The Use of Levonorgestrel-releasing Intrauterine System (LNG-IUS) in the Treatment of Symptomatic Leiomyoma Uteri: A Systematic Review

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Background: While surgical intervention has been the usual treatment option for leiomyomas, non-surgical methods have been gaining popularity over the years. The levonorgestrel-releasing intrauterine system (LNG-IUS) is said to be effective in alleviating the signs and symptoms brought by uterine leiomyomas.
Objective: To determine the effectiveness of LNG-IUS in the treatment of uterine leiomyomas presenting with abnormal uterine bleeding.
Methods: The study was conducted using the PRISMA 2020 guidelines. The literature search was performed using the following databases: Medline, Cochrane Library, PubMed, Elsevier, Embase, and Herdin. All identified studies published from January 2015 up to July 2023 were included. Titles and abstracts were screened independently by two reviewers. Data extraction and risk of bias assessment were done independently by two reviewers. Gathered information were managed using Microsoft Excel spreadsheet. Synthesis of study characteristics and findings were conducted using a descriptive narrative review. The main outcomes were uterine volume, fibroid size, menstrual blood loss or bleeding patterns, and serum hemoglobin and hematocrit levels. Secondary outcome was incidence of adverse events.
Results: A total of 5 studies were included with two having low methodological quality. One before-and-after cohort study showed that the use of LNG-IUS is effective in reducing menorrhagia with improvement in hematologic parameters. There is no change, however, in uterine volume. Another cohort study showed that the intervention is safe with low incidence of severe adverse events (0.5% in 595 patients). A comparative cohort study showed that LNG-IUS significantly decreased uterine volume and fibroid size, and a good alternative for treatment of heavy menstrual bleeding, as compared to intramuscular progestogen. Another before-and-after cohort study showed a significant decrease in uterine volume in women given LNG-IUS, but not in the control group. Finally, one comparative cross-sectional study showed that LNG-IUS did not effectively reduce heavy bleeding in 32.3% of patients, compared to laparoscopic hysterectomy, which was was 100% effective.
Conclusion: The use of LNG-IUS resulted in reduced menstrual bleeding and improved hematologic parameters after treatment. LNG-IUS was more effective compared to other hormonal treatments. However, when compared to laparoscopic hysterectomy, LNG-IUS was less effective in managing heavy bleeding. The incidence of adverse events reported in the studies was low.

Key words: leiomyoma, levonorgestrel-releasing intrauterine system, progestins

Introduction

Uterine leiomyomas (UL), which are also called uterine fibroids (UFs) are one of the most common types of tumors in women of reproductive age.[1,2] Leiomyoma is the most common type of mesenchymal uterine neoplasm. According to a recent study, the estimated prevalence of leiomyomas is between 40% and 60% among women under the age of 35 and this number rises up to 70% to 80% among women

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over the age of 50.[3,4] In the Philippines, according to the Philippine Obstetrical and Gynecological Society (POGS) 2019 nationwide statistics, the most frequent indications for gynecologic admissions included uterine leiomyomas, along with Abnormal Uterine Bleeding-Polyp (AUB-P) and Abnormal Uterine Bleeding-Malignancy (AUB-M).[5] Most uterine leiomyomas are asymptomatic, and thus no treatment is necessary. However, in 20 - 50% of patients, symptoms such as menstrual abnormalities, pelvic pain or pressure, bowel or bladder problems, infertility and recurrent pregnancy losses occur.[6,7] Thus, leiomyomas can significantly affect women's health-related quality of life and place a heavy economic burden on the family and society as well. A study that used data from the Global Burden of Disease (GBD) 2019 showed that disability-adjusted life years (DALYs) associated with leiomyoma went up from 1990 to 2019.[8] In 1990, there were 860,619 DALYs (95%UI: 473,067-1,505,289), and this number rose to 1,378,497 DALYs (95%UI: 710,915-2,475,244) in 2019.[9]

When patients are symptomatic, then treatment is needed. Traditionally, treatment of uterine leiomyomas is surgery. However, symptomatic leiomyomas can now be treated by non-surgical means. Medical methods like combined oral contraception, gonadotropin-releasing hormone (GnRH) agonist, progesterone receptor modulators, progestins, and levonorgestrel-releasing intrauterine systems (LNG-IUS) have grown in popularity.[10,11]

The LNG-IUS is originally designed as a birth control method.[12] LNG-IUS is inserted in the uterus and produces up to 20 mcg of levonorgestrel per day (on average, 14 mcg/day).[13] In recent years, studies have shown that LNG-IUS can also reduce monthly blood loss,[14,15] even in women with uterine leiomyoma.[16] However, existing literature, including previous systematic reviews, depict unclear and contradicting results on its effects on the size of the uterus and leiomyoma.[17,18,19]

Although the precise mechanism by which LNG-IUS controls uterine hemorrhage remains unknown, its ability to induce amenorrhea is possibly its most significant mechanism of action. It has been reported that the progestin contained within the LNG-IUS can inhibit uterine contractility, which could diminish dysmenorrhea. Progestins can also activate progesterone receptors in the myometrium, thereby inhibiting nuclear factor kappalight-chain-enhancer of activated B cells (NF-B) and reducing inflammation, which could also contribute to easing dysmenorrhea. In addition to causing less or no menstrual hemorrhage, LNG- IUS reduces platelet aggregation and thrombin activation, which may inhibit uterine contractions further. Since a progestin is the primary active agent in LNG-IUS, and since the action of progesterone/progestins is mediated by progesterone receptors (PRs), the efficacy of LNG-IUS is highly dependent on the expression levels of PRs, specifically PR isoform B (PR-B), in the endometrium and myometrium. As a ligand, the progestin released by LNG-IUS is likely to induce PR expression and exert its therapeutic effect.[20,21,22,23]

Due to its ability to stop the endometrium from growing, the LNG-IUS decreases menstrual blood loss as soon as it is inserted.[24] Studies have shown that women who use the LNG-IUS have significant improvement in their anemia.[25,26] Treatment of endometriosis, adenomyosis, endometrial hyperplasia, and early-stage endometrial cancer are some of the other current indications for the use of LNG-IUS.[27,28]

Currently, there have been limited and contradicting studies on the effect of LNG-IUS on women with abnormal uterine bleeding due to leiomyomas. A new systematic review with more updated studies included is needed to evaluate the evidence concerning the effectiveness and safety of LNG-IUS for treating symptomatic uterine leiomyomas.

General Objective

- To determine the effectiveness of LNG-IUS in the treatment of uterine leiomyomas presenting with abnormal uterine bleeding by reviewing available published evidence.

Specific Objectives

- To determine the effect of LNG-IUS on uterine volume, menstrual blood loss, hemoglobin, and hematocrit levels.

- To determine the adverse events associated with the use of LNG-IUS

Methods

The researchers conducted a systematic review using the PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines.

Eligibility Criteria

Inclusion criteria

Types of Studies: All randomized controlled trials (RCTs), quasi-randomized trials and observational studies on the efficacy and safety of LNG-IUS as a treatment in symptomatic uterine leiomyoma were included. Single-arm studies with no comparison group but used a pre- and post- treatment design were also considered. Only studies published in English language were included.

Types of Participants: Reproductive-aged women aged 18 years and above with uterine leiomyoma and presenting with abnormal uterine bleeding were included

Types of Interventions: Studies that used LNG-IUS for treatment of leiomyoma were included, including those that used other treatments as comparator or control group, such as surgical (minimally invasive or open) or non-surgical (combined oral contraceptives and progestogens) methods.

Types of Outcome Measures: Studies that reported improvement or change in uterine volume, menstrual blood loss or bleeding patterns, serum hemoglobin, and hematocrit levels after treatment with LNG-IUS, and occurrence of adverse events, were included.

Exclusion Criteria

Reviews, animal studies, abstracts or posters only, protocol, letters and editorials were excluded.

Search Strategy and Information Sources

The literature search was conducted using the following electronic databases: Medline, Cochrane Library, PubMed, Elsevier, Embase, and Herdin. All identified studies published from January 2015 up to July 2023, that studied the use of LNG-IUS, its effectiveness and efficacy, in the treatment of symptomatic uterine leiomyomas were included. Search terms used were the following: "levonorgestrel containing intrauterine system", "levonorgestrel releasing intrauterine system", "LNG-IUS", "myoma", and "fibroids". All studies that matched the terms set by the researchers were retrieved. Titles and research abstract were reviewed individually. No restrictions on geographic location was applied. However, only studies published in the English language were retrieved.

Selection and Data Collection Process

Two reviewers (CWJ and RCJ) performed study selection independently using predefined criteria. The articles were considered eligible based on the title and abstract. Full-text articles for potential inclusion were saved in a Google drive. Two reviewers (CWJ and RCJ) performed data extraction, with disagreements between reviewers resolved by consensus or by the decision of a third independent reviewer. Extracted data were managed using Microsoft Excel spreadsheet. Following the PRISMA 2020 criteria, a flow diagram for the search and selection process was created (Figure 1).

Data Items

Outcomes of interest were improvement or change in uterine volume, menstrual blood loss or bleeding patterns, and serum hemoglobin, and hematocrit levels after treatment. Secondary outcome of interest was occurrence of adverse events. Characteristics and outcomes of each study are presented in Table 1.

Risk of Bias Assessment

Two investigators (CWJ and RCJ) independently assessed the studies' quality using a scale with four dimensions: research group representativeness, suitable techniques for determining exposure, comparability of comparing analysis groups, and lower non-response bias. The quality score varied from 0 (low) to 4 (high). The New Castle-Ottawa Quality Assessment Scale was adapted for this assessment (Table 2)

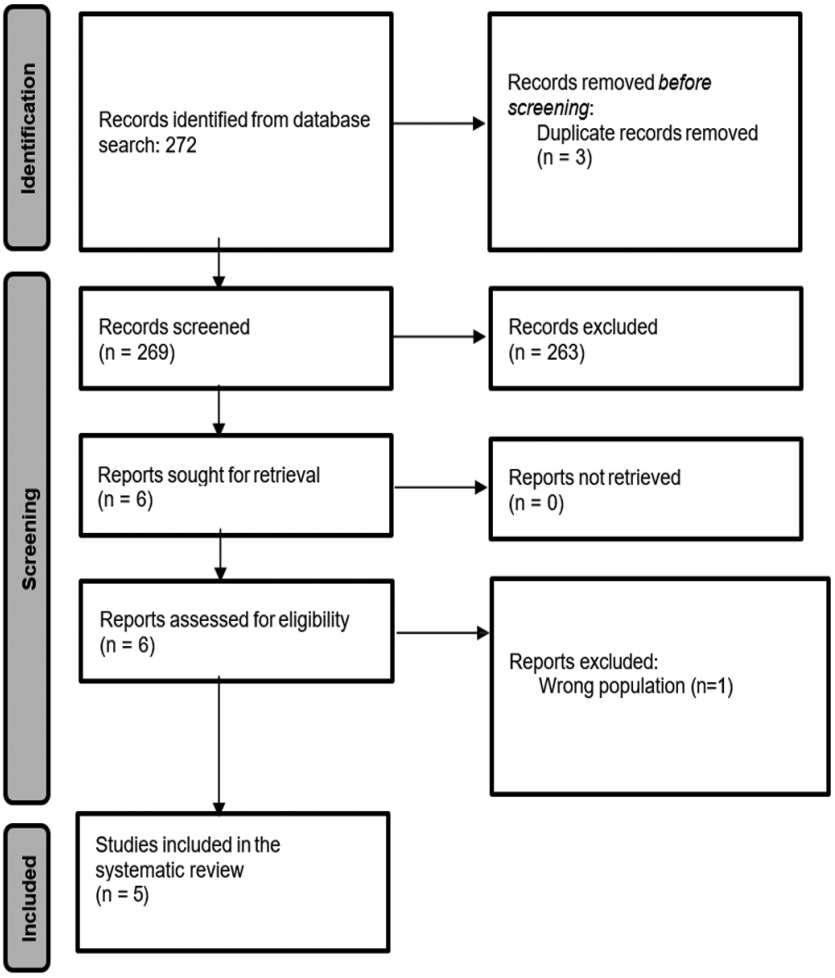

Figure 1. PRISMA flow diagram for the search and selection process

Synthesis Methods

Information from the studies included in this systematic review were consolidated by detailing individual study characteristics and conclusions (Table 1), as well as analyzing possible hypotheses to explain how LNG-IUS affects uterine leiomyoma. Since the studies were found to be heterogenous in terms of comparison groups, population characteristics, and how outcomes were reported, a meta-analysis cannot be performed.

Certainty Assessment

The Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach was used for rating the certainty of evidence using the domains for risk of bias, inconsistency, indirectness, imprecision, and publication bias.

Results

A total of 272 articles were seen after the search and 3 duplicates were removed. After doing title and abstract screening, 6 articles were identified for potential inclusion. After a full-text review, one article was excluded because it was conducted on patients with bleeding but with no uterine leiomyoma. Finally, 5 studies were included in this systematic literature review.

The level of evidence generated from this systematic literature review was graded low because

Table 1. Characteristics of studies included.

Author, year, country	Participants' Characteristics	Study Design	LNG-IUS regimen	Control/comparator	Outcomes
Senol *et al.,* 2015[29] Turkey	n=38; age=35-50 y/o; 100% with uterine leiomyoma	Cohort, before-and-after design	LNG-IUS was inserted into the uterine cavity during days 5-7 of the menstrual cycle.	None	**Pictorial Blood Loss Assessment Chart (PBAC) score-** Before: 410±21 After: 20±3.0 **Hemoglobin g/dl-** Before: 10.7±1.2 After: 12.3±0.8 **Hematocrit %-** Before: 32.9±3.0 After: 36.9±2.6 **Uterine volume mm^3-** Before: 487,818.6 After: 485,962.8 **Menorrhagia, % of the patients-** Before: 100% After: 23.7% **Amenorrhea, % of the patients** Before: 0% After: 52.6%
Erkariyan *et al*., 2018[6] Turkey	n=95; age= not reported; 100% with uterine fibroids	Cohort, before-and-after design	Not described	Medroxyprogesterone Acetate	**Fibroid size, LNG-IUS, cm-** After: 2.9±1.5 **Fibroid size, MPA cm-** After: 4.0±1.7 **Hemoglobin, LNG-IUS g/dL-** After: 12.0±1.2 **Hemoglobin, MPA g/dL-** After: 12.5±1.4 **Menstrual pattern after treatment:** **LNG-IUS group:** Menorrhagia: 5.7% Oligomenorrhea: 24.5% Normal: 13.2%
					MPA group: Menorrhagia: 7.1% Oligomenorrhea: 26.2% Normal: 4.8%
Harada *et al*., 2022[30] Japan	n=595; age=median is 42; 30.8% with uterine leiomyoma	Cohort, before-and-after design	Not described	None	**Adverse events observed:** metrorrhagia (48.9%), procedural pain (14.1%), and ovarian cyst (6.2%). The cumulative incidence of expulsions at 12 months was 8.7%. 1
Magalhaes *et al.*, 2022[31] Brazil	n=147; age = not reported; 15% with uterine leiomyoma	Cohort, before-and-after design	Not described	Hormonal contraception	**Uterine volume decreased** significantly in those given LNG-IUS, but not in the control group.
Depes *et al*.,2023[32] Brazil	n=62; age=mean is 44.8; 88.6% with uterine leiomyoma	Cross- sectional design	Not described	laparoscopic hysterectomy	LNG-IUS did not effectively reduce heavy bleeding in 32.3% of patients, while hysterectomy was 100% effective. **13 patients experienced complications:** Hysterectomy: 19.4% (conversion to laparotomy, surgical wound dehiscence, vaginal vault granulation, infection with vaginal vault dehiscence, residual cervix hemorrhage, and formation of vesicovaginal fistula) LNG-IUS: 22.6% (all cases of expulsion of IUD)

Table 2. Risk of bias assessment (New Castle-Ottawa Quality Assessment Scale).

	Representativeness	Ascertainment of exposure	Comparability of groups	Drop-outs	Score
Senol, et al. 2015	1	1	0	1	2 (low)
Erkariyan, et al. 2018	1	1	1	1	4 (good)
Harada, et al. 2022	1	1	0	1	2 (low)
Magalhaes, et al. 2022 Brazil	1	1	1	1	4 (good)
Depes, et al. 2023	1	1	1	1	4 (good)

of low quality of studies, heterogeneity across methodologies and inconsistency in reported findings.

Five studies published from 2015 through 2023 were included in this systematic review (Table 1). The methodological quality assessment showed two of the studies as low quality because of lack of comparative groups (Table 2).

In 2013, Senol, et al.[29] published a prospective before-and-after study that aimed to evaluate the efficacy of LNG-IUS in the treatment of leiomyoma-related abnormal uterine bleeding and to assess the effect of LNG-IUS on uterine, leiomyoma, and ovarian volume. At the time of insertion and after six months, serum levels of hemoglobin, hematocrit, and uterine, leiomyoma, and ovarian volume were assessed in 38 women (age range 35-50 years old). Within 3 months, patients had a significant improvement in their Pictorial Blood Loss Assessment Chart (PBAC) score (410±21 to 40±17, $p<0.001$) serum hemoglobin levels (10.7±1.2 to 11.5±0.9 g/dL, $p<0.001$) and amenorrhea (0 to 23.7). Leiomyoma (22,367.0±21,879.1 to 22,025.5±21,556.5 mm^3, $p>0.05$), uterine, (487,818.6±352,724.0 to 487,176.8±353,724.6 mm^3, $p>0.05$) and ovarian volume (52,796,05±45,093.173 to 52,744.74±43,972.322 mm^3, $p>0.05$) did not decrease significantly. There were no initial complications after IUS insertion. The authors concluded that LNG-IUS is an easy and effective alternative to surgical treatment of leiomyoma-related abnormal uterine bleeding without significantly affecting the volume of leiomyoma and ovarian and uterine volume, and that it is effective in reducing menorrhagia associated with leiomyomas with improvement in hemoglobin levels.[29]

A retrospective cohort study was published in 2018 by Erkariyan and colleagues6, that included 95 women diagnosed with uterine leiomyoma. Fifty three women received the LNG-IUS, while 42 women received routine intramuscular injections of 150 mg MPA every three months for a period of one year. After one year of treatment. The LNG-IUS group had significantly smaller fibroid size (2.9±1.5 vs 4.0±1.7, $p=0.029$), lower visual analogous scale scores for pelvic pain (3.1±0.9 vs 5.8±1.2, $p=0.032$), dysmenorrhea (3.4±1.3 vs 7.2±1.0, $p=0.014$), and dyspareunia (5.8±1.2 vs 6.1±1.8, $p=0.040$) than the MPA group. At the end of the one-year study period, there was a significant decrease in the number of patients with menorrhagia ($p<0.001$ for both groups) and an increase in serum hemoglobin levels ($p=0.005$ for LNG-IUS and $p=0.049$ for MPA) in both the LNG-IUS and MPA treatment arms. Authors concluded that the LNG-IUS appears to be a viable option for treatment of heavy menstrual bleeding, reducing fibroid size and associated pelvic discomfort.[6]

The prospective, multicenter, single-cohort, open-label, post-authorization 12-month follow- up study of Harada and colleagues[30] (2022) gathered real-world experience with the use of LNG-IUS for heavy menstrual bleeding and dysmenorrhea to assess its safety and therapeutic efficacy. Adenomyosis (39.5%), uterine leiomyoma (30.8%), and endometriosis (12.9%) were common underlying diseases among the 595 patients included in the study. Overall, 59.7% of patients experienced adverse drug reactions, with 0.3% experiencing significant adverse drug reactions. Metrorrhagia (48.1%) was the most commonly reported adverse drug reaction, followed by procedure pain (14.1%) and ovarian cyst (6.2%). At 12 months, the overall expulsion rate was 8.7%. Expulsion was more likely to occur in women who were overweight (BMI≥25 kg/m^2), had adenomyosis, or had a uterine cavity length > 8 cm. Improvements were seen in chronic pelvic discomfort and painful defecation, and the median [interquartile range] VAS score for dysmenorrhea improved from 46.5 [13.0–68.0] at insertion to 1.0 [0.0–13.0] at 12 months. The authors concluded that patients using the LNG-IUS experienced less dysmenorrhea, chronic pelvic pain, and diarrhea pain.[30]

In a 5 year cohort study, Magalhaes, et al.[31] (2022) evaluated the impact of LNG-IUS on uterine volume, bleeding patterns, and LNG-IUS-related outcomes among women with abnormal uterine bleeding caused by fibroids, adenomyosis, and heavy bleeding without structural cause. These were compared with a control group. Clinical and ultrasound assessments were made at baseline and at 3, 6, 12, 24-, 36-, 48-, and 60-months post LNG-IUS insertion. After 60-months of follow-up, authors noted that uterine volume decreased in patients with fibroids, adenomyosis and heavy menstrual bleeding without structural cause, but not for patients in the control group. Change in fibroid volume was not

significantly different. Authors also observed high continuation rates among LNG-IUS users with only 3.4% of women withdrawing due to adverse events. The authors concluded that the LNG-IUS may control uterine menstrual bleeding as well as significantly reduce uterine volume in adenomyosis, fibroids, and those without structural cause.[31]

The most recent of all the included studies was a comparative cross-sectional observational study published by Depes and colleagues[32] (2023), that involved 62 women who were treated with LNG-IUS and followed up for four years. One group underwent laparoscopic hysterectomy while the other group had an LNG-IUS system inserted. Out of the total number of women who used an LNG-IUS (n=31), 67.7% (n=21) had an improvement in their bleeding pattern, and 35.5% (n=11) experienced amenorrhea. Five patients (16.1%) were labeled as treatment failure (no improvement in menstrual blood loss). Complication rates were not significantly different between the two groups, with 53.8% (n=7) occurring in the group that had the LNG-IUS inserted (all were device expulsions) and 46.2% (n=6) occurring in the surgical group (surgical wound dehiscence, vaginal vault granulation, infection with vaginal vault dehiscence, residual cervix bleeding, and bladder injury with the formation of vesicovaginal fistula). Note that complication in the surgical group were relatively more severe than the LNG-IUS group. A higher expulsion rate was noted among patients with smaller hysterometry (p=0.04), and there was no correlation found between treatment failure and larger uterine volumes (p=0.40). Dissatisfaction with the LNG-IUS was reported by 38.7% of patients (n=12), while dissatisfaction with surgical treatment was reported by 3.2% of patients (n=1). The authors concluded that LNG-IUS was an effective treatment for heavy menstrual bleeding in patients with enlarged uterus. When compared with laparoscopic hysterectomy, it had a lower rate of satisfaction and the same rate of complications, although less severe.[32]

Discussion

Several theories have been proposed to explain how leiomyoma uteri may cause abnormal uterine bleeding. An enlarged endometrial surface area and the existence of fragile and engorged vasculature in the peri-myoma environment have previously been hypothesized as possible causes.[21] Platelet activity can be overcome by the increased blood flow caused by these dilated blood vessels. Fibroids are associated with a wide range of cellular and molecular alterations, including those that affect angiogenesis, vasoactive substrates and growth factors, and coagulation.[33,34] Recent research suggests that the influence of fibroids on endometrial function is not localized to the areas directly covering the myoma(s), but rather represents a field shift within the uterine cavity as a whole. Endometrial receptivity and implantation, as well as abnormal uterine bleeding, may be affected by these alterations[35,36]

Also, endometrial hemostasis and healing could be affected by changes in plasminogen modulators.[33] Reduced levels of plasminogen-activator inhibitor-1 (PAI-1), thrombomodulin, and antithrombin III have been observed in vivo and in endometrial stromal cells treated in vitro with transforming growth factor-beta (TGF-).[35] This could be a possible therapeutic target in the future and a putative mechanism for some of the AUB observed in the context of fibroids. Furthermore, Interleukin (IL)-13, IL-17, and IL-10 levels have all been found to be altered in women with fibroids.[37] It is not known if these variants have any effect on immunological function or inflammation, both of which have been linked to endometrial breakdown and repair.

Results from this systematic review showed that the use of LNG-IUS generally resulted in reduced menstrual bleeding and improved hematologic parameters after treatment. Thus, LNG-IUS may potentially be a cost-effective alternative in the treatment of leiomyoma. A randomized controlled trial by Hurskainen et al (2004) showed that by providing improvement in health-related quality of life at relatively low cost, the LNG-IUS may offer a wider availability of choices for the patient and may decrease costs due to interventions involving surgery.[15] Authors of a Cochrane systematic review and meta-analysis recommended advising a less radical treatment as first-line therapy, such as LNG-IUS for heavy menstrual bleeding, as their study concluded that both LNG-IUS and conservative surgery appear to be safe, acceptable and effective. However, more longitudinal research is required to compare the efficacy of the LNG-IUS to that of more conservative surgical procedures.[58]

It is unclear how intrauterine levonorgestrel works to reduce the size of a uterus that has been enlarged due to leiomyoma. Several peptide growth factors and their receptors have been shown to play crucial roles in the pathogenesis of leiomyoma. Insulin-like endometrial growth factor-I (IGF-I) is thought to mediate the effects of estrogen (E2) on the development of uterine myoma.[40,41] Long-term intrauterine levonorgestrel exposure causes IGF-I to be blocked by IGF-binding protein-1.[42,43] Contradictory evidence suggests that progestin may boost the proliferative potential of leiomyoma cells[43] and could encourage fibroid growth by triggering mitosis within the tumor.[44] However, alterations in uterine artery blood flow may also contribute to the effects on the uterine and tumor size, as levonorgestrel increases resistance to blood flow, especially with its continuous intrauterine release.[45]

How LNG-IUS works to alleviate menstrual bleeding is likewise unclear. One of the theories that can help explain this is that high local concentrations of levonorgestrel have been shown to inhibit cell proliferation in uterine fibroid tissue and stimulate apoptosis[46] suggesting that progestin may have a dual role in regulating fibroid growth. The high levels of levonorgestrel likewise act on the uterine vasculature and the receptors in the myometrium, and hasten the decidualization of the endometrial stroma.[14]

As for the potential adverse effects of LNG-IUS use, the expulsion or unintentional release of LNG-IUS has been determined to be the primary reason for unsuccessful treatment. Women with leiomyoma-related menorrhagia appeared to have a higher rate of device expulsion than women with idiopathic menorrhagia.[47] This suggests that leiomyomas may have an effect on the expulsion of LNG-IUS. Moreover, the rate of ejection appeared to correlate with leiomyoma size rather than leiomyoma type, suggesting that LNG-IUS expulsion was more likely in women with bigger leiomyomas (greater than 3 cm in diameter).[14]

The results of this systematic review are similar with previously published reviews. A similar systematic review by Zapata, et al.[47] (2010) reported that majority of women with uterine fibroids who were inserted an LNG-IUS experienced a reduction in monthly blood loss and an increase in levels of hemoglobin, hematocrit, and ferritin. Users of LNG-IUS who had uterine fibroids also had higher ejection rates than those who do not have leiomyoma.[47] Another systematic review published by Jiang, et al. (2014) included 11 studies with varying methods. Results showed that menstrual blood loss significantly decreased is most women who used LNG-IUS. However, the observed benefit was seen only in before-and-after studies, and not in comparative studies.[14]

Conclusion

The the use of LNG-IUS resulted in reduced menstrual bleeding and improved hematologic parameters after treatment. LNG-IUS was more effective compared to other hormonal treatments. However, when compared to laparoscopic hysterectomy, LNG- IUS was less effective in managing heavy bleeding. The incidence of adverse events reported in the studies was low. Consistent with earlier reviews, LNG-IUS showed good potential in the management of uterine leiomyomas presenting with abnormal uterine bleeding, but its effectiveness should be further studied in randomized controlled trials. Given that it is safe, clinicians may consider this as an adjunct treatment until further evidence becomes available.

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