

Emergency Contraception Types and Mechanism of Actions

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ABSTRACT

Introduction: roughly 50% of pregnancy in the United States are unintended, and one of the reasons behind is lack of knowledge among women about various methods of emergency contraception. They come in tablet form, which is commonly known as the morning after pill, and copper intrauterine devices.

Aim of the work: In this study, our aim is to discuss various methods commonly used for emergency contraception, and explore their availability and adverse effects. We will also find its application in obese and breast-feeding women.

Methodology: we conducted this review using a comprehensive search of MEDLINE, PubMed and EMBASE from January 2010 to March 2017. The following search terms were used: emergency contraception, morning after pill, adverse effects of emergency contraception, obese women contraception

Conclusion: Proper education if provided by health care providers to their female patients regarding methods of emergency contraception can lower rates of unintended pregnancies and elective abortions. Such awareness, consultation, and prescription must be given to all women of reproductive age, regardless of marital status for decreasing adverse outcomes of long term health of the woman and decrease rate of abortion.

Keywords: emergency contraception, morning after pill, plan-B, emergency contraception for obese women, breast-feeding emergency contraception

INTRODUCTION

Around 50% of pregnancies in the United States are unplanned. Hence, it is important that women have knowledge and access to a full range of contraceptive methods, which includes most importantly emergency contraception (EC).

EC is defined as the usage of any drug or method after an unprotected sexual intercourse in order to prevent an unintended pregnancy. EC gives a second chance to stop pregnancy when contraception method has failed or in the case of unprotected intercourse. If properly used, EC holds the potential to decrease the amount of induced abortions^[1].

Major gynecologic, pediatric, and primary care organizations suggest counseling women who are at risk of unintended pregnancy about methods of EC. Currently, in the United States, four methods are accessible, which includes the copper intrauterine device (IUD) and 3 forms of oral methods: levonorgestrel (LNG) 1.5 mg (which is a progestin-only pill), the Yuzpe regimen (which is high-dose combined estrogen and progestin oral contraceptives), and ulipristal acetate (UPA) 30 mg (which is a selective progestin receptor modulator).

All EC options can be obtained and used within 5 days of unprotected intercourse and display varying efficacy^[2].

METHODOLOGY

• Data sources and search terms

We conducted this review using a comprehensive search of MEDLINE, PubMed and EMBASE, from January 2010 to March 2017. The following search terms were used: emergency contraception, morning after pill, adverse effects of emergency contraception, obese women contraception

• Data extraction

Two reviewers have independently reviewed the studies, abstracted data and disagreements were resolved by consensus. Studies were evaluated for quality and a review protocol was followed throughout. This study was done after approval of ethical board of King Abdulaziz University.

Methods of EC

Table 1^[2] summarizes the different EC options that are available in the United States. Women of reproductive age pursue contraceptive counseling from different providers, which includes those in primary health care and emergency medicine staff, who need to be simple in prescribing oral EC and in referring women who desire for a copper IUD in a timely method. Providers must educate patients about all forms of contraception, including EC, in scheduled routine health visits^[3].

Table 1: Emergency contraception methods available in United states

Method	Dosage	Timing to use after unprotected intercourse	Patient accessibility
Levonorgestrel single dose	1.5 mg, one time	within 72 h post coitus	over the counter with no age restriction
Split dose	Levonorgestrel 0.75 mg, 2 tablets within 72 h post coitus 12 h apart	within 72 h post coitus	behind the counter for patients over 17 y of age
Ulipristal acetate	30 mg, one time	within 120 h	by prescription
Copper intrauterine device	Single device inserted	within 120 h	Doctor office visit
Combined oral contraceptive (Yuzpe regimen)	Combination of 100ug of ethinyl estradiol and either 0.5-1 mg of levonorgestrel or 1 mg of norgestrel, 2 doses 12 h apart	within 120 h	by prescription

MECHANISM OF ACTION

Available indication suggests that oral EC works by suspending ovulation. Although the major mechanism of action of both LNG and UPA is preventing rupture of follicle and subsequent ovulation, the 'window of effect' for LNG EC is relatively narrow. It starts after selection of the leading follicle, but ends before luteinizing hormone (LH) begins to increase. LNG, if given at the time when LH has already begun to rise, cannot stop ovulation and has no outcome on the endometrium or other postovulatory actions. Subsequently, it is useless to prevent pregnancy.

This is also reinforced by clinical data on women who underwent unprotected intercourse at the time of ovulation. In a study counting women at

the time they wished EC, LNG was effective to prevent pregnancy only when taken prior to LH peak, whereas it had no effect

when intercourse happened on day LH - 1 to 0 and LNG was taken on day LH + 2 founded on endocrine data. Thus, due to its inadequate window of action, although LNG is well endured and easily available, there is still a necessity to find more effective EC methods. Unlike LNG, UPA has been established to have a direct inhibitory effect on follicular rupture. This permits UPA to be effective even when given shortly before ovulation, when the LH surge has already taken place^[3].

The mechanism of action of the Cu-IUD is to avoid fertilization due to the effect of copper (Cu) ions on sperm functions and viability. Nevertheless,

the manifestation on the oocyte and endometrium may donate to its high efficacy and avoid pregnancy also if the unprotected intercourse occurs at after ovulation. The mechanism of action is partially different when the Cu-IUD is inserted after coitus compared to preventing pregnancy when obtained as a regular ongoing contraceptive ^[3].

For correct use, knowledge on the mechanisms of action of EC is important. While the Cu-IUD gives instant long-acting effective contraception, the period of effect of the hormonal methods is restricted. Since the chief action of LNG and UPA is to postpone ovulation without effecting the endometrium, follicular development and ovulation typically resume within a week after its use.

Thus, additional acts of unprotected sex must be avoided in order to prevent unwanted pregnancy ^[4].

To prevent an unintended pregnancy after unprotected coitus at any time throughout the menstrual cycle, insertion of a Cu-IUD must be offered for EC and ongoing long-term contraception if likely. Amongst the hormonal methods, a single dose of 30 mg UPA would be suggested no later than 120 h (5 days) following intercourse. Additional acts of unprotected intercourse after EC use should be avoided to avoid the risk of delayed follicular rupture leading to ovulation.

Regular contraception must be resumed as soon as possible after EC use. Backup contraception can be used for the first 14 days. If UPA is not obtainable, LNG EC offers a well-tolerated, and in several places easily accessible ^[5].

To summarize, EC with a solitary dose of 1.5 mg LNG or 30 mg UPA acts by inhibition or by postponing ovulation, however does not avoid fertilization or implantation and has no hostile effect on a pregnancy. The window of effect of UPA looks wider than that for LNG as it may, in addition, avoid an ovulation subsequent to the LH surge.

The chief mechanism of action of Cu-IUD when applied for regular contraception is to prevent fertilization. In contrast to other hormonal methods, Cu-IUD also effects the uterine fluid and endometrium which can contribute to the strong contraceptive effects when used for EC.

Knowledge of the mechanism of action could confidently rise the acceptability and, consequently, obtainability of EC to offer women a second chance to avoid an unwanted pregnancy ^[6].

EFFICACY

The copper IUD is the most beneficial form of EC, with nearly 100% described efficacy, though exact EC comparisons are lacking. If anticipated, the copper IUD may then be kept for up to 10 years as a form of long-acting reversible contraceptive (LARC), given its safety, ease, and cost-effectiveness. It has been reported that over 80% of women using the copper IUD as EC eventually kept it as their primary contraception ^[7].

Amid the oral methods, UPA sows the most efficacy. A randomized controlled trial for comparing UPA 30 mg and LNG 1.5 mg noted that women treated with UPA had around half the number of pregnancies against those treated with LNG (odds ratio, 0.58; 95% CI, 0.33-0.99). If UPA is unattainable, LNG is a good substitute because it does not need a prescription. When LNG 1.5 mg is used within 72 hours post-coitus, it avoids at least half of pregnancies that would have happened without its use ^[8].

The Yuzpe schedule of multiple combined oral contraceptive pills is recognized as the least effective EC method and relates to an increased risk of adverse effects, for example nausea, when compared to LNG EC.

It contains 2 doses, 12 hours away from each other, of 100 µg of ethinyl estradiol and 0.5 to 1.0 mg of LNG. Nevertheless, the Yuzpe regimen may still have a role in restricted resource settings in which the more beneficial EC methods cannot be easily gained, or for women with prepared access to combined oral contraceptives. Women who have had coitus near the time of ovulation are at greater risk of pregnancy and should be particularly encouraged to use additional effective EC methods ^[4].

Efficacy in women with high Body Mass Index (BMI)

Existing evidence suggests that oral EC may have lower efficacy than copper IUDs in women with a higher body mass index (BMI; calculated as the weight in kilograms divided by the height in meters squared). A meta-analysis of 2 randomized controlled trials for comparing UPA and LNG efficacy among women with normal BMI and obese showed that obese women (BMI, ≥ 30 kg/m²) had the over 3 times chances of pregnancy (OR, 3.60; 95% CI, 1.96-6.53) and overweight women (BMI of 26-29 kg/m²) had 1.5 times higher risk of pregnancy (OR, 1.53; 95% CI, 0.75-2.95). Another pooled data

from 2 large randomized controlled trials and showed that pregnancy rates were considerably higher in LNG EC users weighing over 75 kg. So, for women with a BMI more than 25 kg/m², the copper IUD and UPA are favored as first-line options. Yet, for women who cannot use IUD or UPA, lesser effective EC options must be provided to minimize the chances of unintended pregnancy [9].

Emergency contraception for breast-feeding women

The American College of Obstetricians and Gynecologists endorse LNG EC safety in breast-feeding women. It is not discovered yet whether UPA is secreted into human breast milk or not, therefore it raises concerns about its use in breast-feeding women. Even though the manufacturer does not commend UPA use for lactating women, the World Health Organization has published an update to its EC guidelines suggesting that UPA benefits outweigh its risks in most cases among the breast-feeding women. On the other hand the copper IUD provides a very effective and hormone-free option for EC in breast-feeding women [10].

SIDE EFFECTS

Since oral EC has such a small duration of exposure, the typical contraindications that prohibits the use of hormonal contraceptives do not apply to EC. There is no medical condition in which EC is absolutely contraindicated. Additionally, in women with complicated or multiple medical conditions, the risk of unintended pregnancy usually outweighs any other potential risks of EC.

Common self-limited side effects include change in menstrual patterns and nausea. Providers may have worries about UPA because it is a recent product, approved in the United States since 2010. However, post-marketing surveillance has described its safety and acceptable adverse effect reports. The most frequent adverse effects included nausea, headache, abdominal discomfort, and changes in menstrual bleeding pattern with the next cycle [11].

CONCLUSION

All health care providers who see women of reproductive age must be prepared to counsel, provide, and properly refer for EC. Women are expected to seek care usually with their primary

provider, as well as emergency care physicians when they require EC. The copper IUD is so far, the most effective method of EC and has the advantage of providing cost-effective, convenient and safe long-term contraception. It restricts sperm viability and function and is also the most beneficial method in women with an elevated BMI as well as for those who are breast-feeding. Oral EC postpones ovulation and is normally considered ineffective when administered after ovulation. Levonorgestrel EC is available over the counter to women of all ages. Although there are no absolute medical contraindications to any EC and side effects are often minor, women who frequently need EC must be educated about more efficacious and long-term contraception methods, especially LARC.

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