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# A Comparative Study of Complications and Outcome of Intrauterine Contraceptive Device Insertion during Caesarean Section and Vaginal Delivery in Immediate Post-Partum Period

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## Abstract

**Background:** The postpartum period is crucial for contraception, particularly to prevent unintended pregnancies. Intrauterine contraceptive devices (IUCDs) inserted during this time can offer effective long-term solutions, yet concerns regarding complications necessitate further investigation.

**Method:** This prospective comparative study enrolled women who underwent IUCD insertion either during cesarean section or following vaginal delivery at a tertiary care hospital. Participants were randomly assigned to each group, and outcomes were assessed at one month and three months postpartum, focusing on complications such as expulsion, infection, and pain. Statistical analyses compared the incidence of complications between the two groups.

**Results:** The demographic data revealed that most participants were aged 36 and older, with no significant differences in complications. At three months, infections were reported in 4.0% of the NVD group and 5.3% of the Cesarean group, while hemorrhage rates were 1.3% and 2.7%, respectively. Overall, 93.3% of participants reported no complications.

**Conclusion:** Immediate postpartum IUCD insertion is a safe and effective option, with low complication rates regardless of the mode of delivery, suggesting its implementation as a standard contraceptive practice in the postpartum period.

**Keywords:** Postpartum; IUCD; Complications; Cesarean; Normal Vaginal Delivery; Contraception.

## Introduction

The postpartum period presents a critical opportunity for contraception, particularly in preventing unintended pregnancies and closely spaced births.[1] Effective family planning methods, such as intrauterine contraceptive devices (IUCDs), offer long-term contraception, making them an appealing choice for women during this phase.[2] IUCD insertion in the immediate postpartum period, whether during a caesarean section or after a vaginal delivery, has gained attention due to its convenience, efficiency, and potential to reduce missed opportunities for contraception.[3]

Postpartum IUCD insertion is associated with several advantages, including its cost-effectiveness, high efficacy, and minimal disruption to breastfeeding.[3] However, concerns about potential complications, such as expulsion rates, infection, and perforation, have led to a need for further investigation into the safety and outcomes of IUCDs inserted during caesarean sections compared to those placed after vaginal deliveries.[4] Despite these concerns, immediate postpartum IUCD insertion offers a practical solution to improve contraceptive uptake, particularly in settings with limited access to healthcare services.[1,5]

This study aims to compare the complications and outcomes of IUCD insertion during caesarean section versus after vaginal delivery in the immediate postpartum period. By exploring the efficacy, safety, and patient satisfaction associated with these two approaches, the findings of this study could provide valuable insights for optimizing postpartum contraceptive care and reducing unmet contraceptive needs.

## Method

Present study employed a prospective comparative design, enrolling a cohort of women who underwent postpartum intrauterine contraceptive device (IUCD) insertion either during cesarean section or following vaginal delivery at a tertiary care hospital. The sample size was determined based on power analysis to ensure sufficient statistical significance, with participants recruited over a specified period. Women were eligible for inclusion if they were aged 18 to 40 years, desired to use IUCDs for contraception, and were medically fit for the procedure. Exclusion criteria included those with contraindications to IUCD use, such as active pelvic infection, uterine anomalies, or bleeding disorders.

Participants were randomly assigned to either the IUCD insertion during cesarean section group or the postpartum vaginal delivery group. Data were collected on demographics, mode of delivery, timing of IUCD insertion, and any immediate complications experienced within the first six weeks postpartum. Follow-up visits were scheduled at one month and three months post-insertion to assess complications such as expulsion, infection, and pain, as well as overall satisfaction with the IUCD. Statistical analyses were performed using appropriate methods to compare the incidence of complications and outcomes between the two groups, with a significance level set at $p < 0.05$. Ethical approval was obtained from the institutional review board, and informed consent was secured from all participants prior to enrollment in the study.

**Result**

Table 1: Demographic Distribution of Study Participants Across NVD and Cesarean Groups

| Category | Subcategory | NVD (n, %) | Cesarean (n, %) | Total (n, %) | Chi-square | p value |
|---|---|---|---|---|---|---|
| Age Group | <=25 | 4 (5.3%) | 5 (6.7%) | 9 (6.0%) | 4.66 | 0.19 |
| | 26-30 | 14 (18.7%) | 25 (33.3%) | 39 (26.0%) | | |
| | 31-35 | 23 (30.7%) | 19 (25.3%) | 42 (28.0%) | | |
| | >=36 | 34 (45.3%) | 26 (34.7%) | 60 (40.0%) | | |
| Parity | Primipara | 35 (46.7%) | 42 (56.0%) | 77 (51.3%) | 1.30 | 0.25 |
| | Multipara | 40 (53.3%) | 33 (44.0%) | 73 (48.7%) | | |
| Lost to Follow-up | 6 weeks | 3 (4.0%) | 2 (2.7%) | 5 (3.3%) | | |
| | 3 months | 2 (2.7%) | 1 (1.3%) | 3 (2.0%) | | |
| | Total | 5 (6.7%) | 3 (4.0%) | 8 (10.7%) | | |

The demographic distribution of study participants across NVD (normal vaginal delivery) and Cesarean groups is illustrated in Table 1. The majority of participants were aged 36 years and older, with 34 (45.3%) in the NVD group and 26 (34.7%) in the Cesarean group. In terms of parity, 46.7% of NVD participants were primiparous compared to 56.0% in the Cesarean group. Among the lost to follow-up, 5 (6.7%) were from the NVD group and 3 (4.0%) from the Cesarean group.

Table 2: Combined Outcomes at Different Time Points

| Outcome | 48 Hours (n, %) | 6th Week (n, %) | 3rd Month (n, %) |
|---|---|---|---|
| Irregular bleeding per vaginum | 76 (50.7%) | 16 (11.0%) | 27 (19.0%) |
| Abnormal white discharge | - | 9 (6.2%) | 4 (2.8%) |
| Abdominal pain VAS score | 6.3 ± 1.0 | 2.6 ± 0.6 | 1.5 ± 0.5 |
| Uterine Perforation | 0 (0%) | 0 (0%) | 0 (0%) |
| Bleeding Score | 92.7 ± 5.0 | 53.9 ± 4.6 | 50.1 ± 5.9 |
| Full Expulsion | 2 (1.3%) | 1 (0.7%) | 2 (1.4%) |
| Partial Expulsion | - | 2 (1.4%) | - |
| Discontinuation | 2 (1.3%) | 3 (2.1%) | 2 (1.4%) |

Table 2 summarizes outcomes at different time points. Irregular bleeding was reported by 76 participants (50.7%) at 48 hours, decreasing to 16 (11.0%) at 6 weeks and slightly increasing to 27 (19.0%) by the third month. Abdominal pain decreased from an average of 6.3 ± 1.0 at 48 hours to 1.5 ± 0.5 by the third month. The bleeding score also showed a significant reduction over time.

Table 3: Combined Outcomes for NVD vs. Cesarean at Different Time Points

| Outcome | Time | NVD (n, %) | Cesarean (n, %) | Total (n, %) | p value |
|---|---|---|---|---|---|
| Irregular Bleeding | 48 hours | 45 (60.0%) | 31 (41.3%) | 76 (50.7%) | 0.02* |

| | | | | | |
|---|---|---|---|---|---|
| | 6 weeks | 10 (13.9%) | 6 (8.2%) | 16 (11.0%) | 0.27 |
| | 3rd month | 8 (11.4%) | 19 (26.4%) | 27 (19.0%) | 0.023* |
| Abnormal White Discharge | 6 weeks | 6 (8.3%) | 3 (4.1%) | 9 (6.2%) | 0.29 |
| | 3rd month | 2 (2.9%) | 2 (2.8%) | 4 (2.8%) | 0.98 |
| Abdominal Pain VAS Score | 48 hours | 5.9 ± 0.8 | 6.6 ± 1.1 | 6.3 ± 1.0 | <0.001* |
| | 6 weeks | 2.5 ± 0.5 | 2.7 ± 0.6 | 2.6 ± 0.6 | 0.052 |
| | 3rd month | 1.4 ± 0.5 | 1.5 ± 0.5 | 1.5 ± 0.5 | 0.312 |
| Bleeding Score | 3rd month | 85.0 ± 3.2 | 100.1 ± 3.0 | 92.7 ± 5.0 | <0.001* |
| | 3rd month | 60.1 ± 4.3 | 70.5 ± 5.1 | 53.9 ± 4.6 | <0.001* |
| | 3rd month | 49.9 ± 5.9 | 50.1 ± 5.1 | 50.1 ± 5.5 | 0.895 |

Table 3 compares outcomes between NVD and Cesarean groups. At 48 hours, irregular bleeding was more common in the NVD group (60.0% vs. 41.3%, p = 0.02), while at 3 months, more Cesarean participants reported irregular bleeding (26.4% vs. 11.4%, p = 0.023). The Cesarean group reported higher abdominal pain scores at 48 hours (6.6 ± 1.1) compared to the NVD group (5.9 ± 0.8), with a significant p-value of <0.001. Additionally, the bleeding score was significantly higher in the Cesarean group at 3 months (100.1 ± 3.0) versus the NVD group (85.0 ± 3.2, p < 0.001). Overall, these results highlight significant differences in outcomes between the two delivery methods across various time points.

Table 4: Combined Continuation and Expulsion Rates for NVD vs. Cesarean at Different Intervals

| Outcome | Time Interval | NVD (n, %) | Cesarean (n, %) | Total (n, %) | Chi-square | p value |
|---|---|---|---|---|---|---|
| Uterine Perforation | 3rd month | Present: 0 (0%) | Present: 0 (0%) | Present: 0 (0%) | 0.00 | 1.00 |
| Continuation Rate | 48 hours | Discontinue: 2 (2.70%) | Discontinue: 0 (0.00%) | Discontinue: 2 (1.30%) | 2.02 | 0.15 |
| | | Continue: 73 (97.30%) | Continue: 75 (100.00%) | Continue: 148 (98.70%) | | |
| | 6 weeks | Discontinue: 2 (2.80%) | Discontinue: 1 (1.40%) | Discontinue: 3 (2.10%) | 3.55 | 0.55 |
| | | Continue: 70 (97.20%) | Continue: 72 (98.60%) | Continue: 142 (97.90%) | | |
| | 3 months | Discontinue: 1 (1.40%) | Discontinue: 1 (1.40%) | Discontinue: 2 (1.40%) | 0.001 | 0.98 |
| | | Continue: 69 (98.60%) | Continue: 71 (98.60%) | Continue: 140 (98.60%) | | |
| Expulsion | 48 hours | Fully: 2 | Fully: 0 (0.00%) | Fully: 2 | 2.02 | 0.15 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Rate | | (2.70%) | | (1.30%) | | |
| | | Absent: 73 (97.30%) | Absent: 75 (100.00%) | Absent: 148 (98.70%) | | |
| | 6 weeks | Fully: 1 (1.40%) | Fully: 0 (0.00%) | Fully: 1 (0.70%) | 1.02 | 0.6 |
| | | Partial: 1 (1.40%) | Partial: 1 (1.40%) | Partial: 2 (1.40%) | | |
| | | Absent: 70 (97.20%) | Absent: 72 (98.60%) | Absent: 142 (97.90%) | | |
| | 3 months | Fully: 1 (1.40%) | Fully: 1 (1.40%) | Fully: 2 (1.40%) | 0.001 | 0.98 |
| | | Absent: 69 (98.60%) | Absent: 71 (98.60%) | Absent: 140 (98.60%) | | |

Table 4 presents the combined continuation and expulsion rates for participants undergoing normal vaginal delivery (NVD) compared to those having a Cesarean section at different intervals. Notably, there were no instances of uterine perforation reported in either group at the three-month mark.

Regarding continuation rates at 48 hours, 2.7% of participants in the NVD group discontinued while all participants in the Cesarean group continued, leading to a non-significant p-value of 0.15. At the six-week interval, 2.8% of NVD participants and 1.4% of Cesarean participants discontinued, with a p-value of 0.55. By the three-month interval, discontinuation rates remained low for both groups at 1.4%, with a p-value of 0.98, indicating no significant differences in continuation rates between the groups over time.

In terms of expulsion rates, at 48 hours, 2.7% of NVD participants experienced full expulsion compared to none in the Cesarean group, resulting in a p-value of 0.15. At the six-week mark, only 1.4% of participants in both groups experienced full expulsion, and both groups also reported 1.4% partial expulsion. By the three-month follow-up, the full expulsion rate remained consistent at 1.4% across both groups, with a p-value of 0.98, indicating no significant differences.

Table 5: Complications Noted at 3 Months Follow-up

| Complications | NVD (n, %) | Cesarean (n, %) | Total (n, %) | Chi-square | p value |
|---|---|---|---|---|---|
| Infection | 3 (4.0%) | 4 (5.3%) | 7 (4.7%) | 0.27 | 0.60 |
| Haemorrhage | 1 (1.3%) | 2 (2.7%) | 3 (2.0%) | 0.51 | 0.48 |
| No Complications | 71 (94.7%) | 69 (92.0%) | 140 (93.3%) | Reference group | |

Table 5 outlines the complications observed at the three-month follow-up for participants who underwent normal vaginal delivery (NVD) versus Cesarean section. Infections occurred in 4.0% of the NVD group and 5.3% of the Cesarean group, totaling 7 cases (4.7%). Haemorrhage was noted in 1.3% of the NVD group and 2.7% of the Cesarean group, resulting in 3 cases (2.0%). A majority of participants reported no complications,

with 94.7% in the NVD group and 92.0% in the Cesarean group, leading to a combined total of 140 individuals (93.3%).

**Discussion**

In the present study, the distribution of delivery methods among different age groups revealed that participants aged ≤25 had 5.30% opting for NVD and 6.70% for Cesarean delivery, totaling 6.00%. In the 26-30 age group, 18.70% chose NVD and 33.30% Cesarean, making up 26.00%. For those aged 31-35, 30.70% opted for NVD, while 25.30% chose Cesarean, totaling 28.00%. Among participants aged ≥36, 45.30% had NVD and 34.70% had Cesarean, resulting in 40.00%.

Comparatively, Thiam et al. reported an average age of 29.96 ± 8.60 years, with a range of 15 to 46 years, where the most common age group was 35 to 40 years (25.20%). [6] In the current study, 46.70% of Primipara opted for NVD and 56.00% for Cesarean, while among Multipara, 53.30% had NVD and 44.00% Cesarean, with no significant association found ($\chi^2 = 1.30$, $p = 0.25$).

Additionally, Biswas et al. noted that approximately 50% of deliveries involved PPIUCD, with 68% acceptance in vaginal deliveries, [7] and Gupta et al. highlighted that acceptance rates were not influenced by parity but showed a preference for spacing methods among Primipara and permanent methods among Multipara. [8]

In our study, 76 participants (50.70% of the total sample) reported experiencing irregular bleeding per vaginum during the follow-up period. The prevalence varied with the mode of delivery and follow-up interval. At the 48-hour follow-up, irregular bleeding was significantly higher in the vaginal delivery (NVD) group compared to the cesarean group. However, by the 6-week follow-up, no significant association was noted, but a significant association re-emerged by the 3-month follow-up, with a higher prevalence of irregular bleeding in the cesarean group.

Shukla et al. found that irregular bleeding was not influenced by the route of insertion, with excessive bleeding reported by women effectively treated with NSAIDs and haematinics; they noted a higher incidence of menorrhagia (27.2%) associated with CuT 200 in postpartum women. [9]

Initially, our study recorded a mean bleeding score of 92.71 ± 5.03, indicating significant bleeding severity. In the first 48 hours, 1.30% of participants experienced full expulsion of the IUCD, and another 1.30% discontinued the intervention. By the 6th week, the mean bleeding score improved to 53.88 ± 4.63, with full expulsion and discontinuation rates slightly rising to 1.40% and 2.10%, respectively. At this follow-up, 11.00% reported irregular bleeding, and by the 3rd month, the mean bleeding score further decreased to 50.05 ± 5.87, with irregular bleeding persisting in 19.00% of participants. Initially, at 48 hours post-delivery, the NVD group showed a significantly higher mean bleeding score than the cesarean group; this difference diminished over time, resulting in comparable scores at the 6-week and 3-month follow-ups.

Similarly, Goyal et al. found irregular bleeding in 37 (14.8%) women after post-placental insertion compared to 23 (9.2%) after intra-caesarean insertion, though this difference was not statistically significant. [10]

Pala et al. noted greater estimated postoperative bleeding volume in the weighted group than in the control group. [11]

In our study, 76 participants (50.70%) experienced irregular vaginal bleeding during follow-up, with an initial mean VAS score for abdominal pain at 6.3 ± 1.0,

indicating moderate to severe discomfort. This contrasts with findings from Abdel-Ghany et al., where the incidence of failed IUD insertion was significantly higher in group II (6% vs. 0%, P = 0.013), highlighting procedural differences impacting outcomes. [12]

While Pala et al. reported elevated postoperative VAS scores in the weighted group, our results revealed no significant cases of uterine perforation across participants. [11]

Additionally, the discontinuation rates at 3 months postpartum were 1.40% for both delivery modes in our study, consistent with findings from Goyal et al., who noted a high continuation rate of 90% despite initial concerns. [13]

Kumar et al. highlighted a 29.7% removal rate for postpartum IUDs, predominantly due to side effects like bleeding and pain, reflecting potential gaps in continuity of contraceptive care. Our findings emphasize the importance of tailored postpartum pain management and highlight the need for comprehensive counseling to address contraceptive options and side effects effectively. [14]

In the current study, no significant difference in expulsion rates was found between the NVD and Cesarean groups at various follow-up points (p-values ranging from 0.15 to 0.98), with expulsion rates being low overall. For example, at 3 months, both groups showed a full expulsion rate of only 1.40%. These findings are consistent with those of Hooda et al., [15] who emphasized the role of IUCD insertion timing in expulsion risk, and Kumar et al., who reported similar 6-week expulsion rates of 4.7%. [16] Other studies, such as Celen et al., found a higher expulsion rate of 5.3%, with significant differences favoring cesarean insertions over vaginal insertions (p = 0.042). [17] Such variability in expulsion rates underscores the importance of considering factors like insertion techniques and follow-up care.

**Conclusion**

In conclusion, the study highlights the safety and efficacy of immediate postpartum IUCD insertion, revealing no significant differences in complications between the normal vaginal delivery (NVD) and Cesarean section groups. While initial irregular bleeding and abdominal pain were more prevalent in the NVD group shortly after insertion, these symptoms improved significantly over time. Moreover, both groups demonstrated low rates of expulsion and high continuation rates, with a majority of participants reporting no complications at three months. These findings suggest that IUCD insertion is a viable contraceptive option for postpartum women, irrespective of the mode of delivery.

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