



HAL
open science

Evaluation of physicians' practice patterns in France concerning fertility preservation in women with endometriosis

H. Jourdain, H. Flye Sainte Marie, Blandine Courbiere, G. Lazaro, M. Boukerrou, P.L. Tran

► **To cite this version:**

H. Jourdain, H. Flye Sainte Marie, Blandine Courbiere, G. Lazaro, M. Boukerrou, et al.. Evaluation of physicians' practice patterns in France concerning fertility preservation in women with endometriosis. *Journal of Gynecology Obstetrics and Human Reproduction*, 2021, 50 (2), pp.101985. 10.1016/j.jogoh.2020.101985 . hal-03395938

HAL Id: hal-03395938

<https://amu.hal.science/hal-03395938v1>

Submitted on 2 Jan 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution - NonCommercial 4.0 International License

Evaluation of physicians' practice patterns in France concerning fertility preservation in women with endometriosis

H. Jourdain¹, H. Flye Sainte Marie¹, B. Courbiere^{2,3}, G. Lazaro⁴, M. Boukerrou^{1,5,6}, P.L. Tran^{1,5}

- 1) Service de Gynécologie-Obstétrique, Centre Hospitalier Universitaire Sud-Réunion, BP 350, 97448 Saint-Pierre, cedex
- 2) Centre d'Assistance Médicale à la Procréation, AP-HM La Conception, 147 bd Baille, 13005, Marseille, France
- 3) Aix Marseille Université, CNRS, IRD, Avignon Université, IMBE UMR 7263, 13397, Marseille, France
- 4) Institute of Cancer Research, 15 Cotswold Road, Sutton SM2 5NG, London, UK
- 5) Centre d'Etudes Périnatales Océan Indien Centre Hospitalier Universitaire Sud-Réunion, BP 350, 97448 Saint-Pierre, cedex
- 6) Unité de formation et de recherche santé de La Réunion, Faculté de Médecine, 97490 Saint Denis, Réunion

CORRESPONDING AUTHOR :

Hélène Jourdain

Centre Hospitalier Universitaire Sud-Réunion, Service de Gynécologie-Obstétrique,
BP 350, 97448 Saint-Pierre, cedex, France

Tél: +262 (0)2 62 35 91 35

Fax: +262 (0)2 62 35 91 14

Email : helene.jourdain@chu-reunion.fr

Abstract

Objective: We aim to evaluate the knowledge and physicians' practices concerning fertility preservation in women with endometriosis.

Design: Descriptive, observational, national study using an online self-questionnaire, sent by email to French gynaecologists in October 2019 within 2 months.

Results: We obtained 110 analyzable responses from mainly surgeons (54%) and reproductive clinicians (19%) with a good experience (average 15 years of practice). Amongst these practitioners, 91% seemed aware of latest French recommendations on endometriosis issued in December 2017. The most commonly used surgical techniques for management of endometriomas were intra-peritoneal cystectomy (51%), vaporization by plasma energy (29%) and destruction by bipolar coagulation (8.5%). Preoperative AMH was systematically or often prescribed by 78% of the practitioners against 37.3% who did it postoperatively. Furthermore, 74% also considered and performed fertility preservation strategy to manage endometriosis. It was offered in situations of bilateral or recurrent endometrioma, but only 33% offered it in unilateral endometrioma cases. In the cases recorded, vitrification of mature oocytes appears to be the most common fertility preservation technique (used by 87% of the practitioners).

Conclusion: We observed in our population of sensitized practitioners a good and adequate knowledge concerning endometriosis physiopathology and recommendations for its management, with good information delivery to women. Operating techniques are adapted although information and education concerning fertility preservation indications seem necessary. The place of multidisciplinary concertation meeting in endometriosis appears essential both for discussion of

surgical indications and for fertility preservation possibilities. Creation of dedicated structures should be encouraged.

Keywords

physicians' practice, fertility preservation, endometriosis

Abbreviations

AFS: American Fertility Society

AMH: Anti-Mullerian Hormone

CNGOF: French College of Gynaecologists and Obstetricians

FP: Fertility Preservation

HAS: French National Authority for Health

IVF: In Vitro Fertilization

OR: Ovarian Reserve

PFO: Premature Ovarian Failure

SCGP: Society of Gynecological and Pelvic Surgery

Acknowledgements

None

Funding sources

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Introduction

According to French law, "any person whose medical care is likely to impair fertility, or whose fertility is likely to be prematurely impaired, may benefit from collection and conservation of gametes or germinal tissues, and may benefit from assisted reproductive technology for restoration of fertility". Initially developed to be performed prior to cancer treatment, fertility preservation (FP) has now been extended to benign indications: autoimmune diseases treated with gonadotoxic agents, risk of premature ovarian failure, etc... The most commonly used techniques are: vitrification of mature oocytes after controlled ovarian hyperstimulation and cryopreservation of ovarian tissue after oophorectomy by laparoscopy.

Endometriosis is a common benign gynecological condition affecting about one in ten women [1]. It is often associated with infertility [2]. Though the cause-effect relationship remains controversial, the etiology of infertility may lay within the manifestation of endometriosis itself; tubal obstruction secondary to adhesions, chronic pelvic inflammation responsible for impairment of tubal ciliary action [3], endometrial receptivity disorder, reduction in ovarian reserve [4]; and surgical treatment of endometriosis is furthermore likely to have a negative impact on the follicular capital. Affected patients are therefore potential candidates for fertility preservation.

The aim of our study was to evaluate the knowledge and physicians' practices of French gynaecologists concerning FP in women with endometriosis.

Materials and Methods

We carried out a descriptive, observational, national study. An evaluation by self-questionnaire, available online (<https://docs.google.com/forms/d/1UE->

5cGBB77h4WrKLXrfWEoGCa7eSTwut76qWDVm3JGk/prefill) was distributed by e-mail via different societies, including the Society of Gynecological and Pelvic Surgery (SCGP) and the French College of Gynaecologists and Obstetricians (CNGOF) between October and December 2019. Participation was voluntary, unpaid and anonymous. The guidelines of the French College of Gynaecologists and Obstetricians (CNGOF) and the French National Authority for Health (HAS) issued in December 2017, were used as reference to evaluate the clinical practices [5]. The data was collected using Google Form and statistical analysis performed by Google Sheet. Qualitative variables were expressed as numbers and percentages, and quantitative variables as means \pm standard deviation.

Results

We collected 110 analyzable responses. The socio-demographic characteristics of our respondents are presented in Table 1.

Clinical practice and training: Almost all of our population of gynecologists (98%, n=108) had patients with endometriosis with an estimated number of consultations of 122 ± 161 [2-800] per year. Among those who answered our questionnaire, 91% (n=100) seemed aware of latest recommendations. We have highlighted that more than a third of the practitioners (37%, n=41) had never received specific training on FP in endometriosis.

Knowledge of endometriosis: Global prevalence of endometriosis (10%) amongst women of reproduction age was correctly estimated by 70% (n=77) of our sampled practitioners. All (100%) considered endometriosis to be a factor of infertility and 91% (n=100) knew that it was not systematically pathological. Practitioners stated that diagnosis was mainly clinical (68%, n=75) and/or histological (70%, n=77).

Practices concerning fertility: Our findings revealed that 75% (n=83) reported that patients discussion about their fertility occurred “systematically” and 22% (n=24) described these to occur "often". In addition, 29% (n=32) of the practitioners also reported that women spontaneously and frequently discussed the impact and consideration for FP.

Surgical management: Figure 1 shows the most commonly used surgical techniques for management of endometriosis cysts: 51% performed intra-peritoneal cystectomy by "stripping" or divergent traction, 29% vaporization by plasma energy and 8.5% destruction by bipolar coagulation.

Surgeons in our cohort operated about 57 ± 69 [0-300] patients with endometriosis every year. Amongst our cohort, 64% (n=38) systematically indicated an AFS (American Fertility Society) score in their operation report. For 47.5% (n=28), prescription of Anti-Mullerian Hormone (AMH) dosage in preoperative care was systematic whilst 30.5% (n=18) often prescribed it. Only 37.3% (n=22) prescribed it systematically or often in a postoperative setting: 70% prescribed AMH at 3 months and 22% at 6 months. A medical treatment in post-operative period to suppress ovarian activity was prescribed by 88% (n=52) of the surgeons, of which oestroprogestative contraception was the preferred option for 59% (n=35) of them.

Fertility preservation practices: Practitioners worked in collaboration with a dedicated center for 90% (n=99) of them. Almost 75% (n=81) had already performed FP for endometriosis. The situations in which they offered it are presented in Table 2. The main inclusion parameter for FP decision was age (98%, n=85). The most commonly performed technique was vitrification of mature oocytes in 87% (n=58).

Discussion

To the best of our knowledge, this is the first study about physicians' practice patterns in the diagnosis and management of endometriosis.

The results show that the physiopathology of endometriosis and recommendations for its management, including FP were well known in the population of 110 practitioners who participated in our study. They often communicate the management strategies and address patients' expectations. They seem to deliver clear information about the opportunity of FP in most cases (75%), facing a population particularly well-aware and sensitized.

Preferentially performed operative techniques for the management of endometriomas by our sub-population of surgeons were: intra-peritoneal cystectomy, which is the reference treatment [5] and vaporization by plasma energy, the latter being potentially less harmful for the ovarian reserve (OR) at the cost of a higher number of recurrences of endometriomas [6-8]. Destruction by bipolar coagulation was still used, although it is no longer recommended [5].

An average of 57 patients per year was operated by each surgeon. The surgical level of expertise has previously been inversely correlated with the amount of healthy ovarian tissue removed during cystectomy [9-10]. Therefore "expert surgeons" in regional reference center [11] may be preferred for operations of patients with endometriosis. A national working group is currently dedicated to the creation of such structures on French territory.

Staging of rAFS [12] is not compulsory, and a third of our surgeons did not notify it in their operative report. Its use is nevertheless encouraged in order to facilitate

exchanges between professionals. AFS score can be integrated into the EFI score (endometriosis fertility index) [13], in order to adapt the treatment.

The adverse effects of removal of endometriomas are increasingly clear and AMH pre and post-surgery is a useful marker in assessing the degree of damage to the ovary.

In our analysis, it emerged that an evaluation of the OR, reliably predicted by a preoperative AMH measurement, was prescribed by only half of our surgeons.

Preoperative measurements can detect any alteration of OR which may be attributable to the disease. Moreover, ovarian cystectomy presents a risk, adversely impacting the follicular capital by removal or destruction of the healthy parenchyma surrounding the cyst, resulting in a significant reduction in post-operative AMH [14-16]. This risk seems to be higher in cases of endometriomas compared with other benign cysts [17], as well as in patients undergoing iterative interventions [18]. Bilateral surgery in patients may also trigger earlier menopause (42 years) and a higher incidence of premature ovarian failure (PFO) [19]. Finally, when facing an operation for severe endometriosis without planned cystectomy, knowledge of low preoperative AMH could guide the surgeon who will adapt his gesture in order to limit excessively large peri-ovarian dissections.

A limited number of physicians (37.3%) integrated AMH dosage in post-operative care. Although it is not part of the recommendations, it is interesting to assess the impact of the intervention on OR. There is a significant reduction in OR during the immediate post-cystectomy period [14-16], which could be explained by the unintentional removal of ovarian cortex surrounding the cyst. Medium-term influence of cystectomy on OR might be attributed to vascular compromise resulting from

excessive electrosurgical coagulation and postsurgical inflammation. A recovery of OR is possible with a variable capacity according to studies (Table 3). It can be explained by a favorable healing process with ovarian reperfusion [21] or a follicular cohort rearrangement [24]. It is thus difficult to predict the proper time to offer this control but it could be advisable not to dose AMH too early after cystectomy, not before 3 months at least. The majority (70%) of our surgeons prescribed it at that time.

Our cohort (88%) applies the prescription of a medical treatment in post-operative period, such as oestroprogestative contraception, in accordance with the recommendations [5], in order to reduce the risk of recurrence of endometriomas.

Our sample of experienced physicians appropriately applies recommendations for fertility preservation [26] in situations in which a systematic proposal should be made, such as bilateral endometriomas (77%) or recurrent endometriomas (96%) but only a few do so in cases of unilateral endometrioma (33%). Currently, fertility preservation is recommended facing endometriomas measuring ≥ 5 cm. Therefore efforts to increase awareness needs to be implemented.

Gynecologists also include FP in the management of isolated deep endometriosis in patients with reduced AMH (87%). However, there is no real framework for this situation and it should be discussed on a case-by-case basis according to age, marital status, OR, progressive nature of the lesions and the likelihood of using IVF techniques [26].

Although FP is included in endometriosis management, there is no consensus in the international literature on strategies for FP in this context, and some indications may be very close to societal demands. In this sense, it seems essential to discuss the demands for FP during multidisciplinary, multisite, specialized consultation meetings dedicated to endometriosis with the presence of a reproductive physician.

Cryopreservation of mature oocytes, mostly performed (87%) by our cohort, is the reference technique [27], since it is reliable. Cryopreservation of embryos or ovarian tissue remains a possible alternative.

We still need to define the best timing to offer this FP program to our patients. A critical factor is age, correlated with oocyte quality. It remains to be the main parameter involved in the decisions made by our cohort of physicians (98%). Importantly, age also correlates with the rate of embryonic aneuploidy wherein it appears to be increasing (>40%) at both extremes: before 23 and after 36 years old in general population [28]. The clinical significance of aneuploidy is undoubted. Cobo et al [29] found that the probability of live birth for patients >36 years are halved compared to patients \leq 35 years (19.9% vs 40.8%) when eight oocytes were used.

As such, evaluation of the benefit/risk ratio of this FP procedure should be extensively discussed beforehand. There is an inherent risk related to anesthesia, regardless of its mode during ovarian puncture but also a risk of post-puncture abscess that can reach 1.7% [30]. Encouragingly, the risk of a possible recurrence or increase in endometriosis-related pain by ovarian stimulation does not appear to be increased [31]. Also, the risk of ovarian hyperstimulation is normally ruled out by carrying out antagonist protocols, allowing for ovulation to be triggered by a GnRH

agonist. Nevertheless, the patient must be informed about risks, as well as the challenging pathway of the procedure, the possibility that several stimulation cycles may be necessary to achieve satisfactory egg accumulation and the low chance of reusing vitrified oocytes (9% in Cobo's study [29]).

One limitation of this study is the very low participation rate. Indeed, among 7865 gynecologists listed in France, we obtained only 110 answers. Practitioners who answered the questionnaire were those who were interested in endometriosis and who were dealing with the pathology for a long time (57 patients operated every year and 15 years of practice). This may explain their good knowledge and their sensitivity towards FP. Due to this major selection bias, our results cannot be extrapolated to the overall population of gynecologists in France.

Conclusion

In this study, among physicians responding to the questionnaire, we underlined good knowledge concerning endometriosis physiopathology and the associated risk of impaired fertility. Surgeons used appropriate operating techniques to preserve patients' ovarian prognosis but information and education concerning FP indications seemed necessary.

The place of multidisciplinary consultation meeting in endometriosis appears essential both for discussion of surgical indications and for FP possibilities. Creation of dedicated structures should be encouraged.

Fertility preservation must be carried out "neither too early nor too late" in order to achieve a significant chance of pregnancy for the patient later on. Nevertheless, it remains difficult to predict the risk of infertility in these patients with endometriosis,

with sometimes difficult situations close to societal FP. Finally, the possible cost to society is also an important parameter to take into account when setting up such a program, especially regarding the high frequency of endometriosis in general population.

Bibliographie

1. Viganò P, Parazzini F, Somigliana E, Vercellini P. Endometriosis: epidemiology and aetiological factors. *Best Pract Res Clin Obstet Gynaecol.* avr 2004;18(2):177-200.
2. Ozkan S, Murk W, Arici A. Endometriosis and infertility: epidemiology and evidence-based treatments. *Ann N Y Acad Sci.* avr 2008;1127:92-100.
3. Lyons RA, Djahanbakhch O, Saridogan E, Naftalin AA, Mahmood T, Weekes A, et al. Peritoneal fluid, endometriosis, and ciliary beat frequency in the human fallopian tube. *Lancet Lond Engl.* 19 oct 2002;360(9341):1221-2.
4. Kitajima M, Dolmans M-M, Donnez O, Masuzaki H, Soares M, Donnez J. Enhanced follicular recruitment and atresia in cortex derived from ovaries with endometriomas. *Fertil Steril.* avr 2014;101(4):1031-7.
5. HAS/CNGOF. Prise en charge de l'endométriose. 2017 déc p. 39.
6. Dan H, Limin F. Laparoscopic ovarian cystectomy versus fenestration/coagulation or laser vaporization for the treatment of endometriomas: a meta-analysis of randomized controlled trials. *Gynecol Obstet Invest.* 2013;76(2):75-82.
7. Mircea O, Puscasiu L, Resch B, Lucas J, Collinet P, von Theobald P, et al. Fertility Outcomes After Ablation Using Plasma Energy Versus Cystectomy in Infertile Women With Ovarian Endometrioma: A Multicentric Comparative Study. *J Minim Invasive Gynecol.* déc 2016;23(7):1138-45.
8. Roman H, Auber M, Mokdad C, Martin C, Diguët A, Marpeau L, et al. Ovarian endometrioma ablation using plasma energy versus cystectomy: a step toward better preservation of the ovarian parenchyma in women wishing to conceive. *Fertil Steril.* déc 2011;96(6):1396-400.
9. Muzii L, Marana R, Angioli R, Bianchi A, Cucinella G, Vignali M, et al. Histologic analysis of specimens from laparoscopic endometrioma excision performed by different surgeons: does the surgeon matter? *Fertil Steril.* mai 2011;95(6):2116-9.
10. Yu H-T, Huang H-Y, Soong Y-K, Lee C-L, Chao A, Wang C-J. Laparoscopic ovarian cystectomy of endometriomas: surgeons' experience may affect ovarian reserve and live-born rate in infertile patients with in vitro fertilization-intracytoplasmic sperm injection. *Eur J Obstet Gynecol Reprod Biol.* oct 2010;152(2):172-5.
11. Golfier F, Chanavaz-Lacheray I, Descamps P et al. The definition of Endometriosis Expert Centres. *J Gynecol Obstet Hum Reprod* 47 (2018) 179–181; 2018.
12. Revised American Society for Reproductive Medicine classification of endometriosis: 1996. *Fertil Steril.* mai 1997;67(5):817-21.
13. Adamson GD, Pasta DJ. Endometriosis fertility index: the new, validated endometriosis staging system. *Fertil Steril.* oct 2010;94(5):1609-15.
14. Streuli I, de Ziegler D, Gayet V, Santulli P, Bijaoui G, de Mouzon J, et al. In women with endometriosis anti-Müllerian hormone levels are decreased only in those with previous endometrioma surgery. *Hum Reprod Oxf Engl.* nov 2012;27(11):3294-303.
15. Raffi F, Metwally M, Amer S. The impact of excision of ovarian endometrioma on ovarian reserve: a systematic review and meta-analysis. *J Clin Endocrinol Metab.* sept 2012;97(9):3146-54.
16. Somigliana E, Berlanda N, Benaglia L, Viganò P, Vercellini P, Fedele L. Surgical excision of endometriomas and ovarian reserve: a systematic review on serum antimüllerian hormone level modifications. *Fertil Steril.* déc 2012;98(6):1531-8.

17. Rustamov O, Krishnan M, Roberts SA, Fitzgerald CT. Effect of salpingectomy, ovarian cystectomy and unilateral salpingo-oophorectomy on ovarian reserve. *Gynecol Surg.* 2016;13:173-8.
18. Muzii L, Achilli C, Lecce F, Bianchi A, Franceschetti S, Marchetti C, et al. Second surgery for recurrent endometriomas is more harmful to healthy ovarian tissue and ovarian reserve than first surgery. *Fertil Steril.* mars 2015;103(3):738-43.
19. Coccia ME, Rizzello F, Mariani G, Bulletti C, Palagiano A, Scarselli G. Ovarian surgery for bilateral endometriomas influences age at menopause. *Hum Reprod Oxf Engl.* nov 2011;26(11):3000-7.
20. Lee D-Y, Kim NY, Kim MJ, Yoon B-K, Choi D. Effects of laparoscopic surgery on serum anti-müllerian hormone levels in reproductive-aged women with endometrioma. *Gynecol Endocrinol.* 1 oct 2011;27(10):733-6.
21. Alborzi S, Keramati P, Younesi M, Samsami A, Dadras N. The impact of laparoscopic cystectomy on ovarian reserve in patients with unilateral and bilateral endometriomas. *Fertil Steril.* févr 2014;101(2):427-34.
22. Chang HJ, Han SH, Lee JR, Jee BC, Lee BI, Suh CS, et al. Impact of laparoscopic cystectomy on ovarian reserve: serial changes of serum anti-Müllerian hormone levels. *Fertil Steril.* juin 2010;94(1):343-9.
23. Goodman LR, Goldberg JM, Flyckt RL, Gupta M, Harwalker J, Falcone T. Effect of surgery on ovarian reserve in women with endometriomas, endometriosis and controls. *Am J Obstet Gynecol.* nov 2016;215(5):589.e1-589.e6.
24. Vignali M, Mabrouk M, Ciocca E, Alabiso G, Barbasetti di Prun A, Gentilini D, et al. Surgical excision of ovarian endometriomas: Does it truly impair ovarian reserve? Long term anti-Müllerian hormone (AMH) changes after surgery. *J Obstet Gynaecol Res.* nov 2015;41(11):1773-8.
25. Sugita A, Iwase A, Goto M, Nakahara T, Nakamura T, Kondo M, et al. One-year follow-up of serum antimüllerian hormone levels in patients with cystectomy: are different sequential changes due to different mechanisms causing damage to the ovarian reserve? *Fertil Steril.* août 2013;100(2):516-522.e3.
26. Decanter C, d'Argent E.M, Boujenah J et al. Endométrie et préservation de la fertilité, RPC Endométrie, CNGOF-HAS. *Gynécologie Obstétrique Fertilité & Sénologie.* 2018;
27. Practice Committees of American Society for Reproductive Medicine, Society for Assisted Reproductive Technology. Mature oocyte cryopreservation: a guideline. *Fertil Steril.* janv 2013;99(1):37-43.
28. Franasiak JM, Forman EJ, Hong KH, Werner MD, Upham KM, Treff NR, et al. The nature of aneuploidy with increasing age of the female partner: a review of 15,169 consecutive trophoctoderm biopsies evaluated with comprehensive chromosomal screening. *Fertil Steril.* mars 2014;101(3):656-663.e1.
29. Cobo A, García-Velasco JA, Coello A, Domingo J, Pellicer A, Remohí J. Oocyte vitrification as an efficient option for elective fertility preservation. *Fertil Steril.* mars 2016;105(3):755-764.e8.
30. Benaglia L, Somigliana E, Iemmello R, Colpi E, Nicolosi AE, Ragni G. Endometrioma and oocyte retrieval-induced pelvic abscess: a clinical concern or an exceptional complication? *Fertil Steril.* mai 2008;89(5):1263-6.
31. Coccia ME, Rizzello F, Gianfranco S. Does controlled ovarian hyperstimulation in women with a history of endometriosis influence recurrence rate? *J Womens Health* 2002. nov 2010;19(11):2063-9.

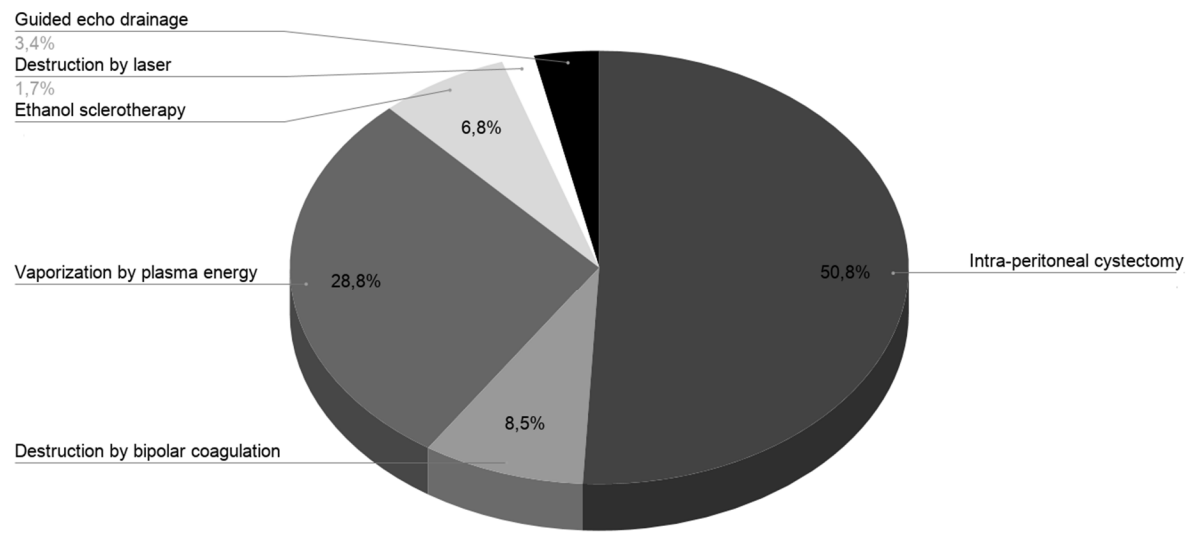


Figure 1: Most commonly used surgical technique for the management of endometriomas

Table 1: Socio-demographic characteristics of gynecologists answering questionnaire

| <u>Characteristics</u> | N=110 n | % |
|---|-------------------|----|
| Sex | | |
| - male | 48 | 44 |
| - female | 62 | 56 |
| Mean age (years) | 45.4 ± 11 [28-67] | |
| Main activity | | |
| - surgical | 59 | 54 |
| - reproductive medicine | 21 | 19 |
| - medical gynecology | 22 | 20 |
| - obstetrics | 8 | 7 |
| Practice | | |
| - public hospital | 61 | 55 |
| - private clinic | 49 | 45 |
| Average number of years of practice (years) | 15 ± 10.5 [1-36] | |

Table 2: Situations in which our practitioners offered fertility preservation

| Situations | N= | % |
|---|-------|----|
| Bilateral endometrioma | 65/84 | 77 |
| Unilateral endometrioma | 24/73 | 33 |
| Recurrent endometrioma | 70/73 | 96 |
| Isolated deep endometriosis with decreased Anti-Mullerian Hormone (AMH) | 68/78 | 87 |

Table 3: Studies on variation of Anti-Mullerian Hormone (AMH) rate post-operatively

| | AMH rate (ng/mL) | | | | | |
|--|------------------|--------|---------|----------|----------|-----------|
| | Pre-operative | 1 week | 1 month | 3 months | 6 months | 12 months |
| Lee et al. (20) Unilateral cystectomy | 4.69 | 2.77 | 2.77 | 3.29 | | |
| Alborzi et al. (21) Unilateral and bilateral cystectomy | 3.86 | 1.66 | 2.06 | | | |
| Chang et al. (22) Unilateral and bilateral cystectomy | 2.23 | 0.67 | 1.14 | 1.5 | | |
| Goodman et al. (23) No precision | 1.77 | | 1.12 | | 1.41 | |
| Vignani et al. (24) Unilateral and bilateral cystectomy | 3.98 | | 1.67 | 2.01 | 2.43 | 4.01 |
| Sugita et al. (25) Unilateral and bilateral cystectomy | 3.56 | | 1.90 | | | 2.10 |