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Intrauterine Device Insertion during Cesarean Section

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ABSTRACT
Intrauterine devices (IUDs) are highly effective contraception, with rates of failure of less than one percent in the first year of utilize. Intrauterine devices are frequently placed at postpartum visits, typically four to six weeks following delivery but increasingly are being placed immediately post-partum, within three days of delivery. IUDs prevent pregnancy by Preventing sperm from fertilizing the egg, killing or immobilizing sperm by creating an inflammatory reaction inside the uterus that is toxic to sperm. Intrauterine devices are accessible to the majority of females, involving those who have not had kids and adolescent females. An intrauterine device can be inserted at any time during the menstrual cycle if females have not had unprotected sex since their last period. Before an intrauterine device is put, a pregnancy test must be performed on females who have engaged in sexual activity without protection. When it comes to females, the most prevalent causes for having an intrauterine device removed are pain and hemorrhage, which accounts for more than half of all removals that occur before the typical replacement time. Copper intrauterine devices are known to cause cramping and raise the volume of monthly bleeding. A nonsteroidal anti-inflammatory drug can typically alleviate the cramping. Implantable urinary devices that release levonorgestrel are known to induce irregular bleeding in the first few months following installation.

Keywords: Intrauterine Device, Insertion during, Cesarean Section

Intrauterine devices (IUDs)

Intrauterine devices (IUDs) (Figure 1) are highly effective contraception, with rates of failure of less than one percent in the first year of utilize. Intrauterine devices are frequently placed at postpartum visits, typically four to six weeks following delivery but increasingly are being placed immediately post-partum, within three days of delivery. rapid postpartum insertion of intrauterine devices is supported by US clinical guidelines and is considered effective, convenient for female and safe [(1)].

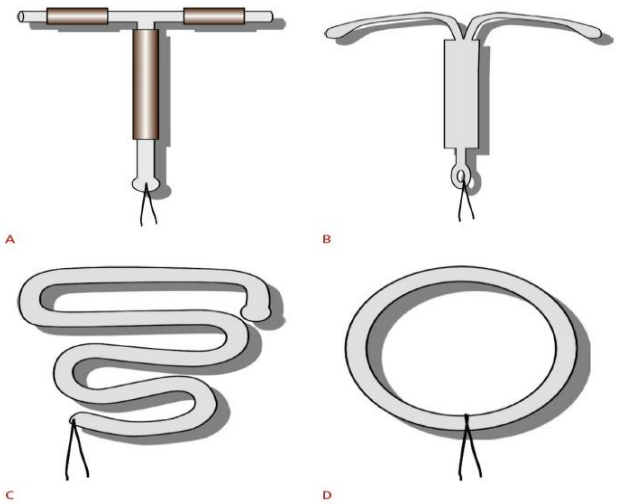

Figure 1: Schematic representation of shapes of intrauterine device. A. T-shaped TCu-380A copper intrauterine device exposes copper on both the arms and stems. B. Levonorgestrel-releasing intrauterine device is also T-shaped. C. Double "S"- shaped Lippes loop intrauterine device was frequently utilized in the 1960s to 1980s. D. Stainless steel ring has been utilized primarily in China before 1993[(2)].

IUDs prevent pregnancy by [(3)]:

- Preventing sperm from fertilizing the egg, killing or immobilizing sperm by creating an inflammatory reaction inside the uterus that is toxic to sperm.

Intrauterine devices are accessible to the majority of females, involving those who have not had kids and adolescent females.

- Nevertheless, utilizing intrauterine devices are not recommended in the presence of the following conditions [(4)]: Uterine anomalies, vaginal bleeding, pregnancy, gestational trophoblastic illness, an infection of the pelvic region, consisting of a sexually transmitted infection or a pelvic inflammatory illness. In addition, tumor of the cervix or tumor of the endometrial, which is the lining of the uterus.

Types of IUDs [(5)]:

- ***Inert or non-medicated***
- Only plastic or stainless steel is used in the construction of these devices. There are still many regions of the world that make use of the Lippes loop, which is composed of plastic (polyethylene) that has been impregnated with barium sulfate. The only country in which stainless steel rings are commonly utilized is China.
- ***Copper IUDs***

On top of the plastic frame, also known as the polyethylene frame, copper wire or copper sleeves are applied. Examples involve Copper T, CuT380 A,

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Multiload 375, etc. The amount of copper included in each of the many types of copper intrauterine devices is what differentiates them from one another. Copper intrauterine devices were initially wound with wire measuring between 200 and 250 millimeters squared (Copper T 200). Copper-containing devices of the current era have a greater quantity of copper, as well as a portion of copper that is in the form of solid tubal sleeves rather than wire. This results in a rise in both the effectiveness and durability (Cu T-380 A).

• ***Cu T 380A*** **-** It is a device in the shape of a T, and it has a frame made of polyethylene that can contain 380 millimeter squared of exposed copper surface area. The frame of the intrauterine device is radio-opaque because it includes barium sulfate.

• ***Cu T-380Ag*** **-** There is no difference among it and 380 A, with the exception that the copper wire on the stem contains a silver core. This is done to prevent the copper wire from fragmenting and to increase its lifespan.

• ***Cu T 380 slimline*** **-** To make loading and inserting the device easier, it is equipped with copper sleeves that are flushed at the ends of the horizontal arms. Both the CuT-380 Ag and the CuT-380 slimline exhibit performance that is comparable to that of the CuT-380 A materials.

• ***Multiload 375*** **-** Copper wire measuring 375 millimeters squared is twisted around the stem of the device. In order to reduce the expulsions, the flexible arms were constructed. There is a comparable level of effectiveness and performance between the multiload 375 and the Cu T-380 A.

• ***Nova T*** **-** The CuT-200, which has a copper content of two hundred square millimeters and is comparable to this one. Nevertheless, the Nova T is designed to prevent cervical perforation by incorporating a silver core that is connected to the copper wire, flexible arms, and a wide flexible loop at the bottom.

❖ ***Hormone-Releasing IUDs***

• ***Progestasert*** **-** The intrauterine device contains titanium dioxide and is shaped like a T. It is made of ethylene and vinyl acetate copolymer. A reservoir of thirty-eight milligrams of progesterone and barium sulfate that is dispersed in silicone fluid is contained within the vertical stem of the device. At a daily rate of sixty-five micrograms, the progesterone is released into the body.

• ***LNG - 20 (Mirena)*** **-** There is a collar that is attached to the vertical arm of this T-shaped device. It contains fifty-two milligrams of levonorgestrel that has been dispersed in polydimethyl siloxane. In vivo, it is effective for seven to ten years and releases fifteen micrograms of levonorgestrel on a daily basis.

Indications of IUDs: Due to the fact that there are 2 distinct types of intrauterine devices, namely copper-containing and levonorgestrel-containing, it is important to be aware that each of these intrauterine devices has a unique set of indications. Every intrauterine device is suitable to be utilized as a method of birth control. There are 3 different strengths of levonorgestrel that are available for the intrauterine device that contains levonorgestrel. These strengths are 13.5 milligrams, 19.5 milligrams, and fifty-two milligrams. Every single one of them is similarly efficient in terms of supplying dependable contraception [(6)].

Nevertheless, the greater dose intrauterine device that contains fifty-two milligrams is also authorized for the management of menorrhagia and for the protection of the endometrium during hormone replacement treatment. While the 13.5 milligrams intrauterine device is permitted to be utilized for a maximum of three years, the 19.5 milligram and fifty-two milligrams intrauterine devices approved for usage for a maximum of five years. The copper intrauterine device has been granted approval for use as a method of birth control for a period of up to ten years. On the other hand, there is a reported off-label indication that allows these contraceptives to be used as emergency contraception within five days of unprotected sexual activity. It is estimated that around 0.1 percent of emergency contraceptive procedures fail after they have been placed. It is possible to insert intrauterine devices soon after delivery of the placenta, within ten minutes of the delivery of the placenta; delayed post-partum, within four to six weeks of delivery; and after an abortion, provided that the abortion was not a septic abortion [(7)].

In addition, there are also indications that lead to the removal of the intrauterine device. The case's preference is the major cause for removal, and this preference can be for any reason, include but not restricted to the desire to become pregnant, an irregular hemorrhage pattern, heavy vaginal bleeding, discomfort or pain, which may be a sign that the device has been displaced. Alteration in bleeding, particularly heavier bleeding, were more probable to occur in the intrauterine devices that contained copper as opposed to the levonorgestrel-containing, which prompted the patient to want to remove the device [(8)].

Contraindications for IUDs

Most females could utilize an intrauterine device. Contraindications include the following[(9)]:

- Infections of the pelvis that are currently present, most commonly pelvic inflammatory disease (PID), mucopurulent cervicitis with a suspected sexually transmitted infection (STI), pelvic tuberculosis, septic abortion, or puerperal endometritis or sepsis within the past three months
- Unexplained vaginal bleeding

- Anatomical abnormalities that cause the uterine cavity to be distorted
- For levonorgestrel-releasing intrauterine devices, breast tumor or allergy to levonorgestrel
- Pregnancy
- Gestational trophoblastic illness with persistently increased serum beta–human chorionic gonadotropin (beta-hCG) concentration (a relative contraindication because supporting data are lacking)
- Known cervical tumor or endometrial tumor
- For copper T380 intrauterine devices, Wilson illness or allergy to copper

Timing

An intrauterine device can be inserted at any time during the menstrual cycle if females have not had unprotected sex since their last period. Before an intrauterine device is put, a pregnancy test must be performed on females who have engaged in sexual activity without protection. Females are also encouraged to utilize another method of birth control until the results of the test are known. Pregnancy must be ruled out prior the intrauterine devices is inserted unless females wish to utilize an intrauterine device as emergency contraception following unprotected sex. In such cases, a copper intrauterine device may be inserted to prevent unwanted pregnancy. If inserted within five days of one episode of unprotected sex, a copper intrauterine device is nearly hundred% effective as emergency contraception. Then, if the females' desires, it may be left in position for long-term birth control. A levonorgestrel-releasing intrauterine devices isn't utilized for emergency contraception, and pregnancy must be excluded prior to its insertion [(10)].

In the event of a miscarriage or abortion during the first or second trimester, as well as the delivery of the placenta following a cesarean section, an intrauterine device may be inserted promptly[(11)].

Technique: Following the determination that an intrauterine device placement is the optimal course of action for the case, the subsequent procedure is followed [(12)]:

1. Confirmed negative pregnancy test.
2. Acquire informed consent.
3. Request that the patient assume a dorsal lithotomy position.
4. Conduct a bimanual examination with gloved hands to ascertain whether the uterus is retroverted or anteverted.
5. Insert the speculum and locate the cervix.
6. Use a cleansing solution, as povidone-iodine, to cleanse the cervix and vaginal fornices. Utilize chlorhexidine gluconate if the case has an allergy to shellfish or iodine.
7. If desired, at this time, an anesthetic gel application or paracervical block placement may be considered, as previously mentioned.
8. At this time, swap to sterile gloves and utilize a sterile single-tooth tenaculum to clasp the anterior lip of the cervix and apply gentle traction to straighten the cervical canal and uterine cavity. It may be advantageous to clasp the posterior lip of the cervix if the uterus is retroverted.
9. Determine the depth of the uterine cavity utilizing a sterile uterine sound, which is typically between six centimeters and nine centimeters. An intrauterine device should not be inserted if the circumference is under six centimeters. If the uterine sound is challenging to place, cervical dilators may be utilized. A paracervical block is advised when cervical dilators are required.
10. After the uterine depth has been determined, adhere to the instructions on the container for the specific IUD that is being inserted.
11. Cut the strings to a length of three to four centimeters with sharp scissors once the intrauterine device has been inserted and the strings are visible. Record this length in the chart.
12. Both the speculum and the tenaculum should be removed, and it should be checked to ensure that there is no hemorrhage at the location of the tenaculum.
13. In order to confirm that the string is properly placed, the case should be checked again in four to six weeks.

Figure 2 shows the steps involved in the novel method for inserting a Copper T380 intrauterine device during a cesarean section.

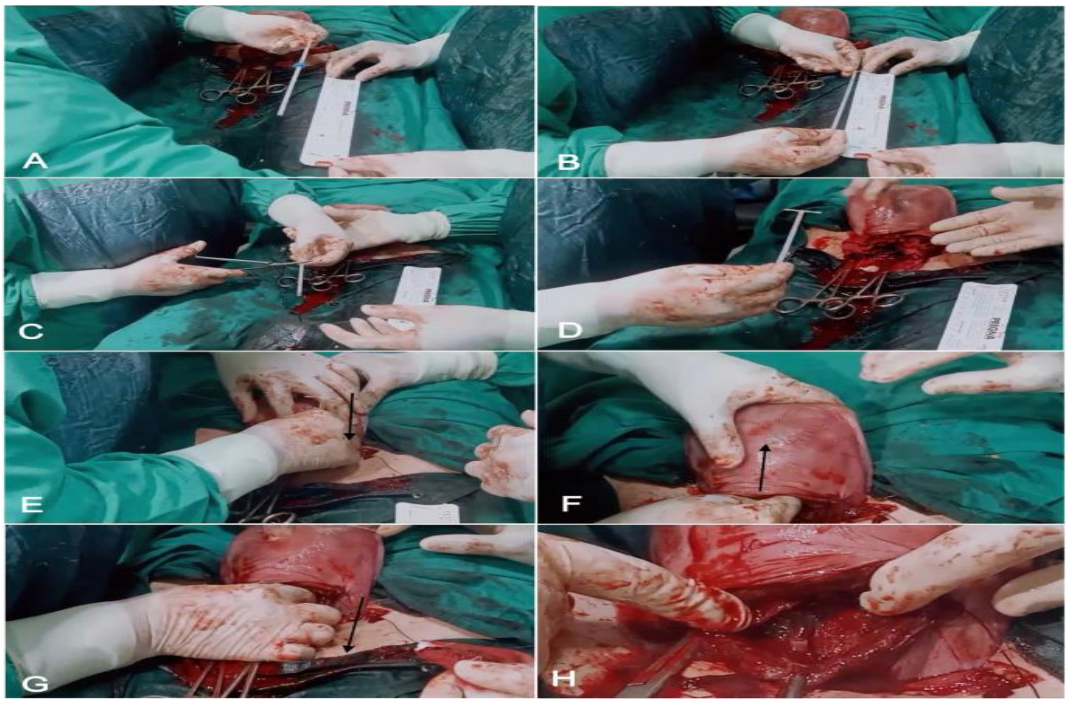

Figure 2: The steps involved in the novel method for inserting a Copper T380 intrauterine device during a cesarean section. intrauterine device inserted into the introducer, with the blue flange in its proper position. B. Following the blue flange has been removed, the length of the introducer, which is twelve centimeters, is measured. C. intrauterine device threads are being trimmed to a length of twelve centimeters on the introducer. D The introducer that has been trimmed, with the IUD stem and threads installed inside, and with the arms of the IUD unfolded. E. A gentle push is made with the introducer into the cervical canal (shown by the black arrow). A. In order to stabilize the introducer, the hand that is not the dominant hand is used to push it upwards until it reaches the fundus (black arrow). G. In order for the introducer to travel through the cervical canal and into the vagina, it is gently dragged downwards (as indicated by the black arrow). H. It is possible to view the intrauterine device threads inside the upper portion of the introducer, which is located above the internal cervical os [(13)].

IUDs mechanism of action

Copper intrauterine devices and hormonal intrauterine devices; both include several processes that prevent pregnancy. One of the most significant effects that has been described is the activation of a local inflammatory reaction in the endometrium. Because of this, the function of the endometrium and the myometrium is disrupted by the immune-inflammatory reaction that occurs in the cells and the humoral system. In all species, it is recognized that the presence of intrauterine foreign substances can disrupt the reproductive process. Copper intrauterine devices have a number of other mechanisms of action, some of which are connected to the effect that copper ions have on the motility and viability of sperm, as well as alterations in the cervical mucus[(14)].

It is possible that the extremely high effectiveness of copper intrauterine devices as emergency contraception is due to the mechanism of inhibiting fertilization or the reduction of sperm viability. Copper intrauterine devices (have been shown to have a rate of failure of less than one per mille when used for emergency contraception within five days of ovulation or sexual activity. This makes them much more successful than any hormonal emergency contraceptive [(15)].

Even though copper intrauterine devices do not often have an effect on the frequency or quantity of monthly periods, ten to thirteen percent of females have their intrauterine devices removed within the first year due to a rise in menstrual flow and abdominal pain that is similar to cramping. Another mechanism of the hormonal intrauterine device is represented by the release of a tiny amount of progestin hormones, specifically levonorgestrel. This mechanism is considered to be in addition to the foreign body reaction. In addition to inhibiting capacitation, penetration, and survival, the hormonal impacts create an environment that is unfavorable to sperm inside the uterus, and it can even be lethal for them [(16)].

Because they thicken cervical mucus, hormonal intrauterine devices interfere with the motion of sperm, which prevents sperm from traveling up into the uterus. Copper intrauterine devices on the other hand, rather affect the survivability of sperm, which can have a variety of impacts, including head-tail disruption. Under the impact of progesterone, the endometrium becomes

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thinner, which in turn has an effect on the implantation of reproductive eggs. Additionally, hormonal intrauterine devices are widely utilized for the management of menorrhagia since they diminish the flow of blood during menstruation. It is important to note that intrauterine devices, regardless of whether they are hormonal or non-hormonal, do not offer protection against sexually transmitted illnesses. Although there is a historical relationship between pelvic inflammatory disease (PID) and tubal infertility, this correlation is regarded to be spurious. A nonsteroidal anti-inflammatory medication called indomethacin is contained within the indomethacin-releasing copper intrauterine device. This agent does not interfere with copper ions and is designed to lower menstrual blood flow and cramping, both of which are commonly associated with the usage of IUDs [(17)].

Possible problems

When it comes to females, the most prevalent causes for having an intrauterine device removed are pain and hemorrhage, which accounts for more than half of all removals that occur before the typical replacement time. Copper intrauterine devices are known to cause cramping and raise the volume of monthly bleeding. A nonsteroidal anti-inflammatory drug can typically alleviate the cramping. Implantable urinary devices that release levonorgestrel are known to induce irregular bleeding in the first few months following installation. Following one year, however, up to twenty percent of females have a total cessation of monthly bleeding [(18)].

In the first year following implantation, intrauterine devices are often removed from the body by less than five percent of females, most frequently within the first few weeks. Sometimes a female fails to observe the expulsion. There are plastic strings that are related to the intrauterine device so that a female can check on it at regular intervals to ensure that it is still in place if she so desires. However, if an intrauterine device is evacuated or if it is positioned incorrectly, a female may often experience bleeding or pain. When a second intrauterine device is placed following the first one has been removed, it often remains in place. Females are required to utilize an alternative method of birth control until the issue is rectified if their doctors suspect that the intrauterine device has been expelled [(1)].

Perforation of the uterus occurs during insertion, but it is quite uncommon. Usually, perforation does not cause symptoms. When a female is unable to identify the plastic strings and an ultrasound or X-ray reveals that the intrauterine device is positioned outside of the uterus, this condition is identified. An intrauterine device that penetrates the uterus and travels into the abdominal cavity needs to be surgically removed, typically by the use of laparoscopy, in order to prevent the intestine from being negatively affected and scarred. In the event that a woman conceives while wearing an intrauterine device, she is at an increased risk of experiencing an ectopic pregnancy. The general probability of an ectopic pregnancy is significantly lower for females who use intrauterine devices compared to females who do not use any form of contraception. This is due to the fact that IUDs are an effective technique of preventing conception[(19)].

Possible benefits [(20)]:

- All types of intrauterine devices have the potential to minimize the risk of developing uterine (endometrial) tumors as well as tumors of the ovaries, in addition to providing efficient birth control.
- Intrauterine devices that release levonorgestrel over a period of five years are also an effective therapeutic option for females who experience heavy menstrual cycles.
- Effective contraception can be provided via the copper intrauterine device for females who are unable to utilize hormonal treatments.

➢ **Cesarean section**

Cesarean section (CS) is a frequently performed obstetric procedure that is utilized to address complications that are correlated with vaginal delivery, including embryonic distress and cephalo-pelvic disproportion. However, it poses risks to both the mother and the fetus. Infection, anesthetic complications, surgical injury, hemorrhage and thromboembolism are among the maternal risks. Additionally, repeated cesarean section raise the chance of dense adhesions, injuries to the bladder and colon, as well as incision-related complications such as wound dehiscence. It is anticipated that the number of problems experienced by both the mother and the fetus will rise in emergency surgeries in comparison to elective ones [(21)].

Indications

There are many different reasons why a fetus should not be delivered vaginally or why it is not possible to do so. Because a vaginal birth would be risky in some clinical situations, certain of these indications are inflexible. For example, if the case has a history of rupture of the uterus or a previous classical cesarean scar, a cesarean birth is typically the method that is suggested [(22)].

Maternal Indications for Cesarean Delivery [(22)]:

- Maternal request
- Pelvic deformity or cephalopelvic disproportion
- Previous perineal trauma
- Prior pelvic or anal/rectal reconstructive surgery
- Perimortem cesarean
- Prior cesarean delivery

- Cerebral aneurysm or arteriovenous malformation
- Herpes simplex or HIV infection
- Cardiac or pulmonary disease
- Pathology requiring concurrent intraabdominal surgery.

Uterine/Anatomic Indications for Cesarean [22]:

- Placental abruption
- Genital tract obstructive mass
- Before classical hysterotomy
- Prior full-thickness myomectomy
- Prior trachelectomy
- Permanent cerclage
- History of uterine incision dehiscence
- Invasive cervical cancer
- Abnormal placentation (as placenta accreta, placenta previa).

Fetal Indications for Cesarean [22]:

- Umbilical cord prolapses
- Prior neonatal birth trauma
- Malpresentation
- Macrosomia
- Failed operative vaginal delivery
- Congenital anomaly
- Thrombocytopenia
- Nonreassuring fetal status (such abnormal umbilical cord Doppler investigation) or abnormal fetal heart tracing.

Contraindications

There are no true medical contraindications to the CS. If the pregnant case is passing away or dying, or if the fetus is also passing away or dying, a cesarean section may be a possibility. Despite the fact that there are some conditions that are ideal for a cesarean section, as the availability of anesthesia and antibiotics, as well as the right equipment, the absence of these characteristics is not a contraindication if the clinical scenario requires it. When a pregnant case declines to have a cesarean section, it is unethical to do the procedure. It is essential to provide adequate education and counseling in order to obtain informed consent. If, on the other hand, the pregnant case does not give her agreement to have surgery carried out on her body, then it is ultimately her right as an independent case doctor to refuse these procedures [23].

Complications of immediate post placental IUD insertion during cesarean section

Intrauterine devices continue to be the most often used contraceptive method, despite the fact that they can cause issues. This is due to the fact that they are non-coital related, they do not cause systemic complications, they last for a long period of time, and they are reversible, allowing for a speedy recovery of fertility after they are removed. Heavy menstrual bleedings, menstrual abnormalities, and infection issues are some of the consequences that can arise from intrauterine devices. These difficulties can be reduced by utilizing stringent aseptic practices throughout the insertion process. It is the most upsetting complication to have an intrauterine device that has been displaced, particularly if the displacement occurred outside of the uterus, because the case would require a surgical technique (often an endoscopic one) in order to remove the IUD. The removal of intrauterine devices not only places a financial and psychological burden on the case, but it also raises the possibility of unintended pregnancies and the risks that are associated with them [24].

The insertion of an intrauterine device is the most common cause of intrauterine device displacement, which can be caused by improper or rough technique. Additionally, the implantation of an intrauterine device at an incorrect timing may raise the possibility of an intrauterine device displacement. Intrauterine devices should be inserted at the appropriate time and using the appropriate technique, as this is of utmost importance. The timing of the insertion of intrauterine devices following a CS is a topic of debate. Some gynecologists insert intrauterine devices during the CS following the placental removal, while other gynecologists prefer to insert IUDs after an interval either immediately after puerperium (forty-two days) or following six-month post-cesarean section. However, the majority of gynecologists insert intrauterine devices following three months have passed since the CS [25].

Waiting three months following a CS is done with the intention of ensuring that the scar has entirely healed and that the uterus has totally involuted to its size before the pregnancy. One of the disadvantages of waiting for such a lengthy period of time is that it makes it difficult to access the cervix, which can be dragged upward in some instances of recurrent cesarean sections. Additionally, it can cause a loss of self-enthusiasm for quick contraception after birth. The intraoperative insertion of intrauterine devices has been the subject of numerous debates, and the advantages of this method over late insertion have not yet been determined. This investigation aimed to examine the efficacy of post-placental placement of intrauterine devices following cesarean sections in contrast to insertion at intervals of three months [26].

The insertion of a post-placental intrauterine device has been demonstrated to be safe, simple to use during a CS, and results in a little extension of the duration of the cesarean section. Compared to the insertion of an intrauterine device at intervals, post-placental IUD insertion is also successful and has less problems. The great majority of cases were willing to accept this method of insertion because it was painless and at the same time

it was a surgical procedure that did not involve any additional costs or maneuvers. Additionally, it made use of the patients' desire for rapid contraception [26].

Ethical considerations: All the procedures of the research were approved by the Obstetrics and Gynecology Department and the Investigation Ethics Committee of National Medical Institute, Damanhour. Administrative consents required were taken. This study was performed in compliance with the Declaration of Helsinki, the code of ethics of the World Medical Association.

DECLARATIONS

- **Funding:** No fund
- **Availability of data and material:** Available
- **Conflicts of interest:** No conflicts of interest.
- **Competing interests:** None.

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