



Recent advances in Intrauterine Drug Delivery System

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Abstract

The intrauterine contraceptive device, or IUD, is a small plastic or copper device that's put into the womb. There are many different types, which are effective for three to ten years depending on type. The IUD is a long-acting reversible method of contraception. An intra-uterine device is a special device that fits inside of the uterus. There is more than one type of IUD. One type contains the hormone levonorgestrel. The hormone is continuously released into the uterus. Another type of IUD is covered by copper. The copper IUD has copper wire coiled around the stem and arms of the device. Both are about 1 1/4 inches tall. Each IUD has a string attached to the end, so the woman can check that the IUD is in place and so it is easier for your health care provider to remove it. The IUD is inserted into your uterus through your vagina and protects against pregnancy. Although the IUD has been used for more than 30 years to prevent pregnancy, how it works is still not fully understood. The IUD affects sperm movement and survival in the uterus (womb) so that they cannot reach the egg to fertilise it. Copper IUDs prevent sperm from being able to go into the egg by immobilizing the sperm on the way to the fallopian tubes. If an egg does become fertilized, implantation on the wall of the uterus is prevented because copper changes the lining of the uterus. With hormonal IUDs, a small amount of progestin or a similar hormone is released into the uterus. These hormones thicken cervical mucus and make it difficult for sperm to enter the cervix. Hormonal IUDs also slow down the growth of the uterine lining, making it inhospitable for fertilized eggs.

Keywords: IUCD, Copper, Uterus, Contraceptives.

Introduction

The intrauterine device (IUD) is a long-term birth control method. Unlike IUDs that were used in the 1970s, present-day IUDs are small, safe, and highly effective. An Intrauterine Device (IUD) is a small piece of plastic that is inserted by a clinician into the uterus to prevent pregnancy. It is approximately 1½ inches (3cm) in length. There are several different types of IUDs. The most

common IUD is T-shaped and coated with copper. This can be left in the uterus for 2-5 years. Another type of IUD contains a hormone (progestin) but it needs to be replaced once a year. Attached to the IUD are two plastic threads or strings that hang down through the cervix into the vagina. The cervix is the opening to the uterus. The threads or strings do not hang outside the body. The IUD can also be used as an emergency method of birth control. If an IUD is inserted within 7 days after unprotected vaginal sex it may prevent a pregnancy. An intrauterine device (IUD) is a small T-shaped plastic device that is placed in the uterus to prevent pregnancy. A plastic string is attached to the end to ensure correct placement and for removal. IUDs are an easily reversible form of birth control, and they can be easily removed. However, an IUD should only be removed by a medical professional. An IUD, or intrauterine device, is a small contraceptive device made of flexible plastic. It's inserted into the uterus, where it provides highly effective long-term contraception. Two IUDs are currently available in the United States: The Copper T 380A (called ParaGard), which is wrapped in fine copper wire and lasts for ten years before it needs to be replaced. Many providers recommend the progestin IUD for women who suffer from extremely heavy, prolonged, or painful menstruation because it tends to lighten their periods or even suppress them altogether. And because they lose less blood, women using this IUD are less likely to develop iron-deficiency anemia, a condition that can cause fatigue and other symptoms. Some studies have found that women with copper IUDs tend to have a lower risk of endometrial cancer. And some experts suspect they'll find that the progestin IUD has the same effect, since that's the case for progestin-only contraceptives like the minipill and the shot. Intrauterine devices can be used as emergency contraception to prevent pregnancy up to 5 days after unprotected sexual intercourse, or sexual intercourse during which the primary contraception is believed to have failed (e.g. a condom was used, but it broke). Insertion of a copper-T IUD as emergency contraception is more than 99% effective, making it more effective than emergency contraceptive pills. The IUD is the world's most widely used safe and effective method of reversible birth control, currently used by nearly 160 million women. An Intrauterine Device (IUD) is a small object that is inserted through the cervix and placed in the uterus to prevent pregnancy. A small string hangs down from the IUD into the upper part of the vagina. The IUD is not noticeable during intercourse. IUDs can last 1-10 years. They affect the movements of eggs and sperm to prevent fertilization. They also change the lining of the uterus and prevent implantation. IUDs are 99.2-99.9% effective as birth control. They do not protect against sexually transmitted infections, including HIV/AIDS. The IUD is 98% effective in preventing pregnancy.

Types of IUDS

Copper IUDs

The copper IUD is the most commonly used type of IUD. It can be left in the body for up to 10 years. It can be removed at any time if a woman wishes to become pregnant or if she does not want to use it anymore. The arms of this IUD contain some copper, which is slowly released into the uterus. The copper prevents sperm from making their way through the uterus into the tubes and prevents fertilization. If fertilization does occur, the copper prevents the fertilized egg from implanting on the wall of the uterus.

Hormonal IUDs

Hormonal IUDs that contain progesterone must be replaced every 5 years. They can be removed at any time if a woman decides she wishes to become pregnant or if she does not want to use it anymore. Hormones are in the arms of the IUD and are released slowly into the uterus. The Mirena levonorgestrel-releasing intrauterine system (IUS) contains the hormone levonorgestrel (LNg), which is similar to progesterone. The LNg IUS causes cervical mucus to thicken to prevent sperm from entering the cervix and reaching the egg. Only about 1 in 1,000 women who use the LNg IUS experience accidental pregnancy in the first year. The LNg IUS reduces the risk of tubal pregnancies and pelvic inflammatory disease. It also dramatically decreases menstrual blood loss. It is approved to protect women from pregnancy for up to 5 years when used in the United States and 7 years in Europe and Asia

Risk/ Side effects

During the first few weeks after insertion, you're more likely to develop pelvic inflammatory disease (PID), an infection that can affect the uterus, fallopian tubes, and ovaries, though your overall risk is still low. This infection, most commonly caused by chlamydia or gonorrhea, can lead to scarring that makes it more difficult to get pregnant later and, in rare cases, can even be fatal. The risk of PID is one reason it's important to return to your caregiver or clinic for a follow-up visit in the first month after insertion, or sooner if you have any signs of infection. PID can be treated with antibiotics, and the sooner it's caught and treated, the less likely it is to cause long-term harm. A very small number of women (about one to eight in 1,000) do become pregnant while using an IUD. For these women, there's a higher than average chance that the pregnancy is ectopic, meaning a fertilized egg has implanted outside of the uterus, typically in one of the fallopian tubes. This is a serious condition that requires immediate treatment. (Note that because IUDs are so effective at preventing pregnancy, your overall risk of having an ectopic pregnancy is lower than that of women not using any contraception.) Some women who use the progestin IUD develop what are known as functional ovarian cysts. In most cases these cysts cause no problems and disappear on their own. In rare cases, they require surgery. Finally, the IUD can perforate the uterus while it's being put in, causing bleeding and injury and possibly requiring surgery to retrieve it, but this is quite rare. Women who are pregnant or who have abnormal bleeding or cancer of the cervix or cancer of the uterus should not use IUDs. However, in their discussion of IUDs, the Reproductive Health Technologies Project disagrees with this claim because IUDs are easily reversible.

The IUD is unlikely to cause any serious side effects. For a small number of women, the progestin IUD causes side effects such as acne, headaches, breast tenderness, and depression, which generally get better over time. And your odds of suffering these side effects is much lower than with other progestin-only contraceptives, such as the minipill and the shot, because the amount of progestin in your blood is much lower with the IUD. There are some side effects of the IUD, but not many. You may have uterine cramps (like menstrual cramps) or low backache when the IUD is inserted, and maybe for a few weeks after insertion. With the levonorgestrel IUS you will likely have much lighter periods or none at all. With the copper IUD, you may have increased menstrual flow and cramps, but this usually lessens after the first few months, as your uterus gets used to the IUD. You can relieve any discomfort by over-the-counter medications, such as acetaminophen (Tylenol), ibuprofen (Advil, Motrin, and Nuprin), or naproxen sodium

(Aleve). Some women have spotting or bleeding between menstrual periods with the IUD. There is a slightly increased risk of infection, called pelvic inflammatory disease (PID) during the first 6 weeks after the IUD is inserted. After that, the risk for PID is very low. Very rarely, the uterus can be injured when the IUD is inserted.

Effectiveness and mechanism

All second-generation copper-T IUDs have failure rates of less than 1% per year, and cumulative 10-year failure rates of 2-6%. A copper IUD may also be used as emergency contraception. If an IUD is inserted within five days of unprotected intercourse, a woman's chance of pregnancy is reduced to that of ongoing IUD users. A large World Health Organization trial reported a cumulative 12-year failure rate of 2.2% for the T 380A (ParaGard) (an average failure rate of 0.18% per year over 12 years), equivalent to a cumulative 10-year failure rate of 1.8% following tubal ligation. The frameless GyneFix also has a failure rate of less than 1% per year. Worldwide, older IUD models with lower effectiveness rates are no longer produced. The presence of a device in the uterus prompts the release of leukocytes and prostaglandins by the endometrium. These substances are hostile to both sperm and eggs; the presence of copper increases this spermicidal effect. The current medical consensus is that spermicidal and oviducal mechanisms are the only way in which IUDs work. Still, a few physicians have suggested they may have a secondary effect of interfering with the development of pre-implanted embryos; this secondary effect is considered more plausible when the IUD is used as contraception. Controversially, the possibility of this secondary effect has led some to consider the IUD an abortifacient. IUDs mainly work by changing the intra-uterine environment and making it spermicidal. Non-medicated IUDs cause a sterile inflammatory response by producing a tissue injury of minor degree but sufficient enough to be spermicidal. Copper-containing IUDs, in addition, release free copper and copper salts that have both a biochemical and morphological impact on the endometrium and also produce alteration in cervical mucus and endometrial secretions. No measurable increase in serum copper is observed.

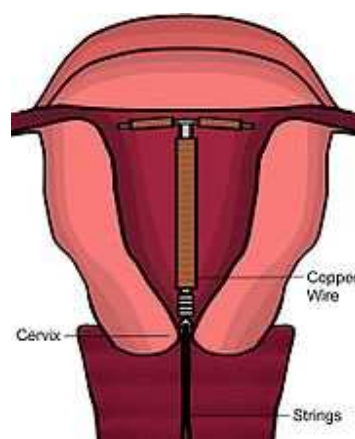


Figure- A diagram showing a copper IUD in place in uterus

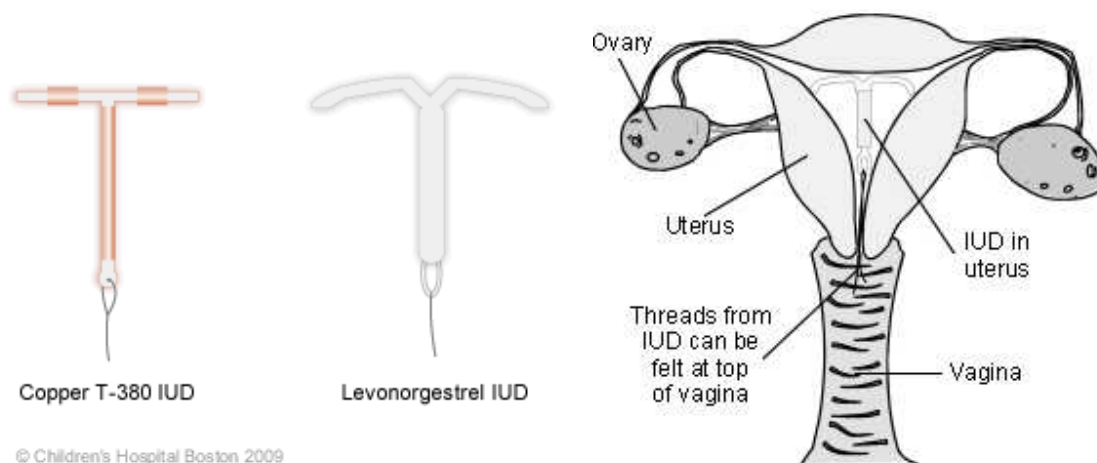


Figure-Intrauterine device used in uterus

Conclusion

An IUD is inserted into the uterus (womb) by a health-care provider with specialized training. An IUD prevents pregnancy by stopping sperm from reaching an egg that your ovaries have released. It does this by not letting sperm go into the egg. An IUD also changes the lining of the uterus so an egg does not implant in the lining if it has been fertilized. Therefore, the egg has no place to grow. An IUD prevents pregnancy by stopping sperm from reaching an egg that your ovaries have released. It does this by not letting sperm go into the egg. An IUD also changes the lining of the uterus so an egg does not implant in the lining if it has been fertilized. Therefore, the egg has no place to grow. A single decision leads to effective long-term prevention of pregnancy. Increased sexual enjoyment because there is no need to worry about pregnancy. It can be inserted immediately after childbirth (except hormone releasing IUDs) or after induced abortion (if there is no evidence of infection). They are very effective and very little need be remembered. Copper IUDs are not recommended for women with Wilson's disease or allergies to copper. Women with a history of breast cancer cannot use the Mirena IUD. Women with diabetes should be monitored carefully if they use the Mirena IUD. Breastfeeding women should be aware the synthetic hormone in the Mirena IUD is excreted in breast milk.

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