# Review of Intaruterine Device (Iud)

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***Abstract*—More than 150 million women worldwide use the intrauterine device (IUD), a long-acting, reversible form of contraception that is very successful. Emphasize its excellent effectiveness less than 1% of patients experience failures annually and list typical withdrawal symptoms, including as discomfort and bleeding. Although the general adverse event incidence is minimal, there is a chance of infection within the first 20 days after insertion as well as other uncommon problems such uterine perforation.**

***Index Terms*—Intrauterine Device, Effectiveness, Bleeding.**

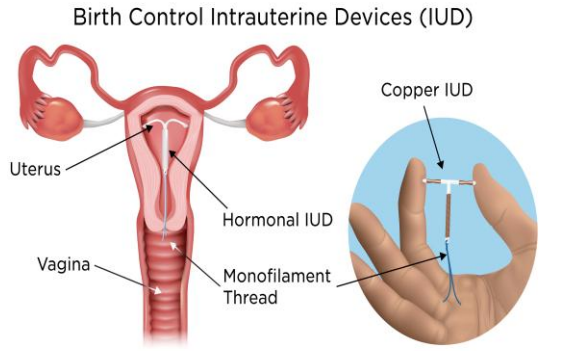
## I. INTRODUCTION

The term "intrauterine device," "intrauterine contraceptive device," or "coil" refers to a type of long-acting reversible birth control method in which a tiny, frequently T-shaped contraceptive device is placed within the uterus to prevent conception (1). The intrauterine device, or IUD, is a very safe and effective method of birth control (2). Over 150 million women use IUDs, mostly in developing nations, especially in Southeast Asia and the Middle East (30% in China); in European countries, the rate of IUD usage is significantly lower (range: 3–24%) (3). One of the most efficient forms of birth control is the intrauterine device (IUD). In the first 12 months of normal usage, the failure rates of today's copper-bearing (Cu) and levonorgestrel-releasing (LNG) IUDs are less than 1% (4). Regardless of the type of device used, the global cumulative pregnancy rate at five years is less than 2% (5). Because of the benefits of IUDs—safe, few side-effects, high continuation rate, and usage in any age or parity(6). They should be considered as one kind of first-line contraceptive choices for any woman with no medical contraindications to prevent unplanned pregnancy(7). This use has continued to rise annually, with 14% of females using contraception opting for LARC methods(8).


## II. PHYSIOLOGY AND ANATOMY

IUDs are 30 to 36 mm in length and 28 to 32 mm in width. Although it has long been believed that uterine width is sufficient for all patients, new ultrasonography research has suggested that cavity width in nulliparous women may be less than device width (9). The cervix and uterus are the main anatomical markers to be recognized when placing and removing an IUD. In order to determine the uterus's size, shape, location, and any anatomical anomalies, a bimanual pelvic examination should be performed (10). All intrauterine devices (IUDs) have the primary function of causing a local inflammatory response in the endometrium, which releases humoral and cellular components into the uterus. The species under study's reproductive strategy is impacted by this inflammatory response in several ways. For instance, in farm animals, this foreign body response might have noticeable extrauterine consequences, whereas in rodents, it can be confined within the

uterus. Therefore, it is impossible to distinguish the effects of IUDs in humans from those in animals (11)




## III. MECHANISM OF ACTION

By preventing sperm from ever reaching the egg, IUDs' primary mechanisms of action take place prior to fertilization (12). As a spermicide, the copper-containing IUD destroys or damages sperm to prevent them from getting to the egg. Instead of hormones, copper IUDs emit copper ions, which are poisonous to sperm. Additionally, they induce the production of a fluid that is toxic to sperm and contains white blood cells, copper ions, enzymes, and prostaglandins in the uterus and fallopian tubes (13). Given their exceptional efficacy as emergency contraceptives, copper-containing IUDs may also work by inhibiting blastocyst implantation (14). By thickening the cervical mucus, the progestogen released by hormonal IUDs mostly blocks sperm from entering the fallopian tubes. Additionally, hormonal IUDs can occasionally stop ovulation (15).

## IV. TYPES

a). Plastic Iuds:

IUDs made of inert plastic The first inert plastic IUDs, such as the Lippes Loop (1961), Margoulis coil (1961), Dalk Shield (1971–1974), and others, hit the market in the early 1960s. It may be possible to keep some inert devices in place after menopause (16). From the 1960s to the 1990s, it was discovered that a disproportionately high number of women suffered from severe injuries (such sepsis), which ultimately resulted in multiple lawsuits and the Dalkon Shield's removal from the American market in 1975. Ever since, every other inert device

b). Cu-IUDs:

The Cu-IUDs include FlexiGard, NOVA-T®380 IUD, Multiload-Cu 375, TCu380A (ParaGard).The only non-hormonal long-acting reversible contraceptive method currently authorized by the US Food and Drug Administration (FDA) is the TCu380A IUD (18). A common process that preferentially affects the cervical part of an IUD and can result in complete metal loss is intrauterine copper corrosion. There are significant individual variations in both its initiation and evolution. Bleeding issues, which remain the primary disadvantage of inert polyethylene devices, have been lessened but not completely eradicated with the addition of copper. Increased copper ion content in endometrial tissue and vascular endothelial growth factor release in the endometrium may result from high dissolution quantities of Cu-IUD, which may then produce irregular uterine bleeding (19).

c). Levonorgestrel-releasing intrauterine delivery system with long-acting reversible action (LNG-IS): Levonorgestrel-releasing intrauterine delivery device with long-acting reversibility (LNG-IUS) (20). In order to stop implantation, LNG-IUS releases levonorgestrel onto the endometrium every day (21). The following ING-IUSs are currently available on the market: Avibella (22) Mirena ®, Jaydess ®, Liletta ®, and Levosert ®. They have an overall pregnancy rate of 0.2 per 100 women-years (23). Although they are authorized for usage for a maximum of five years following device placement, a growing body of scientific research indicates that they can continue to be beneficial for up to seven years (24). Treating nulliparous women with lidocaine before to insertion appears to be a sensible option to lessen discomfort and boost use (25). In the beginning, Mirena ® releases levonorgestrel into the uterus at a rate of around 20 µg/d, whereas Jaydess ®

releases it at a rate of about 12 $\mu$g/d. After five years, it gradually drops to 10–12 μg/d (26). In the first two to three months following the insertion of this device, intermenstrual spotting typically happened. Following that, bleeding problems are rare and far less prevalent than those seen with Cu-IUDs (27). Amenorrhea and decreased bleeding were the main reasons for eliminating the LNG-IUS in a randomized comparative analysis of TCu380A and 52 mg LNG-IUS including 3,755 women, whereas increased bleeding was the main cause for removing the TCu380A (28). Surface epithelium erosion is significantly lower than that seen with Cu-IUDs or inert plastic (29).

d). Intrauterine devices that release antiprogestin (AP IUDs):

Progesterone antagonists released by AP IUDs have the potential to depress the endometrium, cause amenorrhea, and impair fertility. Prolonged menstruation may result with AP IUDs placed during the late luteal phase. As time goes on, AP IUDs can stop the growth of endocrine glands and arteries, boost steroid receptors, and stop progesterone withdrawal bleeding by preventing spiral degenerative changes in the arteries. In other words, systemic AP therapy has been demonstrated to be effective. As a result, AP IUDs can offer a novel method of birth control with low breakthrough bleeding (31).

## V. PLACEMENT AND EXTRACTION

Predicting a woman's experience following IUD implantation or removal is challenging. Women report feeling cramps, a pinch, or nothing at all during the insertion. Just 9% of women who were nulliparous thought the surgery was pleasant, 72% thought it was fairly uncomfortable, and 17% said the insertion caused significant discomfort that required active management (32). Similar discomfort is experienced by around 11% of parous women (33). NSAIDs can be useful in these situations when used to treat post-insertion discomfort, but they have no discernible impact when used as a preventative measure. Applying topical lidocaine before to the surgery is an excellent way to manage discomfort (34). In the United States, intrauterine lidocaine, also known as paracervical block, is not often used despite being a good way to lessen insertion discomfort (35). IUD implantation can take place at several stages of a woman's reproductive life:

1. The most frequent, interval insertion, takes place furthest from pregnancy;
2. When the uterus is known to be empty after an abortion or miscarriage, post-abortion or post-miscarriage insertion takes place;
3. After a woman delivers birth, either right away while she is still in the hospital or up to six weeks later, after a vaginal or cesarean delivery, postpartum insertion takes place. The risk of IUD ejection varies with the date of insertion (36,37,38,39,40).

## VI. METHODOLOGY

Healthcare professionals locate the cervix, or uterine entrance, using a speculum during the insertion procedure. They next use a tenaculum to press the cervix open and stabilize it (41). and then put the IUD into the uterus using an insertion instrument. The cervix is penetrated by the insertion instrument. If the process is simple, it should take five to ten minutes at most (42). To keep the cervix open throughout the IUD insertion operation, a suction cervical stabilizer might be utilized instead of the conventional tenaculum (43). Suction cervical stabilizers, such The CarevixTM Suction Cervical Stabilizer (44), can lessen insertion-related discomfort (45). After the placenta is removed from the uterus, the IUD is implanted for rapid postpartum implantation. After delivery, the uterus is bigger than usual, which has significant ramifications for insertion. After vaginal births, insertions can be done with placental forceps, a longer inserter designed for postpartum insertions, or manually, when the physician uses their hand to insert the IUD in the uterus. Prior to suturing the uterine incision during cesarean births, the IUD is manually or with forceps inserted into the uterus during surgery (46). Since no object must pass through the cervix, the removal is often simple and less painful than the insertion (47). The medical professional must use a speculum to locate the cervix, then grip the IUD strings with ring forceps—which only enter the vagina—and remove the IUD. IUD installation and removal can be taught by manufacturers and other training facilities (48).

Table I. Different Brand of Intrauterine devices

| | Copper (49) | Mirena (50) | Skyla (51) | Liletta(52) | Kyleena (53) |
|---|---|---|---|---|---|
| Hormone (total in device) | None | 52 mg levonorgestrel | 13.5 mg levonorgestrel | 52 mg levonorgestrel | 19.5 mg levonorgestrel |
| Initial amount released | None | 20 µg/day | 14 µg/day | 18.6 µg/day | 16 µg/day |
| Approved effectiveness | 10 years (12 years) | 5 years (10 years) | 3 years | 3 years (5 years) | 5 years |
| Mechanism of action | Copper toxic to sperm | -Levonorgestrel thickens cervical mucus to prevent sperm from reaching egg<br>-Prevents ovulation at times | | | |
| Advantages among IUDs | -No hormones<br>-Emergency contraception | -Various hormone level options<br>-Lighter periods after 3 months; some users experience amenorrhea | | | |
| Disadvantages among IUDs | Heavier menstrual flow and cramps | Ovarian cysts (although they can be asymptomatic) | | | |

## VII. ADVANTAGES

Due to its ease of use and removal, the IUD is one of the most widely used forms of long-term reversible contraception.

Among its benefits are:

• It can be used by nearly any woman, including nulliparous women;
• Its action lasts for ten years if it is not removed in between;
• Its onset of action is immediate;
• It is independent of sexual activity
• It does not interfere with intercourse;
• It is suitable for lactating women;
• Fertility returns promptly upon discontinuation;
• It is safe for use by women taking any kind of medication;
• It is not linked to cancer of any organ, unlike hormonal contraception.
• It normally has little effect on mood or sex desire;
•it does not result in weight gain.

## VIII. DISADVANTAGES

An IUD has both small and big disadvantages, despite its evident advantages. These include:

• Dysmenorrhea, polymenorrhea, and menorrhagia are common complaints. These are also the main causes of IUD discontinuation.
• It provides no defense against STIs (sexually transmitted illnesses).
• Within 20 days following IUD installation, there is a small chance (1%), of developing a uterine infection. If the woman has a history of STIs, this is amplified. Before insertion, women should be checked for chlamydia or gonorrhea, as well as any additional organisms they may want. Thankfully, it is possible to effectively treat pelvic infections caused by the IUD in pregnancy without taking the device out.
• Without proper treatment, pelvic inflammatory disease may develop in women who have an IUD in place and get a STI.
• The IUD may be expelled, particularly during or after the first three months of menstruation. Nulliparous women, or those who had it placed just after giving birth or after an abortion, are more likely to experience this. About 5% of people are at danger. If the device is removed and the loss is discovered only a few days later, backup contraception ought to be used right away.
• 0.1 percent of women may experience uterine perforation during implantation. Lower abdomen

discomfort might be one way this shows up. Surgery will be necessary to remove the perforation.

• Although pregnancies with an IUD in situ are extremely uncommon, there is a greater chance of an ectopic pregnancy if conception takes place using this approach. (54)

## IX. CONTRAINDICATIONS

There are particular contraindications for each of the two kinds of IUDs. Universal contraindications that are unique to both kinds do exist, though.

The following are universal contraindications for IUD use:

• A history of septic abortion or postpartum endometritis within the last three months;

• Confirmed or suspected uterine or cervical malignancy or neoplasia;

• Any condition that increases the risk of pelvic infection;

• History of previously inserted IUD that has not been removed;

• Acute pelvic inflammatory disease;

• Sexuall transmitted infection at the time of IUD;

• Acute pelvic inflammatory disease, unless a subsequent successful intrauterine pregnancy has occurred;

The following are specific contraindications for levonorgestrel-releasing IUDs:

• Breast cancer or any progestin-sensitive cancer that has been confirmed or suspected

-Acute liver illness;

-benign or malignant liver tumors

• Other contraindications for the copper IUD include the following:

-Wilson's disease

-Copper sensitivity

## X. CONCLUSION

IUDs are highly effective and long-lasting reversible contraceptives, but they do not protect against STIs and have a small risk of complications like expulsion or perforation. For pregnancies that occur with an IUD in place, there is a higher risk of complications, and removal in early pregnancy is recommended, though it does not entirely eliminate risks. Choosing an IUD requires understanding both its advantages, like convenience and high effectiveness, and potential side effects, which vary by type (copper vs. hormonal) and can include increased bleeding or cramping.

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