

Optimising Care For Endometriosis: New Therapeutic Options and Surgical Considerations — A Systematic Literature Review (SLR)

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Abstract

Endometriosis is a chronic gynaecological condition that is linked to pelvic pain, dysmenorrhea, infertility and poor quality of life (QoL) and now needs to be managed increasingly on an individual basis combining medical and surgical treatment. This systematic literature review assessed recent therapeutic and surgical considerations for the optimization of endometriosis treatment, focusing on pain control, QoL, fertility, ovarian reserve, recurrence, safety and postoperative outcomes. Original clinical studies published between 2015 to 2025 were identified through PubMed and Google Scholar. Following duplications removal and eligibility screening, 15 studies were included and narratively synthesized based on therapeutic approaches, surgical management, reproductive outcomes, patient-reported outcomes and methodological quality. Newer oral gonadotropin-releasing hormone antagonists (elagolix, relugolix, and linzagolix) uniformly reduced dysmenorrhea and non-menstrual pelvic pain and improved functioning and QoL. Based on the surgical procedures, pain and QoL were also improved, but not in all cases the more extensive procedures were superior. It was demonstrated that the ovarian reserve was affected by surgical technique, underscoring the need for fertility preserving surgical techniques. Factors to consider for long-term results were recurrence, treatment safety, and repeat procedures. In summary, the ideal care of endometriosis must progress beyond the medical versus surgical dichotomy and exhibit a patient-centred approach that considers symptom management, safety, reproductive considerations and long-term QoL.

Keywords: Endometriosis; GnRH antagonists; Surgical management; Fertility preservation; Quality of life.

Introduction

Endometriosis is a chronic gynaecological disease which is described by the occurrence of endometrial-like tissue in places other than the uterine cavity, usually in the ovary, pelvic peritoneum, and other components of the reproductive system. It is related to wide form of clinical symptoms like dysmenorrhea, chronic pelvic pain, dyspareunia, fatigue, infertility and decreased QoL. There is growing evidence that endometriosis is not simply a disease of the pelvis, but a chronic systemic disease with inflammatory, hormonal, neurological and reproductive impacts [1]. Clinical disease presentations, locations of lesions, severity of symptoms and reproductive goals are variable, which complicates clinical management. Persistent symptoms and delayed diagnosis could also add to the physical, psychological, and socioeconomic burden faced by women affected [2]. The present review, in line with the above-mentioned defined review structure, accordingly, discusses the background of the disease, current management, the need for optimized care and the rationale for addressing the contemporary therapeutic and surgical approaches.

The current approach to treating endometriosis combines medical and surgical treatments determined by severity of symptoms, age of the patient, nature of the lesions, desire for fertility, response to other treatments and patient preferences. The goals of medical management are to suppress ovarian hormonal activity, to decrease inflammatory stimulation and to control pain accompanying with endometriosis. These include combined hormonal contraceptives, progestins, gonadotropin-releasing hormone (GnRH) agonists/antagonists, and other hormonal therapies. While these therapies can be effective in providing symptom relief, there are concerns about recurrence after therapy and adverse effects of the therapy [3]. The therapeutic field has been expanded in recent years, especially with the use of newer oral GnRH antagonists, and with more individualized hormonal protocols. This means that current care is shifting away from one-size-fits-all treatment to personalized long-term treatment plans that consider the symptoms, disease phenotype, safety concerns, and reproductive goals of the patient [4]. However, surgical therapy is still a valuable option when medical therapy fails or when the patient is intolerant of medical therapy, if there is anatomical distortion or deep infiltrating disease, or if there are fertility considerations. Surgical options include laparoscopic excision, ablation, ovarian cystectomy and laparotomy for deep

endometriosis. Surgery can offer significant benefits in terms of pain and QoL; the risks of surgery, recurrence and damage to reproductive structures need to be weighed against the extent of surgery performed. The most important point is in ovarian endometriosis, multiple surgeries or extensive surgery can affect ovarian reserve [5]. So, when choosing surgery, it is not just about removing the lesion, it's about what long-term function and reproduction can be achieved.

When deciding on optimal care for endometriosis, it is important to compare therapeutic efficacy, surgical outcomes, safety, recurrence, fertility preservation and patient-reported outcomes. There is evidence that both hormonal and surgical treatments help alleviate pain related to endometriosis, and which one is more valuable will depend on the clinical context and the desired treatment outcome [6]. The modern management of the disease aims at lesion suppression or removal, but also includes the integration of pain control, fertility planning, QoL and long-term disease management. Meanwhile, an understanding of the disease processes and therapeutic targets has opened opportunities for more targeted and personalized strategies for disease management [1,2].

Even with these advances, there is still a lot of uncertainty about the best order for medical and surgical treatments, the safety of new treatments, the choice of surgical methods and the preservation of fertility and ovarian function. There is thus a need for a systematic collection of recent clinical evidence to inform about the relative advantages and disadvantages of current approaches and priorities for individualised care of endometriosis. This review thus sought to examine the efficiency and safety of new treatment modalities for endometriosis-related symptoms; to compare recent surgical options for pain, postoperative complications, recurrence rates and QoL; and finally, to estimate the effect of medical and surgical treatment in terms of ovarian reserve, fertility, and other patient-reported outcomes.

2. Materials and Methods

2.1 Review Design

This systematic literature review assessed recent therapeutic options and surgical considerations to advance the care of endometriosis. The review was conducted using PRISMA (Preferred Reporting Items for Systematic Review and Meta-Analyses) recommendations and comprised of predefined eligibility criteria, literature searching, study screening, data extraction, ROB assessment, and narrative synthesis. Original clinical studies published between 2015 and 2025 were included.

2.2 Eligibility Criteria

Study was deemed eligible if patients had been diagnosed with endometriosis and the intervention was related to medical, therapy or surgical management. Outcomes of interest were pain, QoL, fertility, ovarian reserve, recurrence, safety and postoperative outcomes. Eligibility framework was in line with the pre-established review outline.

2.2.1 Inclusion Criteria

Original clinical research included if it evaluated medical or surgical treatment and included at least one relevant clinical outcome, with patients who had endometriosis. The study involved randomized clinical trials, prospective studies, observational studies, and comparative clinical studies reporting the treatment of DR in English-language journals between 2015 and 2025.

2.2.2 Exclusion Criteria

Studies were omitted if they were not related to therapeutic/surgical management, were an ineligible patient population, did not have relevant clinical outcomes, or were not original research. Studies not published by the journals or studies that were not in English, and reports without full text were also excluded.

2.3 Information Sources

Literature search was functioned using the search engines PubMed and Google scholar to look for biomedical and clinical research related to modern-day management of endometriosis. The search period was narrowed down to the timeframe 2015-2025.

2.4 Search Strategy

Search terms comprised endometriosis, medical therapy, hormonal treatment, GnRH antagonist, elagolix, relugolix, linzagolix, dienogest, laparoscopic surgery, excision, ablation, cystectomy, pain, QoL, fertility, ovarian reserve, recurrence and safety. Boolean operators were used and the search conditions were adjusted to each database used: AND and OR.

2.5 Study Selection Process

In total, 664 records were found of which 266 were via PubMed and 398 were via Google Scholar. six hundred and thirty-seven (637) were screened after eliminating 27 duplicates. After the title and abstract screening 585 records were excluded, and 52 full-text reports were considered. Additional 37 reports were removed due to the eligibility criteria, and 15 studies were finally included. The selection process was showed in the form of PRISMA flow diagram.

2.6 Data Extraction

The following report was abstracted from each study: author(s), year of publication, study design, study population, intervention, comparator, follow-up duration, and key outcomes. Pain, QoL, fertility, ovarian reserve, recurrence, postoperative results and treatment safety were all considered.

2.7 Risk of Bias Assessment

The methodological quality was evaluated based on type of study. Cochrane RoB 2 was used to evaluate randomized trials, and ROBINS-I was used to assess non-randomized trials. The key domains assessed were participant selection, confounding, missing data, outcome measurement and selective reporting.

2.8 Data Synthesis

Since different interventions, surgical techniques, outcomes and follow-up periods were used in the included studies, a narrative synthesis was operated. The results were grouped into therapeutic options, surgical management, ovarian reserve and fertility, pain and QoL and effectiveness and safety of treatment.

3. Results

3.1 Study Selection

A total of 664 records (266 from PubMed and 398 from Google Scholar) were retrieved in the literature search. six hundred and thirty-seven (637) records were screened after 27 duplicates were removed. After the abstract and title screening 585 records were excluded and 52 full text articles were considered for eligibility. 37 of these were excluded for predefined reasons and 15 studies were contained in the final systematic review. The entire process of study selection is shown in the PRISMA flow diagram (Figure 1).

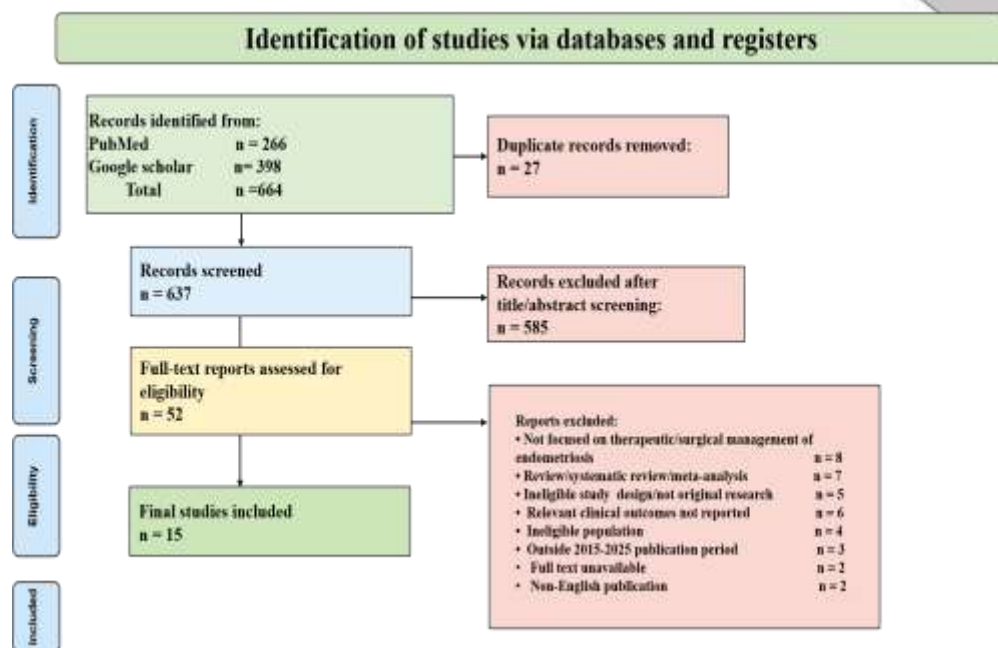


Figure 1. PRISMA Flow Diagram of the Study Selection Process

3.2 Characteristics of Included Studies

All 15 studies were published between 2016 and 2025, and comprised of randomized clinical trials, phase III trials, extension trials, prospective cohorts and observational surgical studies. Medical studies mostly assessed elagolix, relugolix combination therapy, and linzagolix, and surgical studies assessed excision, ablation, cystectomy, conservative surgery, colorectal resection, hysterectomy, and laparoscopic excision. The primary outcomes were pain, QoL, ovarian reserve, fertility, recurrence, safety and postoperative recovery. The general attributes of these studies are shown in Table 1.

Table 1. Characteristics of Included Studies

Study	Design	Intervention / Exposure	Main Outcomes	Follow-up
[7]	Two Phase III randomized trials	Elagolix vs placebo	Dysmenorrhea; NMPP; safety	6 months
[8]	Phase III extension studies	Long-term elagolix	Pain; dyspareunia; safety	12 months
[9]	Two Phase III randomized trials	Relugolix combination therapy vs placebo	Dysmenorrhea; NMPP; safety	24 weeks
[10]	Open-label long-term extension	Relugolix combination therapy	Long-term pain response; safety	104 weeks
[11]	Long-term extension analysis	Relugolix combination therapy	Functioning; EHP-30 quality of life	104 weeks
[12]	Phase III randomized	Linzagolix +/- add-	Dysmenorrhea; NMPP	6months

	trial	back therapy vs placebo		
[13]	Randomized clinical trial	Excision vs ablation	Pelvic pain; dysmenorrhea; dyspareunia	12 months
[14]	Randomized trial	Conservative rectal surgery vs segmental resec...	Functional and postoperative outcomes	24 months
[15]	5-year randomized trial follow-up	Conservative surgery vs colorectal resection	Recurrence; pain; functional outcomes	5 years
[16]	Randomized clinical trial	Suturing vs bipolar coagulation after cystectomy	AMH; FSH; ovarian reserve	3 months
[17]	Prospective longitudinal study	Surgical treatment	EHP-30 quality of life	6 months
[18]	Prospective cohort study	Conservative surgery or hysterectomy	Pain-related quality of life	Prospective follow-up
[19]	Prospective observational cohort	Radical laparoscopic excision	Quality of life; pain; fertility; repeat surgery	Long-term
[20]	Prospective observational study	Laparoscopic surgery	EHP-30 quality of life	3 months
[21]	Comparative retrospective study	Surgical treatment	EHP-30 quality of life domains	6-10 weeks

3.3 Therapeutic Approaches for Endometriosis

Each of the medical studies demonstrated that newer oral GnRH antagonists were efficient in alleviating pain accompanying with endometriosis. Elagolix was found to be effective at reducing dysmenorrhea and non-menstrual pelvic pain, but with adverse effects of hypoestrogenism and bone mineral density changes, when compared to placebo [7]. Long-term treatment sustained pain relief but there had to be ongoing safety checks [8]. The dysmenorrhea and non-menstrual pelvic pain also significantly improved with relugolix combination therapy [9]. These advantages have continued with longer follow-up and continued pain control with acceptable long-term safety [10]. Daily functioning and disease specific QoL were also found to be improved [11]. Linzagolix also decreased the pain associated with endometriosis in a phase III trial and has been suggested as an alternative oral GnRH antagonist therapy [12]. This is summarized in Table 2 as findings which are therapeutic.

Table 2. Contemporary Medical Therapies

	Study	Therapy	Principal Finding	Important Consideration
1	[7]	Elagolix	Improved dysmenorrhea and non-menstrual pelvic...	Hypoestrogenic adverse effects
2	[8]	Elagolix	Pain reductions maintained during long-term th...	Bone mineral density and lipid changes

3	[9]	Relugolix combination therapy	Improved dysmenorrhea and non-menstrual pelvic...	Generally well tolerated
4	[10]	Relugolix combination therapy	Pain responses sustained through 104 weeks	Supports longer-term treatment
5	[11]	Relugolix combination therapy	Improved functioning and EHP-30 QoL	Patient-centered quality-of-life benefit
6	[12]	Linzagolix	Reduced endometriosis-associated pain	Add-back therapy relevant to safety

3.4 Surgical Management of Endometriosis

Surgical studies revealed that multiple surgical techniques could help alleviate symptoms, but the best method varied according to disease type and patient characteristics. Generally similar improvements were found with superficial endometriosis associated pain following both excision and ablation [13]. In the deep endometriosis of the rectum, although there is no difference in functional results between conservative surgery and colorectal resection, there are surgical risks associated with the latter [14]. Three groups were compared in the same study with five-year follow-up, which confirmed the importance of recurrence, functional outcomes, and long-term morbidity when making a surgical choice [15]. In the prospective surgical studies, pain and QoL improved after endometriosis surgery [17,18]. However, there were indications that long-term laparoscopic removal led to long-term symptom and general health improvements, although some patients still required further surgery ([19]. In addition, there were improvements in various domains of EHP-30 QoL following laparoscopic treatment [20,21]. The main surgical findings are summarised in Table 3.

Table 3. Surgical Approaches and Postoperative Findings

	Study	Surgical Approach	Main Result
1	[13]	Excision vs ablation	Broadly similar pain effectiveness
2	[14]	Conservative rectal surgery vs segmental resec...	No clear functional superiority between appoa...
3	[15]	Long-term conservative vs colorectal resection	Long-term evidence on function, pain and recur...
4	[16]	Cystectomy with bipolar coagulation vs suturing	Suturing showed better preservation of ovarian...
5	[17]	Endometriosis surgery	Improved postoperative EHP-30 scores
6	[18]	Conservative surgery vs hysterectomy	Both improved QoL; greater improvement with hy...
7	[19]	Radical laparoscopic excision	Long-term improvements in health and pain
8	[20]	Laparoscopic surgery	Improvement across EHP-30 domains
9	[21]	Endometriosis surgery	Improvement in major EHP-30 quality-of-life do...

3.5 Ovarian Reserve and Fertility-Related Outcomes

The importance of ovarian reserve was highest in patients who underwent surgery for endometrioma. After laparoscopic cystectomy, ovarian reserve had also decreased in both groups of haemostasis (suturing and bipolar coagulation); however, this decrease was more significant in the bipolar coagulation group compared to suturing, indicating that the surgical technique of achieving haemostasis may have an impact on ovarian preservation [16].

Long-term fertility outcomes were also reported following the laparoscopic removal, and women in the study who attempted pregnancy had had successful pregnancies. The results of these studies suggest that the preservation of fertility should be a key factor in deciding upon surgical options, especially in the case of reproductive-age patients.

Table 4 presents an overview of fertility and ovarian reserve data that are available.

Table 4. Ovarian Reserve and Fertility-Related Evidence

	Study	Outcome	Finding	Clinical Relevance
1	[16]	AMH and FSH / ovarian reserve	Greater ovarian reserve reduction after bipola...	Hemostatic technique may influence ovarian res...
2	[19]	Postoperative fertility	Successful pregnancies occurred among a substa...	Fertility should be considered when evaluating...
3	[20]	Infertility-related quality-of-life concerns	Postoperative improvement occurred in fertilit...	Reproductive concerns contribute to patient-ce...

3.6 Pain and Quality-of-Life Outcomes

The most consistent finding was reduction of pain both in the medical and surgical studies. All three drugs (elagolix, relugolix and linzagolix) were found to be effective for dysmenorrhea and non-menstrual pelvic pain [7,9,12]. Using elagolix and relugolix led to sustained symptoms over longer follow-up periods as well [8,10]. Surgical intervention has also been shown to be correlated with a better pain, emotional wellbeing, social function and QoL [21,17]. In addition, long-term laparoscopic excision of EHP-30 scores were significantly improved (McDonnell et al., 2025), and other surgical cohorts showed significant improvements in postoperative EHP-30 scores [20]. The results reinforce the need to take patient-reported outcomes into account along with clinical control of symptoms.

3.7 Risk of Bias Assessment

Overall methodological quality was by study design. Generally, randomized therapeutic trials delivered higher levels of evidence, due to controlled treatment allocation and predefined outcomes [7,9,12]. Randomized surgical trials were also useful for comparison but were challenging to blind due to the nature of the surgical intervention [13,14]. Long-term extension and observational studies provided valuable real-world and durability data but were subject to attrition and selection bias and were confounded [10,18,19]. Table 5 represents the results of ROB Assessment of Included Studies.

Table 5. Risk of Bias Assessment of Included Studies

	Study	Study Design	Assessme nt Tool	Selection / Randomiza tion	Deviatio ns / Confound ing	Missing Data	Outcom e Measur ement	Selective Reporting	Overall Risk of Bias
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1	[7]	Randomized controlled trial	RoB 2	Low	Low	Low	Low	Low	Low
2	[8]	Extension study	ROBINS-I	Moderate	Moderate	Moderate	Low	Low	Moderate
3	[9]	Randomized controlled trial	RoB 2	Low	Low	Low	Low	Low	Low
4	[10]	Open-label extension study	ROBINS-I	Moderate	Moderate	Moderate	Low	Low	Moderate
5	[11]	Extension analysis	ROBINS-I	Moderate	Moderate	Moderate	Low	Low	Moderate
6	[12]	Randomized controlled trial	RoB 2	Low	Low	Low	Low	Low	Low
7	[13]	Randomized controlled trial	RoB 2	Low	Some concerns	Low	Some concerns	Low	Some concerns
8	[14]	Randomized controlled trial	RoB 2	Low	Some concerns	Low	Some concerns	Low	Some concerns
9	[15]	Long-term RCT follow-up	ROBINS-I	Moderate	Moderate	Moderate	Moderate	Low	Moderate
10	[16]	Randomized clinical trial	RoB 2	Low	Low	Low	Low	Low	Low
11	[17]	Prospective observational study	ROBINS-I	Moderate	Moderate	Low	Moderate	Low	Moderate
12	[18]	Prospective cohort study	ROBINS-I	Moderate	Moderate	Low	Moderate	Low	Moderate

13	[19]	Prospective observational cohort	ROBINS-I	Moderate	Moderate	Moderate	Moderate	Low	Moderate
14	[20]	Prospective observational study	ROBINS-I	Moderate	Moderate	Low	Moderate	Low	Moderate
15	[21]	Retrospective comparative study	ROBINS-I	Moderate	Moderate	Moderate	Moderate	Low	Moderate

3.8 Overall Synthesis of Therapeutic and Surgical Evidence

Overall, there was a substantial improvement in the outcomes related to endometriosis with both modern medical and surgical interventions. Newer oral GnRH antagonists appeared to be consistently beneficial for pain control, and surgery was seen to be beneficial for indicators and QoL, especially in selected patients. But, when choosing a treatment, one must consider symptom control, safety, risk of recurrence, reproductive goals and potential adverse effects of treatment. Results of ovarian reserve also emphasize the need for fertility preserving surgical techniques (Asgari et al., 2016). Overall, the studies provided indicate that treatment of endometriosis must be patient-centred and individual, and that there is no one-size-fits-all approach.

4. Discussion

Based on the present systematic review, the optimal management of endometriosis is moving towards the integration of effective medical management, appropriate surgery, fertility conservation, and patient empowerment. Newer oral GnRH antagonists showed consistent improvements in dysmenorrhea and non-menstrual pelvic pain and surgery in select patients showed improvement in pain, QoL, and functional outcomes. These results argue for a shift from the medical/surgical paradigm to a symptom-driven, individualized approach to treatment that considers the disease location, reproductive goals, previous treatment response, and patient preference [22]. It fits into the discussion context of the review which focuses on medical improvements, surgical factors, safety, fecundity, personalized treatment, and future investigations.

Medical management has been broadened with the use of newer oral GnRH antagonists and combination therapies which can offer excellent pain relief and improve QoL. But long-term tolerability, bone health and adverse effects of the treatment are still factors that need to be considered. Current guidance also suggests that treatment should be tailored, based on the severity of the symptoms, fertility wishes, contraindications and patients' priorities and not the same sequence for all patients [23]. This helps to promote the use of medical therapy as a first-line treatment, as a long-term symptom control or as an adjunct to a combined management.

Surgery is still indicated for deep endometriosis, when symptoms are persistent, anatomical distortion, endometriomas and selected fertility reasons. But radical surgery isn't always the best surgery. Location of lesion, benefit anticipated, potential complications and expertise should therefore be considered for surgical planning. In the case of deep endometriosis, detailed assessment and multidisciplinary planning are highlighted [24,25].

Fertility preservation is crucial in the case of ovarian endometriosis. The evidence reviewed indicates that the surgical technique employed could have an impact on ovarian reserve, especially if healthy ovarian tissue is further damaged. Thus, it is important to highlight the importance of careful surgery of endometrioma and preservation of

normal ovarian tissue whenever possible in contemporary literature [26]. The international recommendations also favour the methods with the lowest impact on the ovarian function [27].

The results also emphasize the need for patient reported outcomes. Success of treatment should also be assessed by the control of the lesions and reduction of pain since endometriosis may impact emotional health, work and sexual status, social function and QoL. Thus, a patient-centred treatment strategy should consider symptom relief, safety, fertility, risk of recurrence, and treatment acceptability over the long term [22].

Randomized trials, prospective studies and long-term follow-up data are all accessible but the study designs, interventions, severity of the disease, and outcome measurements vary, making direct comparisons difficult. There are key areas of uncertainty concerning comparative effectiveness over the long-term, optimal treatment sequencing, prevention of disease recurrence, fertility, and selection of patients who are most likely to advantage from therapies. These priorities align with the international recommendations for more uniform and individualized studies of endometriosis. Future research efforts should thus be geared towards long-term patient-focused comparisons of integrated medical and surgical care that are sensitive to fertility.

5. Conclusion

This systematic literature review underscores the need for a personalized methodology to optimize treatment for endometriosis, combining current medical and surgical management, fertility preservation, and patient-centred outcomes. The evidence reviewed indicates that newer oral GnRH antagonists can be of significant value to reduce dysmenorrhea and non-menstrual pelvic pain as well as other improvements in daily functioning and QoL. Meanwhile, duration of safety and tolerability are also factors to consider in choosing medical treatment. Surgical management remains substantial, especially when the symptoms are persistent, when the endometriosis is deep, endometriomas are present, anatomic distortion or for a fertility indication. But, as the evidence shows, more extensive surgery does not necessarily equal better. Therefore, the decision on surgery should be made contemplating both the relief of symptoms and the risk of complications, recurrence and damage to reproduction structures. Especially for women of reproductive age, preservation of ovarian reserve is important and should play a role in the choice of the operative technique. Overall, the results suggest that the days of a medical vs surgical treatment approach are over and that integrated and personalised care is the way forward. Evaluation of treatment success should be based on pain reduction, but in addition, QoL, fertility goals, functional recovery, safety and long-term acceptability. Coming studies should emphasize long-term comparative results, prevention of repetition, fertility-considerate therapy and a better understanding of which patient groups will benefit from which therapy or surgery.

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