significant increase in the average age of patients in the period 2021–2023. This result is in accordance with the globally observed trend of delaying reproduction, which directly affects the clinical presentation of benign gynecological diseases and the threshold for surgical intervention (13,14). As life expectancy increases, the need for a more cautious diagnostic and therapeutic strategy also increases, especially in the context of adnexal masses in which it is necessary to reliably exclude malignancy (15,16).

The frequency of surgical treatment of functional cysts did not differ significantly between the periods analyzed, demonstrating that operative indications for surgery in this subgroup have remained relatively unchanged over time (15). However, the fact that patients in the more recent period were significantly older indicates a different clinical context in which the decision to treat surgically is made. In older women, even morphologically benign changes more often require surgical verification due to increased oncological risk and limited tolerance for diagnostic uncertainty (6, 8, 16).

Of particular note is the reassessment in the choice of surgical approach, with a higher prevalence of laparotomy in the period 2021–2023. Although this finding at first glance deviates from current recommendations favoring minimally invasive surgery, it likely reflects more complex clinical scenarios, larger lesion sizes, and the need for oncological safety in borderline cases (17-19).

A marked and clinically relevant shift toward more conservative surgical strategies has been observed in the treatment of uterine fibroids. The significantly higher incidence of myomectomy in recent times indicates a strengthening of the concept of uterine preservation, which is conforming with the rules of contemporary recommendations and leading clinical guidelines (20,21,22).

At the same time, the significant decrease in the number of hysterectomies, especially those followed by adnexectomy, reflects a paradigm shift in understanding the long-term consequences of these procedures. Numerous studies indicate that the loss of ovarian function, even in women of non-reproductive age, can have far-reaching negative effects on cardiovascular, metabolic, and neurocognitive health (18,19,23-25).

It is important to point out that myomectomies in both periods were consistently performed in younger patients, with no significant difference in their age, which indicates the stability of clinical indications for this procedure and the long-term establishment of the principle of fertility preservation (20,21).

One of the most significant findings of the study is the increased frequency of hysterectomies with adnexal conservation in the period 2021–2023. This change indicates a clear acceptance of the concept of functional ovarian preservation, in accordance with data showing that adnexectomy in pre- and perimenopausal women carries an increased risk of premature ovarian failure and associated morbidity (19,23,26).

The absence of a difference in the age of patients in whom adnexal conservation was performed further confirms that decisions are increasingly based on individual risk-benefit assessments, and less on rigid age criteria, which is in line with the modern concept of personalized gynecological surgery (27).

Advances in ultrasound diagnostics, especially with the use of the IOTA and ADNEX models, have significantly improved the preoperative assessment of adnexal masses (7). However, more precise risk stratification does not necessarily lead to a uniform reduction in invasiveness, but rather allows for a more selective choice of surgical approach, especially in cases with borderline findings, where oncological safety takes priority (28). Recent studies focus on assessing ovarian reserve damage following surgery for benign ovarian cysts, indicating that electrocauterization during

laparoscopic ovarian surgery significantly impairs ovarian reserve. Careful assessment of the extent of surgery is crucial to preserve healthy ovarian tissue. (29,30)

The greatest diagnostic and therapeutic challenge involves masses that are neither clearly benign nor clearly malignant. Avoiding unnecessary surgical interventions is especially important in young women, as such procedures may adversely affect fertility and overall reproductive health. Although it is impossible to completely eliminate unnecessary adnexal surgeries, their frequency should be reduced. (31,32)

At the same time, the role of surgical experience, the availability of minimally invasive techniques, and institutional protocols remains an important factor in the implementation of current recommendations, as has been repeatedly confirmed in studies analyzing “real-world” clinical practice (33,34).

Limitations of this research include the ambispective observational cohort study design and the lack of data on long-term reproductive, endocrine, and quality of life outcomes, which limits the possibility of drawing definitive conclusions about the functional consequences of treatment. However, the analysis of a large number of patients and the direct comparison of two time periods at the same institution represent a significant strength of the study and provide reliable insight into the evolution of surgical practice.

Conclusion

Based on our research, there is a clear trend towards a decrease in the number of hysterectomies for uterine fibroids, with an increasing emphasis on adnexal conservation. Given the importance of preserving ovarian function and reproductive potential, surgical interventions on the ovaries must be carefully indicated and individualized. Critical assessment of clinical findings, application of modern diagnostic methods and adherence to evidence-based recommendations are crucial for reducing unnecessary surgical procedures and minimizing potentially harmful iatrogenic consequences for a woman's health and fertility.

References

1. Thurston J, Murji A, Scattolon S, Wolfman W, Kives S, et al. No. 377-Hysterectomy for Benign Gynaecologic Indications. J Obstet Gynaecol Can 2019;41(4):543-57. doi: 10.1016/j.jogc.2018.12.006
2. Farghaly SA. Current diagnosis and management of ovarian cysts. Clin Exp Obstet Gynecol 2014;41(6):609-12. doi: 10.12891/ceog20322014
3. Pascual MA, Hereter L, Tresserra F, Carreras O, Ubeda A, et al. Transvaginal sonographic appearance of functional ovarian cysts. Hum Reprod 1997;12(6):1246-9. doi: 10.1093/humrep/12.6.1246.
4. Granberg S, Wikland M, Jansson I. Macroscopic characterization of ovarian tumors and the relation to the histological diagnosis: criteria to be used for ultrasound evaluation. Gynecol Oncol 1989;35:139–44. doi: 10.1016/0090-8258(89)90031-0.
5. Minaretzis D, Tsionou C, Tziotziotis D, Michalas S, Aravantinos D. Ovarian tumors: prediction of the probability of malignancy by using patient's age and tumor morphologic features with a logistic model. Gynecol Obstet Invest 1994; 38: 140–4. doi: 10.1159/000292467.
6. Shen L, Sadowski EA, Gupta A, Maturen KE, Patel-Lippmann KK, Zafar HM, et al. The Ovarian-Adnexal Reporting and Data System (O-RADS) US Score Effect on Surgical Resection Rate. Radiology 2024; *313*(1), e240044. doi: 10.1148/radiol.240044
7. Osmers RGW, Osmers M, von Maydell B, Kuhn W. Evaluation of ovarian tumors in the postmenopause by transvaginosonography. Eur J Obstet Gynecol Reprod 1998;77:81–8. doi:10.1016/s0301-2115(97)00235-2.
8. American College of Obstetricians and Gynecologists' Committee on Practice Bulletins–Gynecology. Management of Symptomatic Uterine Leiomyomas: ACOG Practice Bulletin, Number 228. Obstet Gynecol. 2021 Jun 1;137(6):e100-e115. doi: 10.1097/AOG.0000000000004401.
9. Lefebvre G, Vilos G, Allaire C, Jeffrey J, Arneja J, et al. Clinical Practice Gynaecology Committee, Society for Obstetricians and Gynaecologists of Canada. The management of uterine leiomyomas. J Obstet Gynaecol 2003 May;25(5):396-418. doi: 10.1016/S1701-2163(16)30582-5

10. Sabry M, Al-Hendy A. Medical treatment of uterine leiomyoma. Reprod Sci. 2012 Apr;19(4):339-53. doi: 10.1177/1933719111432867
11. Petric A, Tubic Pavlovic A, Djordjevic I, Vucetic D, Zivadinovic R, et al. Echinococcosis of Iliopsoas Muscle and Anaphylaxis as the Cause of Urgent Laparotomy. West Indian med 2014;1(3):111-13. doi: 10.7727/wimjopen.2014.218
12. Mills M, Rindfuss RR, McDonald P, Te Velde E, ESHRE Reproduction and Society Task Force. Why do people postpone parenthood? Reasons and social policy incentives. Hum Reprod Update. 2011;17(6):848–60. doi: 10.1093/humupd/dmr026.
13. Schmidt L, Sobotka T, Bentzen JG, Nyboe Andersen A, ESHRE Reproduction and Society Task Force. Demographic and medical consequences of the postponement of parenthood. Hum Reprod Update. 2012;18(1):29–43. doi: 10.1093/humupd/dmr039.
14. Levine D, Brown DL, Andreotti RF, Benacerraf B, Benson CB, Brewster WR, et al.; Society of Radiologists in Ultrasound. Management of asymptomatic ovarian and other adnexal cysts imaged at US: Society of Radiologists in Ultrasound Consensus Conference Statement. Radiology. 2010;256(3):943–54. doi:10.1148/radiol.10100213.
15. Timmerman D, Ameye L, Fischerova D, Epstein E, Melis GB, Guerriero S, et al.; IOTA group. Simple ultrasound rules to distinguish between benign and malignant adnexal masses before surgery: prospective validation by IOTA group. BMJ. 2010;341:c6839. doi: 10.1136/bmj.c6839.
16. Aarts JW, Nieboer TE, Johnson N, Tavender E, Garry R, Mol BW, et al. Surgical approach to hysterectomy for benign gynaecological disease. Cochrane Database Syst Rev. 2015;(8):CD003677. doi: 10.1002/14651858.CD003677.pub3.
17. Parker WH, Broder MS, Chang E, Feskanich D, Farquhar C, Liu Z, et al. Ovarian conservation at the time of hysterectomy and long-term health outcomes in the Nurses' Health Study. Obstet Gynecol. 2009;113(5):1027–37. doi: 10.1097/AOG.0b013e3181a3f2d3.
18. Parker WH. Bilateral oophorectomy versus ovarian conservation: effects on long-term women's health. J Minim Invasive Gynecol. 2010;17(2):161–6. doi: 10.1016/j.jmig.2009.10.013.
19. Stewart EA. Uterine fibroids. Lancet. 2001;357(9252):293–8. doi: 10.1016/S0140-6736(00)03684-3.

20. Bulun SE. Uterine fibroids. N Engl J Med. 2013;369(14):1344–55. doi: 10.1056/NEJMra1209993.
21. Orozco LJ, Salazar A, Clarke J, Tristan M. Hysterectomy versus hysterectomy plus oophorectomy for premenopausal women. Cochrane Database Syst Rev. 2008;(3):CD005638. doi: 10.1002/14651858.CD005638.pub2.
22. Laughlin-Tommaso SK, Khan Z, Weaver AL, Smith CY, Rocca WA, Stewart EA. Cardiovascular and metabolic morbidity after hysterectomy with ovarian conservation: a cohort study. Menopause. 2018;25(5):483–92. doi: 10.1097/GME.0000000000001041.
23. Rocca WA, Grossardt BR, Shuster LT. Oophorectomy, estrogen, and dementia: a 2014 update. Mol Cell Endocrinol. 2014;389(1–2):7–12. doi: 10.1016/j.mce.2014.03.012.
24. Shuster LT, Gostout BS, Grossardt BR, Rocca WA. Prophylactic oophorectomy in premenopausal women and long-term health. Menopause Int. 2008;14(3):111–6. doi: 10.1258/mi.2008.008016.
25. Rocca WA, Bower JH, Maraganore DM, Ahlskog JE, Grossardt BR, De Andrade M, et al. Increased risk of cognitive impairment or dementia in women who underwent oophorectomy before menopause. Neurology. 2007;69(11):1074–83. doi: 10.1212/01.wnl.0000279405.98832.ef.
26. Van Calster B, Van Hoorde K, Valentin L, Testa AC, Fischerova D, Van Holsbeke C, et al.; IOTA group. Evaluating the risk of ovarian cancer before surgery using the ADNEX model to differentiate between benign, borderline, early and advanced stage invasive, and secondary metastatic tumours: prospective multicentre diagnostic study. BMJ. 2014;349:g5920. doi: 10.1136/bmj.g5920.
27. ESHRE Guideline Group on Female Fertility Preservation, Anderson RA, Amant F, Braat D, D'Angelo A, Chuva de Sousa Lopes SM, et al. ESHRE guideline: female fertility preservation. Hum Reprod Open. 2020;2020(4):hoaa052. doi: 10.1093/hropen/hoaa052.
28. Timmerman D, Planchamp F, Bourne T, Landolfo C, du Bois A, Chiva L, et al.; ESGO/ISUOG/IOTA/ESGE. ESGO/ISUOG/IOTA/ESGE Consensus Statement on pre-operative diagnosis of ovarian tumors. Int J Gynecol Cancer. 2021;31(7):961–82. doi: 10.1136/ijgc-2021-002625.
29. Murdock C, Sanchez-Ramos L, McKinney J, Carrubba A, Lewis G. The impact of laparoscopic cystectomy for ovarian endometrioma on anti-Müllerian hormone levels: a

systematic review and meta-analysis. Gynecol Obstet Invest. 2025;90(6):657–71. doi: 10.1159/000545230.

30. Deckers P, Ribeiro SC, Simoes RDS, Miyahara C, Baracat EC. Systematic review and meta-analysis of the effect of bipolar electrocoagulation during laparoscopic ovarian endometrioma stripping on ovarian reserve. Int J Gynaecol Obstet. 2017;140(1):11–7. doi: 10.1002/ijgo.12338.
31. Liu C, Zhu Y, Dai K, Tan B, Dong H, Lin J, et al. Accurate prediction of benign and malignant adnexal tumors: early diagnosis helps avoid unnecessary surgical treatment and improve fertility-preserving management. J Ovarian Res. 2025;18:XX. doi: 10.1186/s13048-025-01707-1.
32. Rocha RM. Practical recommendations for the management of benign adnexal masses: emphasis on surveillance and fertility preservation. Rev Bras Ginecol Obstet. 2020;42(10):576–85. doi: 10.1055/s-0040-1714130.
33. Sisodia RM, Del Carmen MG, Boruta DM. Role of minimally invasive surgery in the management of adnexal masses. Clin Obstet Gynecol. 2015;58(1):66–75. doi: 10.1097/GRF.0000000000000086.
34. Peeraully R, Henderson K, Fairbrother K, Patel R, Fraser N, Shenoy M, et al. Effect of surgical specialty on the management of adnexal masses in children and adolescents: a cohort study. J Pediatr Adolesc Gynecol. 2020;33(1):89–92. doi: 10.1016/j.jpag.2019.06.007.