



Evaluation of Incidence of Displacement of PPIUCD Inserted After Vaginal and Caesarean Delivery in Tertiary Care Centre: A Comparative Study

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Abstract: Postpartum intra-uterine contraceptive devices (PPIUCD) are IUCDs that are inserted immediately following the delivery of the placenta or up to 48 hours after birth. The most common complications of PPIUCD are heavy vaginal bleeding, menstrual irregularities, abdominal discomfort, fever, unusual vaginal discharge, missing strings, expulsion, displacement, and rarely perforation. Therefore, the present study was conducted for a comparative evaluation of the incidence of displacement and other complications of PPIUCD inserted after vaginal and cesarean delivery in cases delivered at tertiary care hospitals.: The study was designed as an observational study conducted at the Department of Obstetrics and Gynecology in Pt. J.N.M. Medical College and Dr. BRAM Hospital in Raipur, Chhattisgarh. The study spanned from August 2022 to December 2023. The study population was antenatal clients who came to Antenatal OPD or those who got admitted to the labor room to undergo vaginal or cesarean delivery and given consent for PPIUCD insertion. The statistical software SPSS 22.0 was used to analyze the data. The total number of PPIUCD insertions was 5475 (43%). Out of which 2471 (45%), PPIUCD insertions were done after vaginal delivery, and 3004 (55%) were intra-caesarean insertions. PPIUCD was more invaginal PPIUCD group (12%) than caesarean PPIUCD group (3.9%). The present study concludes that PPIUCD is an effective, safe, and convenient intervention both in vaginal and caesarean deliveries.

Keywords: Displacement, PPIUCD, Vaginal, Caesarean, Comparative.

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1. INTRODUCTION

India accommodates about 16% of the world's population. It is the second most populous country in the world.¹ Family planning is widely recognized as a lifesaving and health-improving intervention for women and children.² Only 26% of women are using any method of family planning during the first year postpartum.³ Because the woman's frequent contact with the health system over a relatively long period makes an opportunity for counseling women about the adoption of family planning methods.⁴ 61% of births in India occur at intervals that are shorter than the recommended birth-to-birth interval of 36 months. 27% of births occur within 24 months after a previous birth, and 34% occur between 24 and 35 months. Only 26% of women are using any method of family planning during the first year postpartum.³ Post partum intra uterine contraceptive devices (PPIUCD) are IUCDs that are inserted immediately following the delivery of the placenta or up to 48 hours after birth.⁴⁻⁶ Most common complications of PPIUCD are heavy vaginal bleeding, menstrual irregularities, abdominal discomfort, fever, unusual vaginal discharge, missing strings, expulsion, displacement, and rarely perforation. Optimal position of PPIUCD is in the fundal portion of the uterine cavity. PPIUCD can be displaced in the cervix, embedded, or perforated in the surrounding tissues. Displacement of PPIUCD presents mainly with symptoms like missing threads and lengthening or shortening of strings. Studies have shown that insertion of PPIUCD is associated with low expulsion or displacement rate of around 10% to 20% as compared to interval IUCD insertion; it is even lower when following intra-caesarean insertion as compared with insertion following vaginal delivery.^{7,8} Recent trials compared different insertion times after vaginal or caesarean delivery. Evidence was limited because studies with full reports generally have small sample sizes. Trials of adequate power are needed to estimate expulsion rates and side effects.⁹ This study is for comparative evaluation of the incidence of displacement and other complications of PPIUCD inserted after vaginal and caesarean delivery in cases delivered at tertiary care hospitals. Our objective is to compare the incidence of displacement of PPIUCD inserted after vaginal and caesarean delivery and to compare various complications of PPIUCD inserted after vaginal and caesarean delivery.

2. MATERIALS AND METHODS

The prospective study was conducted from August 2022 to December 2023 at the Department of Obstetrics and Gynecology in Pt. J.N.M. Medical College and Dr. BRAM Hospital in Raipur, Chhattisgarh.

2.1 Study Population

The study population was all antenatal clients who came to Antenatal OPD or those who got admitted to the labor room to undergo vaginal or caesarean delivery and given consent for PPIUCD insertion were registered for inclusion in the study. A total of 12,748 deliveries were conducted during the study period. Out of that, 5475 PPIUCD insertions were done. All mothers were informed about the advantages and importance of family planning, including the advantages, limitations, and complications of PPIUCD.

2.2 Inclusion criteria

- Women who have undergone vaginal or caesarean delivery and given consent for PPIUCD insertion.

2.3 Exclusion criteria

- Women with ischemic heart disease
- SLE
- Unexplained vaginal bleeding
- Molar pregnancy (gestational trophoblastic disease), pelvic tuberculosis, or any other infection
- Unresolved PPH
- Recurrent PID.

2.4 Ethical Statement

Permission from the Ethical Committee was obtained before the commencement of the study and informed written consent was obtained from the study participants. Depending upon the mode of delivery, they were subdivided vaginal PPIUCD insertion group and the intra-caesarean insertion PPIUCD group. Those going home with PPIUCD inserted were followed up at 6 weeks, 3 months, and 6 months. Counseling was done in the maternity ward before discharge regarding complications that can occur, like expulsion, missing string, bleeding, abdominal pain, infection, etc. They were counseled on when to report and come for follow-up. Mothers who did not come for clinical follow-up were called by telephone at the number provided during admission. They were also counseled on whether they had any of the above complaints. After 6 months, the data collected are statistically analyzed. Both the study groups were compared based on studies like missing string, expulsion of PPIUCD, complications like bleeding, pain in the abdomen, vaginal discharge, UTI, etc. By history, clinical examination, and ultrasonography. The statistical analysis was done using SPSS 22.0.

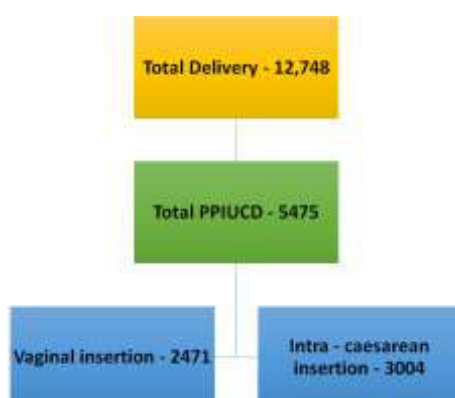


Fig 1: Showing a selection of study participants

3. RESULTS

A total of 12,748 cases were delivered to the center during the study period. There were 6006 (47%) vaginal births and 6742 (53%) cesarean sections. The total number of PPIUCD insertions was 5475 (43%). Out of which 2471 (45%), PPIUCD insertions were done after vaginal delivery, and 3004 (55%) were intra-caesarean insertions.

Table 1: Distribution of patients according to demographic profile			
Demographic profile	Age group	No of patients (n=5475)	Percentage
Age group (years)	Less than 20yr	602	11%
	21-25	2847	52 %
	26-30	1643	30 %
	31-35	328	6 %
	36-40	55	1 %
Registration	Booked	4774	87.2%
	Unbooked	701	12.8%
Residence	Rural	383	7%
	Urban	5092	93%
Literacy	No formal education	22	0.4%
	Primary education	1588	29%
	Secondary education	3537	64.6%
	Higher education	328	6%
Socioeconomic class	Upper middle	3449	63%
	Lower middle	745	13.6%
	Upper lower	876	16%
	Lower	405	7.4%
Parity	1	3829	70%
	2	1436	26.2%
	3	204	3.7%
	4	6	0.1%

Table 1 presents The mean maternal age of 24.9 ± 3.7 years. It has been observed that a maximum number of patients were in the age group of 21-25 years (50%). Most cases were primiparous 3829 (70%), followed by cases with 2nd parity, i.e., 1436 (26.2%). There were only 6 cases (0.1%) with 4th parity. This study found that maximum number of cases were from upper middle class (63%) followed by upper lower class (16%) It was observed that most of the cases in the study had secondary education (64.6%)

Table 2: Comparison of the status of PPIUCD at follow up visits in both groups									
Variable	Six weeks		P value	Three months		P value	Six months		P value
	Vaginal group	Caesarean group		Vaginal group	Caesarean group		Vaginal group	Caesarean group	
	Status of PPIUCD								
1. Total follow up	1046	1156		923	1109		883	1019	
2. Retained	932 (89.2%)	1109 (95.9%)	<0.001 (HS)	890 (96.4%)	1080 (97.5%)	0.2 (NS)	844 (95.5%)	993 (97.4%)	0.02 (S)
3. Expelled	107 (10.2%)	36 (3.1%)	<0.001 (HS)	13 (1.5%)	7 (0.6%)	0.07 (NS)	6 (0.7%)	2 (0.2%)	0.10 (NS)
4. Removed	7 (0.6%)	11 (1%)	0.46 (NS)	11 (1.2%)	17 (1.5%)	0.5 (NS)	19 (2.2%)	13 (1.3%)	0.53 (NS)
5. Replaced PPIUCD	0	0	-	1 (0.1%)	0	-	1 (0.1%)	2 (0.2%)	0.9 (NS)
6. Shifted to another mode of contraception	0	0	-	8(0.8%)	5 (0.4%)	0.4 (NS)	13 (1.5%)	9(0.9%)	0.08 (NS)

Table 2 shows that at 6 weeks follow-up, in the vaginal group, 932 cases (89.1%) retained PPIUCD as compared to the cesarean group in which 1109 cases (96%) retained PPIUCD with a statistically significant difference. ($P < 0.001$) Out of the total, there were 107 cases (10.2%) that had complete expulsion of PPIUCD within 6 weeks in the vaginal group as compared to 36 cases (3.1%) in a cesarean group with a statistically significant difference. ($P < 0.001$) At 3 months follow-up, there were 13 cases (1.5%) who had complete expulsion of PPIUCD in the vaginal group as compared to 7 (0.6%) cases in a cesarean group with no statistically

significant difference. ($P>0.05$) At 6 months (883), in the vaginal group, there were 6 cases (0.7%) who had complete expulsion of PPIUCD as compared to 2 (0.2%) cases in a cesarean group with no statistically significant difference. ($P>0.05$)

Table 3: Comparison of complications of PPIUCD at follow up visits in both groups

Variable	Follow up visits					
	Six weeks		Three months		Six months	
	Vaginal group	Caesarean group	Vaginal group	Caesarean group	Vaginal group	Caesarean group
Displacement related complications						
1. Expulsion	107 (10.2%)	36 (3.1%)	13(1.3%)	7(0.6%)	6(0.6%)	2(0.2%)
2. Missingthread						
a. Broken thread	0	0	0	0	1 (0.1%)	1 (0.1%)
b. Coiled thread	0	49 (4.2%)	22 (2.2%)	82 (7.5%)	38 (4.1%)	69 (6.5%)
3. Displaced PPIUCD	2 (0.2%)	2 (0.2%)	12 (1.2%)	1 (0.1%)	5 (0.5%)	0
4. Perforation	0	0	0	0	0	0
Other complications						
1. Abdominalpain	11 (1%)	15 (1.3%)	39 (3.8%)	44 (4%)	57 (6.2%)	53 (5%)
2. Menstrual irregularities (bleeding)	4 (0.4%)	7(0.6%)	16 (1.6%)	10 (1%)	11 (1.2%)	18 (1.7%)
3. Vaginal infection	0	0	2 (0.2%)	3 (0.2%)	0	4 (0.4%)
4. PID	0	0	0	1 (0.1%)	0	2 (0.2%)
5. UTI	0	0	0	2 (0.2%)	0	5(0.5%)

Table 3 observed that, in the vaginal group, at 6 weeks following, the up major complication was abdominal pain in 11 (1%) cases as compared to 15 (1.3%) cases in the Caesarean group with no significant difference. ($P>0.05$) The other complication was menstrual irregularities in 0.4% and 0.6% cases among the cvaginal and Caesarean groups, respectively, with no significant difference. At 3 months follow-up, a major

complication in the vaginal group was abdominal pain in 39 (3.8%) cases as compared to 44 (4%) cases in the Caesarean group with no significant difference. ($P>0.05$) At 6 months follow-up, a major complication in the vaginal group was abdominal pain in 57 (6.2%) cases as compared to 53 (5%) cases in the Caesarean group with no significant difference. ($P>0.05$)

Table 4: Reason for removal of PPIUCD at various intervals in both groups

Reason for removal		Vaginal group N=1046		Caesarean group N=1156		P value
		N	Percentage	N	Percentage	
At 6 weeks	Abdominal pain	6	0.6%	7	0.6%	0.3 (NS)
	Menorrhagia	1	0.1%	4	0.3%	1.0(NS)
At 3 months	Abdominal pain	3	0.3%	11	1%	0.1 (NS)
	Menorrhagia	5	0.5%	6	0.5%	0.5(NS)
	Tubectomy	3	0.3%	0	0%	
At 6 months	Abdominal pain	8	0.9%	7	0.7%	0.8 (NS)
	Menorrhagia	3	0.3%	3	0.3%	0.8(NS)
	Wants issue	1	0.1%	2	0.2%	0.9(NS)
	Tubectomy	7	0.7%	1	0.1%	0.2(NS)

Table 4 observed that total PPIUCD removal at 6 weeks in the Vaginal and Caesarean groups was abdominal pain in 6 (0.6%) and 7 (0.65) patients, respectively, with no significant difference. Similarly, at 6 months, in the Vaginal group, 8 cases (0.9%) and Caesarean group 7 (0.7%), patients removed PPIUCD due to abdominal pain, which was not relieved by medication.



Fig 2: Ultra sonographic picture of PPIUCD with thread inside the cervical canal



Fig 3: Ultra sonographic picture of PPIUCD with broken thread

Table 5: Expulsion rate of PPIUCD at various follow-up weeks in various studies

Year of study	Author	Expulsion rate at 6 weeks	Expulsion rate at 3 months	Expulsion rate at 6 months
2010-11	Nidhi Gupta ¹¹	4% & 2.6%	1.3% complete & 1.3% partial expulsion	0.3% complete expulsion and 1.2% Partial expulsion
2012-13	Lakshmi Garuda ¹²	6.25%	-	1/12 (8.3%) in follow up cases
2015-17	Parul S. Jani ¹³	0.6%	-	Overall 5/17 (29.4%) in follow up cases
2017-18	Radha Agrawal ⁶	8.47% Vaginal & 2.54% caesarean	2.54% vaginal & 0% caesarean	-
2018-20	Sneha Gupta ¹⁴	3.3%	5.6% in follow-up cases	-
2021	Shobha N. Gudi ¹⁵	Overall 4.16%	-	1.31% in follow-up cases.
2022	Shilpa Gupta ¹⁶	2%	-	-
2024	Present study	10.2% in vaginal & 3.1% in caesarean	1.5% in vaginal group & 0.6% in Caesarean group	6/883 (0.7%) in vaginal group & 2/1019 (0.2%) in caesarean group

Table 6: Complications of PPIUCD within various studies

Year of study	Author	No. of cases	Complications
2012-2013	Lakshmi Garuda ¹²	220	Bleeding-2/20 (10%) Infection- 1/4 (25%) Missing string-3/32 (10.3%)
2016-2017	Dhruba Prasad Paul ¹⁷	55	Pain abdomen-1.8% Bleeding-3.6%
2016-2017	Nirja Sharma ¹⁸	100	Menstrual complains-16% in vaginal group & 12% in caesarean group Vaginal discharge-4% in vaginal group & 2 % in caesarean group Missing thread – 16% in vaginal group & 60% in Caesarean group.
2018-2020	Sneha Gupta ¹⁴	300	Infection-3.39% Abdominal pain-1.7% AUB-2.54%
2021	Shobha N. Gudi ¹⁵	5227	Bleeding-1.58% Pain- 0.73% Infection-0.2% Missing thread-0.58% Long thread- 0.4%
2024	Present study	1902 (followed up cases)	Lower abdominal pain- 57/883 (6.2%) in the vaginal group & 53/1019 cases (5%) in both groups Menorrhagia-11/883 cases (1.2%) in the vaginal & 18/1019 (1.7%) in the caesarean group. Vaginal infection-4/1019 cases (0.4%) in the caesarean group PID - 2/1019 cases (0.2%) in caesarean group UTI - 5/1019 cases (0.5%) in caesarean group Missing thread- 39/883 cases (4.2%) in the vaginal group & 70/1019 cases (6.6%) in the caesarean group Long threads- 5/1019 (0.5%) in vaginal group

4. DISCUSSION

Postpartum IUCD (PPIUCD) insertion is an opportunity not to be missed in developing countries like ours, where delivery may be the only time when a healthy woman comes into contact with healthcare providers, and the chances of returning for contraception advice are uncertain. It does not interfere with breastfeeding. It is convenient for both women and their healthcare providers. It allows women to obtain safe, long-acting, highly effective contraception while already in the medical system. This also gives the mother enough time to recover from the physical stress of one pregnancy before moving on to the next and gives enough time for lactation. A report by WHO 2006 states that healthy timing and spacing of provenances positively affect maternal health and newborn outcomes.¹⁰ The present prospective observational study was to determine the incidence of displacement of PPIUCD inserted after vaginal and cesarean delivery and to compare both. A total of 5475 PPIUCD insertions were made during the above mentioned study period. Out of which, the total number of vaginal PPIUCD insertions was 2471, and after the cesarean section was 3,3004. Counseling was done regarding the benefits of PPIUCD and associated complications, and follow-up was required during the postpartum period. Antenatal counseling plays a very important role in the acceptance of contraceptive methods. This is reflected in our study as a maximum number of cases, i.e. 87.2%, who accepted PPIUCD, were booked in the ANC clinic of our center, and 12.8% of the cases were un-booked and referred from other centers at the time of delivery. A similar observation was made by Sudha et al., in which 98.3% were booked in the study center, some were booked in other nearby centers, and only 1 case was unbooked. It has been observed that a maximum number of cases retained PPIUCD with no complaints in both groups. There is a significantly higher retention rate, i.e., 96% in the cesarean group versus 89.1% in the vaginal group, as they are more motivated to the continuance of PPIUCD. Various studies have made similar observations, so ours aligns with them. It has been observed that at this follow-up visit, some cases were also reported with complaints of lower abdominal pain, menorrhagia, vaginal infection, PID, UTI, etc. There were 57/883 cases (6.2%) and 53/1019 cases (5%) complaining of lower abdominal pain in vaginal and cesarean groups, respectively. 11/883 cases (1.6%) in the vaginal group and 18/1019 cases (1%) in the cesarean group had menorrhagia. No significant difference was observed in the comparisons between the two groups. Most of the cases were relieved by medications. Despite treatment, some cases requested the removal of PPIUCD for the abovementioned complaints as they have not responded to medical management. Out of total follow-up cases, 8/883 cases (1.1%) and 7/1019 cases (0.7%) removed PPIUCD for constant and intolerable lower abdominal pain in vaginal and cesarean groups, respectively. Some requested removal for menorrhagia but were not responding to medical treatment, i.e., 3/883 cases (0.3%) and 3/1019 cases (0.3%) in both groups. No significant difference was observed in the comparisons between the two groups. Various studies have made similar observations. So, our study is consistent with them. 7/883 cases (0.7%) in the vaginal group and 1/1019 cases (0.1%) in the cesarean group have removed PPIUCD as they opted permanent method. 1/883 cases (0.1%) and 2/1019 (0.2%) in the vaginal and cesarean group removed PPIUCD as they wanted pregnancy due to the death of the baby in the nursery

(NICU). Cases in whom expulsion and removal of PPIUCD have occurred shifted to other methods of contraception, i.e., 13/883 cases (1.5%) and 9/1019 cases (3%) in vaginal and cesarean groups, respectively. Discontinuation was seen more among vaginal insertions, as women who underwent cesarean delivery were more motivated to continue PPIUCD. The most common method opted for was injectable contraceptives (in DMPA), i.e., 8/22 (36.3%). At 6 months follow-up visit, some cases came with complaints of missing threads of PPIUCD. It was seen in 39/883 cases (4.2%) and 70/1019 cases (6.6%) in the vaginal group and cesarean group, respectively. History and clinical examination showed that there were 1/883 and 1/1019 cases, i.e. (0.1%), with broken PPIUCD threads in each group. In some cases, clinical examination (per-speculum) was sufficient to see the spiral thread in the vagina, and some required ultrasonography to confirm PPIUCD in situ and to rule out unknown expulsions. On comparing both the groups, this was found to be significantly higher in the cesarean group as compared to the vaginal group. Some cases amongst the vaginal group, i.e. 5/883 (0.5%) cases presented with complaints of long threads causing discomfort and vulval irritation. The threads need to be trimmed, and only reassurance is required. Similar observations were made by a few studies, which is consistent with our study. At this follow-up visit, 1/883 cases (0.1%) in the vaginal group and 2/1019 cases (0.2%) in the cesarean group requested re-insertion of PPIUCD. Apart from the above complications, there were 4/1019 cases (0.4%) with vaginal infection which were investigated and treated. This may be due to a lack of perineal hygiene. 2/1019 cases (0.2%) with pelvic inflammatory disease and 5/1019 cases (0.5%) with urinary tract infection were seen. They were managed by medical treatment. There were no cases with the above complications in the vaginal group. Various studies mentioned above have made similar observations, so our study aligns with them. PPIUCD insertions by trained clinicians and meticulous placement can reduce expulsions and other complications. Early and regular follow-up examinations are important to identify spontaneous expulsions and provide alternative contraceptives or IUCD re-insertions.

5. CONCLUSION

The present study concludes that PPIUCD insertion is one of the best methods of contraception. It is an effective, safe, and convenient intervention both in vaginal and cesarean deliveries. It was found that the displacement, including the expulsion rate of PPIUCD, was more in the vaginal PPIUCD group (12%) as compared to the cesarean PPIUCD group (3.9%). Despite the higher expulsion rate in the vaginal group, placement of PPIUCD should be encouraged, considering the advantages that come along.

6. AUTHORS CONTRIBUTION STATEMENT

Dr. Tripti Nagaria conceptualized and designed the study. Dr. Tripti Nagaria and Dr. Anjum Khan discussed the methodology and provided valuable input on designing the manuscript. Dr. Deepti Sapaha gathered and analyzed the data for this study. All authors read and approve the final version of the manuscript.

7. CONFLICT OF INTEREST

Conflict of interest declared none.

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