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# Comparison between Intrapartum and Post Puerperium Insertion of Copper Intrauterine Contraceptive Device in Women Undergoing Elective Caesarean Section

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## Abstract

The intrauterine device (IUD) is an effective and reversible form of birth control. The term "postpartum family planning" (PPFP) refers to measures taken during the first year after giving birth to reduce the likelihood of unwanted pregnancies and those with very close spacing. To evaluate the safety profile and efficacy of intrapartum and post puerperium IUCD so that It's a viable option for those seeking a healthy family planning strategy. This prospective cohort study was conducted at the tertiary care hospital at the Gynecology and Obstetrics department at Al-Azhar University Hospital of new Damietta and family planning department of Damanhur National Medical Institute (DMNI) from March 2023 till November 2023 and performed on a total of 304 patients who recruited from outpatient clinic and needed to use the copper IUD for post puerperium contraception. Post-placental IUD insertion as an alternative to delayed IUD insertion is strongly recommended in patients with long-term reversible contraception. Applications of an intrapartum IUD is a safe, effective, and convenient contraceptive method.

**Keywords:** The intrauterine device, Postpartum family planning, Damanhur National Medical Institute.

## 1. Introduction

Intrauterine copper devices have a very low failure rate of 0.2-1.0 percent, making them the most popular long-acting reversible form of birth control [1]. In the first year of using a copper T-380 IUD, about 10–20% of patients want to have the device removed since it raises menstrual blood loss by 30–50% [2]. Pelvic discomfort, dysmenorrhea, heavy periods, and the possibility of a stopover due to uterine device ejection are the most common IUDs adverse effects. The majority of device removals are due to heavy menstrual cycles [3]. A 5-to-15 % removal rate is seen in the first year after I.U.C.D. placement, which might be attributed to these adverse effects [4]. Cesarean section (CS) is defined as the birth of a fetus through incisions in the abdominal wall (laparotomy) and the

uterine wall (hysterotomy). This definition does not include removal of the fetus from the abdominal cavity in the case of rupture of the uterus or in the case of an abdominal pregnancy [5].

The incidence of CS is increasing across all nations, including in the field of general surgery .The utilization of IUD insertion during CS presents a potential avenue for expanding the availability of long-acting reversible contraceptive methods. Conversely, if a prior CS scar causes complications with insertion or future IUD issues, it can prevent interval IUD implantation access [6].

The best moment to start using postnatal control, whether for prevention or as a family planning tool, is just after the baby is born. When thinking about her current and future health choices, women may benefit from instant contraception since it is both practical and timely [7].

Fertility return timing in women after childbirth is variable and cannot be accurately predicted; however, in non-breastfeeding women, it may happen directly after three weeks postpartum. Moreover, a return of fertility is not always associated with menstruation. As a result, the postpartum period is regarded as the most favorable time to utilize contraceptive methods. The prenatal period presents a perfect time to engage in discussions about contraception with women, considering the specific requirements, accessibility of contraceptive options, and several related subjects, including the benefits and drawbacks of each method [7].

IUD strings becoming visible at the cervix are diminished in probability subsequent to immediate postpartum IUD insertion, which is defined as inserting the IUD within 10 minutes of placental delivery. This is due to the subsequent involution of the uterus, which necessitates ultrasound monitoring of the IUD's correct position and investigation into the possibility of a correlation between IUD position and expulsion risk. In order to ascertain whether symptoms of menstrual hemorrhage and pain are correlated with IUD position, ultrasound surveillance was employed to document the position of the IUD [8].

## 2. Patients and Methods

This prospective cohort study was included women attending Gynecology and obstetrics department at Al-Azhar University hospital of new Damietta and family planning department of Damanhur National Medical Institute (DMNI) for insertion of IUD after an elective caesarean section, and who want to use the copper intrauterine device (IUD) for postpartum contraception after 6-12 weeks or so.

### 2.1 Inclusion criteria

Singleton Full term pregnancy, Planned for CS, Ultrasound detection of normal parameters, including placental site, uterine cavity, and gestational age (apart from a scar region).

### 2.2 Exclusion criteria

Previous failed IUCD, Rupture membrane for more than 12 hours, Contraindication of IUD e.g.: History of Repeated pelvic infections whatever recurrent or active and ectopic pregnancy, any uterine pathology. Uterine fibroid, Uterine abnormalities, such as a deformed uterine cavity or cancer of the cervix or uterus, bleeding disorders as anemia, emergency CS &abnormal placentation, any causes of bleeding during CS operation and Copper allergy.

### 2.3 Sample size

Sample size calculation was based on the difference between cases with intrapartum IUD insertion versus cases with post-puerperium insertion retrieved from previous research (Abdel‑Ghany et al., 2022). Using G*power version 3.0.10 to calculate sample size based on the difference in frequency of 5%, 2-tailed test, α error =0.05 and power 80.0% the

total sample size was 152 cases in each group.

### 2.4 Ethical consideration

Al-Azhar University, Faculty of Medicine's ethical committee reviewed and approved the study's protocol. Both written and verbal approval were gained from each one sharing in the study:
The consent contained:

A. An explanation of the study's purpose in a way that the general public may grasp.
B. There will be no damaging manoeuvres executed or used.
C. Without the proper authorization, no data will be utilised for purposes other than the research.
D. We provided the researcher's phone number and all available contact options so that you may reach out to them whenever you need.
E. The results of the research revealed the identities of all participants.
F. Subjects were not included in the research even though they were free to withdraw at any moment and for any reason.

### 2.5 Methods

#### 2.5.1 History was taken including

#### 2.5.1.1 Personal history included

Age, name, telephone number, residency, occupation, marital status, education level, consanguinity, marriage years and children number, youngest child age and any habits that are medically significant.

#### 2.5.1.2 Menstrual history included

Menarche, menstrual bleeding duration, regularity of menses, pain and related bleeding, length of cycle, amount, any forms of abnormal haemorrhage, and the time span of the contraceptive methods she had employed.

#### 2.5.1.3. Obstetric history included:

Parity, time, site gravidity and prior delivery type, abortion (in regard to gestational age, termination method, possible causes, treatment received, complications that occurred in the post-abortive phase and final abortion time).

#### 2.5.1.4 Present history included

**A. Gynaecological symptoms**

That may indicate a sexually transmitted disease including pelvic discomfort, vaginal discharge, purities, post-coital bleeding, or dyspareunia.

**B. Urinary symptoms**

That indicates a urinary tract infection including dysuria, urgency or frequency.

#### 2.5.1.5 Past history included:

Medical disease history (hypertension, DM, chest disease, rheumatic disease and heart disease), Prior medical operations and drug sensitivity .

#### 2.5.2. Examination including

#### 2.5.2.1 General examination:

General condition, weight, height, gait and vital signs (pulse rate, blood pressure, respiratory rate and temperature).

#### 2.5.2.2. Abdominal examination included

#### 2.5.2.2. a. Inspection

(shape, size, scars and Hernia's presence).

#### 2.5.2.2. b. Palpation

(of the abdomen to detect any abnormality).

#### 2.5.2.3 Vaginal examination

If it is indicated.

### 2.5.3. Technique

The copper IUD was inserted in group one immediately after the cesarean operation, after baby delivery, membranes and placenta, within a timeframe of 10 minutes. It is necessary to put the intrauterine device (IUD) with its plastic sleeve at the fundus of the uterine cavity. Following fingertip dilation of the cervix, through which the threads enclosed in the plastic sleeve were maneuvered. The plastic sleeve was carefully removed via the vaginal opening after the abdominal and uterine walls were closed. The threads were then reduced to a depth of 2 cm below the external cervical os. Throughout the procedure, all women were administered prophylactic intravenous cefazon 2g once. Conversely, conventional IUD insertion was performed on women in group two during their postnatal follow-up visit (6-12 weeks following lower scar caesarean section).

### 2.6 Statistical analysis

The gathered data were encoded, organized into tables, and subjected to statistical analysis using IBM SPSS statistics software version 28.0, developed by IBM Corp. in Chicago, USA, in 2021. Using the independent t-test, quantitative data that were examined for normality with the Kolmogorov-Smirnov test, described as mean and SD (standard deviation), and included the maximum and minimum values of the range, were compared. The chi-square test was used to compare qualitative data expressed as a percentage and number. P-values less than <0.050 were regarded as significant; values below that threshold was deemed non-significant.

## 3. Result

As shown in Table .1 no substantial changes were found between the studied groups regarding demographic characteristics. As shown in Table 2 duration of insertion was substantially longer among the Postpurperium group. Failure of insertion was significantly more frequent among the Postpurperium group. Missed threads were significantly more frequent among Intrapartum group. Among Postpurperium group, the Mean ± SD of pain VAS was 6.1±0.8, none needed anesthesia. As show in table 3 No substantial changes were seen between the studied groups concerning the distance of the Serosa and endometrium in month-1. As show in table 4 pelvic pain in month-3 was significantly more frequent in the Postpurperium group. As show in table 5vaginal bleeding in month-3 was non-significantly more frequent in the Postpurperium group. In cases with bleeding, duration and amount (number of pads) were significantly higher in the Postpurperium group. As shown in Table-6 no substantial change was found among studied groups concerning IUD missed threads as well as displacement and expulsion in month-3. None developed vaginal & cervical infection or pregnancy. As shown in Table 7 no substantial difference among studied groups concerning the distance of the Serosa and endometrium in month-3. As show in table 8 PI and RI in month-3 were substantially lower in postpurperium group.

**Table (1):** Comparison between intrapartum group and postpurperium group regarding age, BMI and parity.

| Variables | | Intrapartum (Total=152) | Postpurperium (Total=152) | p-value |
|---|---|---|---|---|
| Age (years) | Mean ± SD | 28.6±4.3 | 28.2±4.6 | ^0.472 |
| | Range | 19.0–39.0 | 19.0–39.0 | |
| BMI (kg/m$^2$) | Mean ± SD | 27.3±2.7 | 27.3±2.4 | ^0.833 |
| | Range | 18.8–34.4 | 20.4–34.4 | |
| Parity | Mean ± SD | 2.1±1.0 | 2.3±1.0 | ^0.246 |
| | Range | 1.0–5.0 | 1.0–5.0 | |
| Parity at last CS | Primi | 40 (26.3%) | 36 (23.7%) | #0.173 |
| | Para 1 | 55 (36.1%) | 49 (32.2%) | |
| | Para 2 | 22 (14.4%) | 32 (21%) | |
| | Para ≥3 | 17 (11.1%) | 15 (9.9%) | |
| Previous vaginal delivery | | 18 (11.8%) | 20 (13.2%) | #0.729 |

BMI: Body mass index. ^Independent t-test. #Chi square test.

**Table (2):** Comparison between the intrapartum group and Postpurperium group at the time of insertion regarding duration, pain, need for anaesthesia, failure of insertion and missed threads.

| Variables | | Intrapartum (Total=152) | Postpurperium (Total=152) | p-value |
|---|---|---|---|---|
| Duration of insertion (minutes) | Mean ± SD | 0.6±0.2 | 13.7±4.8 | ^<0.001* |
| | Range | 0.3–1.0 | 3.0–24.0 | |
| Pain (VAS) | Mean ± SD | Not applicable | 6.1±0.8 | |
| | Range | | 4.0–8.0 | |
| Need to anesthesia | | Not applicable | 0 (0.0%) | |
| Failure of insertion | | 0 (0.0%) | 6 (3.9%) | ^<0.030* |
| Missed threads | | 115 (75.7%) | 0 (0.0%) | #<0.001* |

^Independent t-test. #Chi square test. *Significant.

**Table (3):** Comparison between the intrapartum group and Postpurperium group regarding the distance of the Serosa and endometrium after one month from delivery.

| Variables | | Intrapartum (Total=134) | Postpurperium (Total=146) | p-value |
|---|---|---|---|---|
| Serosa distance(mm) | Mean ± SD | 18.3±4.6 | 17.8±4.1 | ^0.319 |
| | Range | 8.9–29.2 | 9.3–29.6 | |
| Endometrium distance (mm) | Mean ± SD | 4.0±2.1 | 3.7±2.4 | ^0.414 |
| | Range | 0.8–13.1 | 0.8–13.1 | |

^Independent t-test.

**Table (4):** Comparison between intrapartum group and postpurperium group regarding pelvic pain after 3 months from the insertion.

| Pain | Intrapartum (Total=131) | Postpurperium (Total=138) | p-value |
|---|---|---|---|
| Positive | 13 (9.9%) | 26 (18.8%) | #0.038* |
| Negative | 118 (90.1%) | 112 (81.2%) | |

#Chi square test. *Significant.

**Table (5):** Comparison between the intrapartum group and postpurperium group regarding vaginal bleeding after 3 months from the insertion.

| Variables | | Intrapartum (Total=131) | Postpurperium (Total=138) | p-value |
|---|---|---|---|---|
| Vaginal bleeding | | 15 (11.5%) | 27 (19.6%) | #0.067 |
| Type | HMB | 8 (53.3%) | 15 (55.6%) | #0.890 |
| | IMB | 7 (46.7%) | 12 (44.4%) | |
| Duration (days) | Mean ± SD | 7.5±2.0 | 10.0±3.4 | ^0.014* |
| | Range | 5.0–10.0 | 5.0–15.0 | |
| Number of pads | Mean ± SD | 2.2±0.9 | 3.0±1.3 | ^0.015* |
| | Range | 1.0–4.0 | 1.0–5.0 | |

**Table (6):** Comparison between the intrapartum group and post puerperium group regarding missed threads, displacement& expulsion, vaginal & cervical infection, and pregnancy after 3 months from the insertion.

| Variables | Intrapartum (Total=131) | Postpurperium (Total=138) | p-value |
|---|---|---|---|
| Missed threads | 8 (6.1%) | 7 (5.1%) | #0.712 |
| Displacement & expulsion | 6 (4.6%) | 6 (4.3%) | #0.926 |
| Vaginal & cervical infection | 0 (0.0%) | 0 (0.0%) | NA |
| Pregnancy | 0 (0.0%) | 0 (0.0%) | NA |

#Chi square test. NA: Not applicable.

**Table (7):** Comparison between the intrapartum group and post puerperium group regarding the distance of the Serosa and endometrium after 3 months from the insertion.

| Variables | | Intrapartum (Total=125) | Postpurperium (Total=132) | p-value |
|---|---|---|---|---|
| Serosa distance(mm) | Mean ± SD | 16.4±4.2 | 16.2±3.7 | ^0.705 |
| | Range | 2.6–24.8 | 8.8–28.6 | |
| Endometrium distance(mm) | Mean ± SD | 3.6±1.8 | 3.4±1.7 | #0.239 |
| | Range | 1.0–10.4 | 0.9–12.3 | |

^Independent t-test.

**Table (8):** Comparison between the intrapartum group and postpurperium group regarding uterine artery Doppler after 3 months from the insertion.

| Variables | | Intrapartum (Total=125) | Postpurperium (Total=132) | p-value |
|---|---|---|---|---|
| PI | Mean ± SD | 2.30±0.55 | 2.12±0.66 | ^0.014* |
| | Range | 1.12–3.91 | 0.77–3.63 | |
| RI | Mean ± SD | 0.89±0.10 | 0.85±0.13 | ^0.007* |
| | Range | 0.62–1.19 | 0.44–1.11 | |

RI: Resistance index. PI: Pulpability index. ^Independent t-test. *Significant.

## 4. Discussion

The intrauterine device (IUD) is a cost-effective, long-lasting, and reversible method of contraception that is especially effective for spacing pregnancies, particularly in developing nations where women often lack consistent access to healthcare facilities. IUDs that are inserted immediately after placental delivery subsequent to a normal, abdominal delivery or operative vaginal may be utilized for postpartum contraception. IUD placement is also possible within 48 hours of delivery. [5]

This prospective cohort study was conducted at tertiary care hospital at Gynaecology and obstetrics department at Al-Azhar University hospital of new Damietta and family planning department of Damanhur National Medical Institute (DMNI) from March 2023 till November 2023 and performed on total 304 patients who recruited from outpatient clinic and needed to use the copper IUD for post puerperium contraception.

In terms of age, body mass index (BMI), parity, and history of vaginal or caesarean birth, the present research found no statistically significant difference between the groups (p value= 0.472, 0.833, 0246, 0.729).

Our results revealed that the duration of insertion was significantly longer among the post-puerperium group (p value< 0.001) and successful insertion of IUD immediately after delivery (intrapartum insertion) was statistically significantly higher than post-puerperium insertion group (p value= 0.030). Missed threads were significantly more frequent among Intrapartum group (p value< 0.001).

As regards follow up findings after 1 month, our results revealed that 95.4% of intrapartum group cases was compliant to the scheduled follow up. Missed threads and displacement & expulsion were 11.0% and 7.6% respectively with no substantial change between the studied groups concerning the distance of the serosa and endometrium to the IUD in month-1 (p value=0.319, 0.414), respectively.

As regards follow-up findings after 3 months, our results revealed that 97.8% and 94.5% of the cases were compliant to the scheduled follow-up in the intrapartum group and post-puerperium group respectively with no statistically significant difference between the studied groups (p value=0.163) regarding the distance of the serosa and endometrium to the IUD in month-1 (p value=0.705, 0.239) respectively.

Only limited data are available regarding assessment of patients' satisfaction in both groups of the study. Consequently, our results assessed pain and patients' satisfaction in month-1&3 using VAS score and revealed that pelvic pain was significantly more frequent in post-

puerperium group (p value= 0.038). Consequently, patients' satisfaction was significantly higher among intrapartum group at 1&3 months after insertion.

This confirms what other research has shown, which conducted a prospective cohort study and enrolled 90 patients undergoing cesarean delivery with follow up at 6 weeks and 12 months postpartum and to evaluate the immediate post-placental IUD insertion at cesarean delivery and reported that all women were contacted by phone 6 months after enrolment to assess their satisfaction with their IUD and to ascertain IUD continuation and revealed that 47% women were reached with no requests for IUD removal were made and at 6 months, 80% of those women reported being "happy" or "very happy" with their IUD. No subjects reported being "unhappy" with their IUD. [9].

Parallel randomized trial, which was in contrast to our results, and enrolled 172 women that desired IUD insertion and reported that at each study visit, women completed a questionnaire about their satisfaction with their IUD, pain, and bleeding and revealed no significant difference between the studied groups regarding patient satisfaction with IUD at 6 months after insertion (p value=0.9) [10].

No substantial pelvic pain was reported throughout the follow-up after insertion at 6 and 12 months with non-significance between the studied groups with (P value= 0.82 and 0.96) respectively. Consequently, no statistically significant difference between the studied groups after one year of continuous use regarding satisfaction with IUD insertion with (p value=0.14) which is in harmony with our results [11].

Our results revealed that there was no statistically significant difference between the studied groups regarding heavy menstrual bleeding (HMB) or intermenstrual bleeding (IMB) (p values = 0.067, 0.890) respectively, while in cases with bleeding, duration and amount (number of pads) were significantly higher in post-puerperium group (p value= 0.014, 0.015) respectively.

As regards complications of IUD after 3 months from insertion, we found no substantial change between the groups we analysed when it came to IUD missing threads, displacement, or expulsion. However, Displacement & expulsion among cases with successful IUD insertion were significantly more frequent in the intrapartum group (p value= 0.022).

These results are consistent with those of earlier investigations. Comparing post-placental and puerperal IUD insertion among women undergoing caesarean delivery, [11] enrolled one thousand patients in a parallel-group RCT. The study found that the post-placental group had a higher expulsion rate than the puerperal group, which could be explained by low participant attendance at follow-up visits. Furthermore, the available data indicate that women from disadvantaged social and economic backgrounds are more likely to miss postpartum visits [12]. The factors contributing to variances in expulsion rates remain uncertain, including the timing of insertion, insertion technique, the particular type of IUD, and the level of expertise of the healthcare professional [11].

In relation to the uterine artery doppler findings during the third month, our findings indicated that the post-puerperium group exhibited substantially reduced PI and RI values in month 3 (p value= 0.014, 0.007). Consequently, insertion of IUCD in the post-puerperium period is associated with abnormal uterine bleeding and menstrual irregularities.

Similar to our findings, prospective cohort research including 110 women was conducted to determine the association between IUCD-induced excessive monthly bleeding and power Doppler velocimetries of the endometrium, uterine arteries, and sub-endometrium vascularizatio. Their findings found that both non-heavy and heavy menstrual bleeding cases

exhibited a significant decrease in uterine artery PI and RI over time. However, PI and RI of the uterine artery (basal and after 3 months) were considerably reduced in instances of excessive monthly bleeding, and this decrease was much greater in these situations [1].

All 110 women included in the study experienced a significant increase in menstrual flow three months after IUCD insertion (49.7 ± 8.5 before, 100.5 ± 45.6 after, $P < 0.001$).

After three months following IUCD insertion, there was a noticeable shift in the endometrial, uterine artery, and sub-endometrial vascular indices. Thus, in predicting excessive menstrual hemorrhage induced by IUCD, endometrium VFI demonstrated the most significant diagnostic performance, followed by sub-endometrium VI.

There is some controversy surrounding uterine artery PI and RI in patients with IUCDs. Some studies indicate that RI and PI are comparable prior to and following insertion [13] [14] [15] Furthermore, other studies have shown an increase in PI during the midluteal phase. However, they still concurred with this research and proposed a reduction in uterine artery PI after the implantation of an IUCD. Several studies have shown no significant statistical difference between those experiencing excessive menstrual bleeding caused by IUCD and those taking IUCD with regular periods [16] [17] Despite this, multiple investigations have seen uterine artery RI and PI in women with IUCD-induced menorrhagia to be significantly lower than for both: control women and women without IUCD-induced menorrhagia. [18] [19].

## 5. Conclusion

The placement of an intrapartum intrauterine device (IUD) is a safe, effective, and easy form of birth control. Incorporating it with maternal child health care helps guarantee that patients are satisfied with their long-term reversible contraception before they leave the hospital. Nevertheless, the findings presented in this study validate the hypothesis that aberrant uterine haemorrhage may be attributed to elevated uterine blood flow in women during the post-purperium period. The utilization of uterine artery Doppler vascular indices is feasible in order to predict excessive menstrual bleeding induced by IUCD.

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