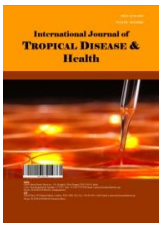

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Clinical Outcomes of Trans-caesarean and Vaginal Post-placental CuT380A IUCD Insertions: A Comparative Study

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Authors' contributions

This work was carried out in collaboration among all authors. Author CPO designed the study, performed the statistical analysis, wrote the protocol and managed the analyses of the study. Authors DNO and CPN wrote the first draft of the manuscript. All authors managed the literature searches, read and approved the final manuscript.

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ABSTRACT

Background: Immediate postpartum CuT380A intrauterine contraceptive device (PPIUCD) insertion provides a novel approach in reducing the unmet contraceptive needs of family planning. The insertion can be trans-caesarean or vaginal following delivery of the placenta. The clinical outcomes of the different routes of insertion have not been adequately studied.
Aim: The study aimed at comparing the clinical outcomes following trans-caesarean and vaginal post-placental insertions of CuT380A IUCD.
Methodology: The study was a prospective cohort study of 81 pregnant mothers managed at a tertiary health institution in southern Nigeria. They were recruited into two groups using a

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convenient sampling technique; 27 and 54 mothers in the caesarean and vaginal delivery groups respectively. The pregnant mothers were followed up till delivery and at the six weeks postnatal visit. Information on their socio-demographic characteristics, Obstetrics and Gynecology history were obtained with the aid of a proforma. The proforma was updated with the clinical outcomes of immediate PPIUCD insertions in the two groups, at the six weeks visit. Data obtained were analyzed using statistical package of social sciences version 21. Continuous variables were expressed as means and standard deviations. The Chi square test was used for dichotomous or categorical variables. A p-value of less than 0.05 was considered statistically significant.

Results: The study showed that PPIUCD is a safe practice in both vaginal and caesarean deliveries with no significant differences in clinical outcomes. However, incidence of missing string was higher in the caesarean group compared to vaginal group (81.5% vs 51.9%; p value-0.01); and expulsion rate was also high in the vaginal group but not significant. (13.0% vs 7.4%; p value 0.45).

Conclusion: Immediate postpartum CuT380A contraception, irrespective of route of insertion, is convenient, effective, and safe. Although there is a relatively higher incidence of missing strings, including expulsions after vaginal PPIUCD insertions, immediate post-partum contraception should be encouraged. This will help to reduce high unmet contraceptive needs in our environment and loss to follow up irrespective of route of delivery.

Recommendation: Immediate PPIUCD, irrespective of the route, should be encouraged and integrated into the existing Maternal and Child Health Programme. Awareness should be created to promote acceptance in our environment.

Keywords: Post-partum Intrauterine Contraceptive device (PPIUCD); trans-caesarean; post-placental; trans-vaginal; comparative.

1. INTRODUCTION

Family planning reduces maternal mortality by 30% and childhood deaths by 10% [1]. One of the methods to achieve this is through post-partum/placental (following caesarean or vaginal delivery) contraception using CuT380A IUCD. This refers to insertion of CuT380A into the fundus of the uterine cavity within the first 48hours of childbirth [2]. Post-partum CuT380A (PPIUCD) insertion can be immediate or early postpartum/placental. It is immediate, if within 10 minutes and early if between 10minutes and 48hrs postpartum/placental delivery irrespective of mode of delivery or termination of pregnancy [3] If inserted after 48hours to 6weeks postpartum, it is regarded as interval insertion.

The modern CuT380A is safe during breastfeeding, highly effective, cheap, convenient, long acting and rapidly reversible method of contraception [4-8] Provision of CuT380A PPIUCD to women after facility child birth will increase its uptake and reduce the unmet contraceptive need in the first twelve months of delivery. Facility birth is a great opportunity that should not be missed to start post-partum family planning and post-partum intrauterine device (PPIUCD) services, because few women especially in low resource settings would return for follow up visit after facility birth [6].

The uterus is approximately the size of a five months old pregnancy during the first forty-eight hours after vaginal delivery and the fundus is approximately felt through the anterior abdominal wall at the level of the umbilicus [9]. The lower uterine segment and the cervix is thinned out and the cervix is open at the time of vaginal delivery. These post-partum changes permit a convenient insertion of CuT380A with minimal discomfort. However, for trans-caesarean CuT380A insertion, these changes may not be observed depending on whether it was inserted before onset of labour (i.e. Elective c/s) or following advanced labour (i.e. Emergency c/s). In both scenarios, fundal placement is facilitated through the uterine incision and the string is brought down into the lower uterine segment before uterine wound closure is performed. Post-partum insertion of CuT380A at caesarean or vaginal delivery is very important in women who may be lost to follow up. There are few potential risks associated with PPIUCD insertion either at caesarean or vaginal deliveries; abnormal vaginal discharge/pelvic infection, abnormal uterine bleeding, perforation, lower abdominal cramps/pains, missing strings [10-11].

There is a low level of awareness and practice of PPIUCD insertion at caesarean and vaginal deliveries, among many contraceptive providers in Nigeria, making this practice a less popular

method of post-partum family planning. A study revealed that pregnant mothers who were counseled about immediate PPIUCD insertions (caesarean and vaginal) in the antenatal period were more likely to get IUCD inserted in the immediate post-partum period. [5] A systematic review of PPIUCD with a copper device found that the expulsion rate for trans-caesarean insertions was less than vaginal insertions within 48hours of delivery [12]. It therefore appears that rate of PPIUCD expulsion is related to the route of insertion within the post-partum period. A comparative study documented expulsion rate of 6% in the vaginal delivery group and 2% in the caesarean group [13]. In another study, expulsion rate was 4% in the vaginal group and 2% in the caesarean group [14]. Expulsion rates of 5.1% at 6weeks,7% at 6months and 12.3% at 12months respectively have been found in a study of PPIUCD insertion for both vaginal and caesarean delivery [15]. These findings underscores the need for regular follow up in mothers who opt for immediate PPIUCD. Delay in uterine involution following caesarean or vaginal delivery could explain the increased incidence of missing strings when compared to interval IUCD insertion. Consequently, there could be coiling of the string of the IUCD against the cervix and thus not visualized at the level of external cervical os even at insertion

A study reported 55.1% and 22.1% of missing strings for trans-caesarean and vaginal insertions respectively [16]. Missing CuT380A IUCD strings can be minimized by ensuring that the string is brought down to the lower segment during caesarean section. Care should be taken to avoid string being entangled with suture material, during closure of uterine wound. Despite the increased incidence of missing strings especially during trans-caesarean insertions, satisfaction rates are comparable following the two routes of insertion. Options of management of missing strings of CuT380A include either reassurance and follow up, after confirming fundal placement by a pelvic ultrasound or by removal with use of Alligator forceps, retrieval hook or Karman's syringe [17].

A study comparing infection rates following PPIUCD insertions revealed unusual vaginal discharge in the vaginal group (5.8%) and caesarean group (6.5%) [11] This finding, although shows a slight difference, is similarly comparable and demonstrates no significant difference in this outcome variable following the two routes of insertion. Bleeding irregularities have not been found problematic in women choosing PPIUCD either at vaginal or caesarean delivery [10,12,18].

However, Babita et al reported a higher incidence of irregular vaginal bleeding in the caesarean group (9.7%), than the vaginal group (5.8%), while heavy bleeding was more in the vaginal group (10.1%) than in the caesarean group (8.6%) [11]. Halder et al documented complaints of vaginal bleeding by 10% of mothers in the vaginal group and 5% of mothers in the caesarean group, but excessive bleeding was found to be 2% and 5% in the vaginal and caesarean group respectively [14]. The findings from the above studies are conflicting. Hence, it is not conclusive, in this outcome variable following the two routes of insertion. No case of uterine perforation has been reported following trans-caesarean and vaginal PPIUCD insertions [10,12,18,19] Gupta et al established an overall continuation rate with PPIUCD of 91.7% among users at 6weeks and this increased linearly to 92.9% at 3months and 95.6% at 6months respectively. [20] In Enugu, Nigeria, Okafor et al documented that over 90% of mothers were happy and satisfied with PPIUCD insertion both at vaginal and caesarean delivery and 76.5% of users want to continue the method [17]. Another study revealed that the rate of removal of CuT380A IUCD at six weeks was found to be low in caesarean group than in the vaginal group [11].

This study therefore aims to compare the clinical outcomes following trans-caesarean and vaginal post-placental insertions of CuT380A IUCD. Findings from this study will contribute to addressing the unmet need for family planning via the use of every available and possible opportunity.

2. MATERIALS AND METHODS

Study Setting: This study was conducted at the Obstetrics and Gynecology department of the Federal Medical Centre Asaba, Delta State; tertiary and referral Centre in Delta state and environs. The Centre attends to the majority of the pregnant mothers in Asaba from where the study population was recruited. There are three Antenatal sessions per week at the Maternity complex. Average antenatal attendance in each clinic session is 100 women including 50 new bookings, thus average attendance per week is 300 and 150 respectively. The average total number of deliveries per month is 90. They

comprise of 60 spontaneous vaginal deliveries and 30 by caesarean section, thus the SVD/CS ratio is 2:1. The annual delivery rate is about 1200.

The family planning unit is run by five Nurses trained in family planning, a Registrar on monthly posting and a Consultant Obstetrician. Contraceptive services provided include: interval IUCD insertions, sub-dermal implant insertion (Implanon, Jadelle), injectables, combined contraceptive pills, mini-pills, and condoms. An average of forty new clients and hundred old clients are seen every month in the family planning unit. Contraceptive uptake rate in the study Centre is 11.9% and the commonest contraceptive method of choice is CuT380A IUCD. Clients' information is entered in the family planning card/ follow -up card.

Study Design: The study was a facility based prospective cohort study.

Study Population: Mothers who delivered at Federal Medical Centre Asaba, during the period of the study, having met the eligibility criteria and gave informed consent for the study.

Inclusion criteria:

1. Pregnant Mothers who delivered vaginally or by caesarean section having received counseling for PPIUCD contraception.
2. Pregnant Mothers who were willing to return for six weeks postnatal visit.
3. Mothers with preterm deliveries were also recruited into the study.

Exclusion criteria:

1. Prolonged rupture of fetal membranes > 18 hours duration.
2. Mothers with unresolved post-partum haemorrhage.
3. Mothers with multiple sexual partners and at risk of sexually transmitted infections.
4. HIV Mothers not on highly active anti-retroviral therapy (HAART).
5. Significant anatomic distortion of the uterus.
6. Pregnant Mothers in established labor with no post-partum family planning counseling.
7. Mothers with extensive genital tract lacerations.

Study period: The duration of the study was 10 months, from October 2018 to August 2019.

Sample size calculation: Formula for comparing proportions between two groups [21] was used as shown below;

$$p = \frac{p1 + r(p2)}{1 + r} = \frac{0.55 + 2(0.22)}{1 + 2} = 0.33$$

$$n = \frac{(Z_{1-a/2}\sqrt{(r+1)p(1-p)} + Z_{1-b}\sqrt{rp1(1-p1)+p2(1-p2)^2}}{r(p2-p1)^2}$$

Alpha (a)= 0.05, $Z_{1-a/2}$ = 1.96

Beta (b)= 0.2, Z_{1-b} = 0.84

P1 is the proportion in group 1 (caesarean)=55.1%=0.55

P2 is the proportion in group 2(vaginal)=22.1% =0.22

Ratio (Group 2 / Group 1) =2(SVD/CS ratio in the study setting)

n=

$$\frac{\left(1.96\sqrt{3X0.33X0.67} + 0.84\sqrt{(1.1X0.45) + (0.22X0.78)}\right)^2}{2(0.33)^2}$$

= 24

n (sample size for the caesarean delivery group) =24

Providing for attrition rate of 10%, therefore the calculated sample size for the caesarean group, n=24/0.9=27.

For the SVD group n=27x2=54.
Thus, a total of 81 women were recruited for the study comprising of 27 and 54 women for the C/S and SVD group respectively.

A study reported proportion of missing IUCD in trans-caesarean and vaginal group to be 55.1% and 22.1% respectively [16] These values were used in calculating the minimum sample size as shown above.

Sampling method: A total of 27 and 54 women who delivered by C/S and SVD respectively during the study period and who met the eligibility criteria and gave consent to participate in the study, were recruited using a convenient sampling technique, until the required minimum sample size for each study aim was attained.
Data collection: The Investigator was trained by the Society for Family Health (SFH) and was

certified competent in PPIUCD insertion. The Investigator involved three Family Planning. Nurses and three Nurse Midwives, who were trained on effective post-partum family planning counseling skills by the SFH, with emphasis on CuT380A IUCD. Resident Doctors were also trained by the Investigator on post-partum counseling and selection of study participants using eligibility criteria check list. At the six weeks visit, the three Family Planning Nurses assisted in filling the follow up visit cards. The Nurse Midwives were involved in identification of eligible study participants using check list developed by the Investigator based on the inclusion and exclusion criteria.

Following counseling during the Antenatal sessions by the Principal Investigator and the Family Planning Nurses, awareness on CuT380A PPIUCD was created and pregnant mothers that gave consent to participate in the study were followed up by the Nurses. However, pregnant mothers at 36weeks Gestation were closely followed up at the Antenatal consulting room by the Investigator and Resident Doctors. They were also encouraged to discuss with their spouses. Phone Contacts and addresses were exchanged and follow up continued till onset of labour. Study participants were instructed to make a phone call to the Investigator when labour was established. This enabled the Investigator to make adequate preparation and facilitated early transit to the study Centre when necessary.

For Un-booked Pregnant Mothers who presented early in labour and booked Mothers with poor antenatal visits, they received Post-partum family planning counseling from the Investigator, Resident Doctors or Nurse Midwives on duty at that time. Participants were enrolled into the study after they met eligibility criteria and gave consent.

Vaginal post-placental CuT380A IUCDs were inserted within 10 minutes of delivering the placenta, for study participants who delivered vaginally. This was to eliminate bias and confounders such as timing in insertions, thereby comparatively matching for trans-caesarean insertions. All vaginal CuT380A IUCD insertions were performed by the Investigator, so as to eliminate bias in insertion skills.

Pregnant mothers on Hospital admission and being worked up for elective caesarean section, were counseled by the Investigator. They were enrolled into the trans-caesarean study group after meeting the eligibility criteria and gave consent to participate in the study. Counseling commenced in the Antenatal Clinic sessions and a written consent was obtained before surgery. Insertion of CuT380A at caesarean section was carried out by the Investigator on the day of surgery. For booked Pregnant Mothers who gave verbal consent to participate in the study during the Antenatal period, but presented in advanced labour before their scheduled date of elective caesarean delivery, the Investigator was notified, the eligibility check-list was reviewed and then trans-caesarean CuT380A insertion was conducted with closure of uterine incision. Before discharge, the study participants filled a family planning clients' record form and a six-week visit was scheduled by the Investigator.

Study materials: Materials used in this study were a comprehensive check list, Kelly forceps, sponge holding forceps, Alligator forceps, retrieval hook, Sims and Cusco's speculums, Galipot, kidney dishes, chlorhexidine solutions, sodium hypochlorite, glutaraldehyde solution (cidex), sterile gauzes, sterile drapes, sterile surgical gloves, autoclave unit, CuT380A IUCD, follow up card/checklist and a 3D ultrasound machine.

2.1 Procedure for Vaginal Post-Placental CuT380a IUCD Insertion

After adequate counseling and brief physical examination, each of the study participants was placed in lithotomy position. The abdomen was examined to assess for uterine tone and size. Sterile drapes were applied over the mother's abdomen and underneath the buttocks. While maintaining asepsis, the Investigator changed to a new sterile glove. The external genitalia were cleaned with a sterile gauze soaked in chlorhexidine solution. Under a good light source, the cervix was exposed with speculum and the vaginal walls and cervix were also cleaned with antiseptic lotion after evacuating blood clots. The anterior cervical lip was gently grasped with sponge holding forceps. The CuT380A was removed from its sterile pack and placed in a sterile tray. The IUCD was grasped with Kelly forceps at the vertical stem while ensuring that the horizontal arm of the IUCD was just above the ring of the forceps and on the same plane. The string of the CuT380A was outside the plane of the Kelly Forceps. A gentle traction was exerted on the cervix holding forceps. The forceps holding the IUCD was gently introduced through the cervix and into the

lower uterine segment up to the uterine fundus while avoiding contact with the vaginal walls. The non-dominant hand was placed on the abdomen to stabilize the uterus and also to confirm fundal placement of CuT380A. After achieving fundal placement of CuT380A, the Kelly forceps was gently withdrawn from the uterine cavity, keeping it slightly open. The cervix was examined to ensure that the string was not visible within the vagina. The vagina was cleaned with sterile gauze mounted on a sponge holding forceps and all instruments were removed. The study Participants were thanked for their co-operation.

2.2 Procedure for Trans-Caesarean IUCD Insertion

Trans-caesarean insertions were performed during uncomplicated caesarean sections after removal of placenta, membranes and blood clots. The CuT380A was advanced through the uterine incision into the uterine cavity up to the fundus using Kelly forceps. The non dominant hand was placed on the fundus so as to stabilize the uterus and confirm fundal placement. The forceps were opened and withdrawn from the uterine cavity in a gentle manner. The tail of the IUCD was brought to the lower uterine segment and the uterine incision was closed in double layers with absorbable suture 2. After ensuring hemostasis, the uterus was returned into the abdominal cavity. The peritoneal cavity was cleaned with sterile abdominal mop and the anterior abdominal wall was closed in layers in the routine manner.

2.3 Follow up Visit (Six Weeks)

At discharge, PPIUCD follow up cards were given to all the study participants after insertion of the CuT380A IUCD. Information contained in the card included: instructions on recognizing expulsions, warning symptoms e.g. abnormal uterine bleeding, lower abdominal pain, unexplained fever, abnormal vaginal discharge. The phone number of the Investigator was also contained in this card. Data to be extracted from case files of mothers were: bio-data, previous obstetric history, sexual history, Gynecological history including contraceptive history, using a proforma sheet. Pelvic examination was done at the six weeks visit to address concerns of potential complications and to confirm intrauterine placement of IUCD. The IUCD string was trimmed by either the Research Assistants or the Investigator when necessary.

Pelvic examinations were performed and ultrasonography was done in cases of missing strings and expulsions, during the six weeks visit. Findings obtained following evaluation of study participants at this visit were used to update the proforma.

2.4 Outcome Measures

Missing strings: This is defined as the inability to visualize the thread of the CuT380A beyond the external cervical os during a speculum examination. IUCD expulsions are also included in this operational definition.

CuT380A expulsions: This is the clinical and ultrasonographic demonstration of the absence of CuT380A from the fundus of the uterine cavity.

Abnormal uterine bleeding: This is regarded as any unusual pattern of bleeding per vagina as perceived by the post-partum women. Primary and secondary post-partum haemorrhage is also included in this definition.

Lower abdominal pain: This is the unpleasant discomfort in the lower abdomen ranging from mild and persistent pain to severe excruciating pain.

Abnormal vaginal discharge: This is described as any unusual discharge characterized by aberration in the quantity, colour, consistency of discharge and associated with symptoms such as offensive smell and itchiness and/or demonstrable on speculum examination.

Removal of IUCD: This is the discontinuation of IUCD using any suitable means and devices e.g. retrieval hook, alligator forceps Karman's syringe; either for medical or personal reasons or due to spousal request.

Data analysis: Data collected was entered into Statistical Package for the Social Sciences (SPSS) version 21.0 for statistical analysis. Descriptive data was summarized as percentages for qualitative variables or means (SD) for quantitative variables. Rates of missing strings of CuT380A and expulsions of IUCD shall be expressed in percentages. Comparison of difference in rates of missing strings and other factors between women who had trans caesarean and vaginal insertions was done with Chi-square test. Test of association between selected factors- age, parity, educational status,

etc. and outcome variables was also measured using the Chi square test. A P-value of < 0.05 was considered to be statistically significant.

3. RESULTS

A total of 81 post-partum women were studied and data collected from them were analyzed and the findings presented below. The mean age of the patients 34.3±4.5 years, with age group 31-40 (66.7%) being the modal age group. Sixty-five (80.2%) were multiparous women. The mean gestational age at delivery was 38.4±1.4 weeks, hence most of the subjects (93.8%) were term at delivery.

Figure 1 shows the distribution of the women by method of PPIUCD insertion. Fifty-four (66.7%) of them were vaginal insertion while the remainder – 27 (33.3%) were trans-caesarean section.

Table 2 shows the socio-demographic and obstetrics characteristics of the women according to method of PPIUCD insertion. The mean age of the women was 34.9±4.6 and 33.2±4.3 for vaginal and trans-caesarean group respectively. Women that had trans-caesarean PPIUCD were significantly better educated than those that had vaginal insertion (Fisher's exact =6.38, p=0.04).

A significantly higher proportion of those that had vaginal insertion were grand-multiparous (22.2%) compared to those that had trans-caesarean section (Fisher's exact=7.27, p=0.03). All the patients that had trans-caesarean were term at delivery and there was no significant difference in gestational age at delivery between both groups.

Table 3 shows outcome of PPIUCD according to method of insertion. A significantly higher proportion of women that had trans C/S (81.5%) had missing IUCD compared to those with vaginally inserted IUCD (51.9%), hence women with trans C/S PPIUCD were more likely to experience missing IUCD than those with vaginal IUCD ($\chi 2=6.38$, p=0.01). On the other hand, even though a higher proportion of those who expelled the IUCD were those with vaginal insertion (13.0%) compared 7.4% with trans C/S insertion, the difference was not statistically significant.

Table 1. Characteristics of the subjects

Characteristic	Frequency (n=81)	Percentage (%)
Age (in years)		
≤30	19	23.4
31-40	54	66.7
41+	8	9.9
Mean ± SD	34.3±4.5	
Parity		
Primipara	4	4.9
Multipara	65	80.3
Grand multiparous	12	14.8
GA at delivery		
Preterm	5	6.2
Term	76	93.8
Mean ± SD	38.4±1.4	
Educational Status		
Primary	6	7.4
Secondary	20	24.7
Tertiary	55	67.9
Religion		
Christianity	78	96.3
Muslim	3	3.7

Tertiary education 55 (67.9%) was the predominant educational status and almost all the women (96.3%) were Christians

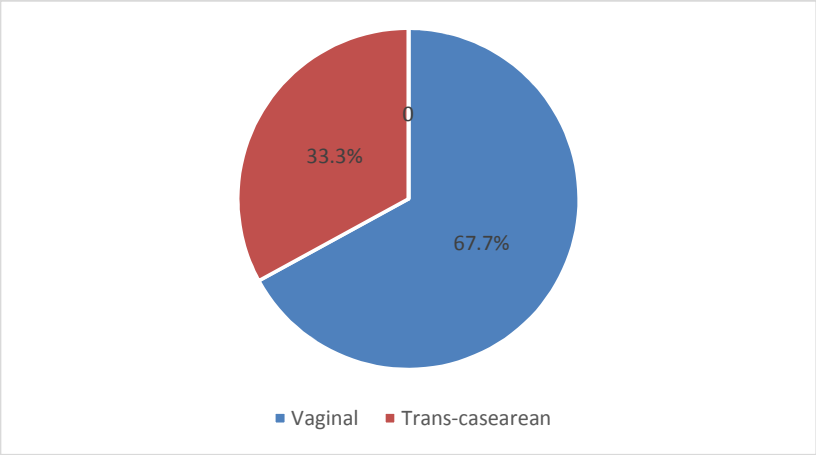

Fig. 1. Distribution of the women by method of PPIUCD insertion

Table 2. Characteristics of the subjects by method of Insertion of IUCD

Characteristic	Vaginal N=54 (%)	Trans C/S N=27 (%)	Fisher's exact test	P value
Age (in years)				
≤30	10 (18.5)	9 (33.3)	2.28	0.32
31-40	38 (70.4)	16 (59.3)		
41+	6 (11.1)	2 (7.4)		
Mean ± SD	34.9±4.6	33.2±4.3		
Educational Status				
Primary	6 (11.1)	0 (0.0)		
Secondary	16 (29.6)	4 (14.8)	6.38	0.04*
Tertiary	32 (59.3)	23(85.2)		
Religion				
Christianity	51 (94.4)	27 (100.0)	1.56	0.55
Muslim	3 (5.6)	0 (0.0)		
Parity				
Primipara	2 (3.7)	2 (7.4)		
Multipara	40 (74.1)	25 (92.6)	7.27	0.03*
Grand multiparous	12 (22.2)	0 (0.0)		
GA at Delivery				
Preterm	5 (9.3)	0 (0.0)	2.66	0.16
Term	49 (90.7)	27 (100.0)		

**statistically significant*

Table 3. Outcome of PPIUCD by method of Insertion of IUCD

Outcome	Vaginal N=54 (%)	Trans C/S N=27 (%)	χ2	P value
Missing IUCD				0.01*
No	26 (48.1)	5 (18.5)	6.69	
Yes	28 (51.9)	22 (81.5)		
Expelled IUCD				
No	47 (87.0)	25 (92.6)	0.56	0.45
Yes	7(13.0)	2 (7.4)		

**statistically significant*

Table 4 shows types of complications experienced by the women following IUCD insertion. They include cramps and abnormal vaginal discharge among those that had vaginal

insertion. While 3 women had abnormal bleeding within the 1-2 weeks of insertion, 2 (66.7%) had vaginal insertion, while 1 (33.3%) had trans-C/S insertion. All the patients with cramps were treated with non-steroidal anti-inflammatory drugs, those with abnormal vaginal discharge were treated with anti-fungal (clotrimazole), while those with abnormal uterine bleeding had their IUCD removed.

Overall rate of removal of IUCD irrespective of method of insertion is 9.9%. However, rate of removal based on method of insertion is 13.0% and 3.7% for vaginal method and trans-C/S method of insertion respectively. There was no statistically significant difference in rate of removal of IUCD as shown in Table 5.

4. DISCUSSION

Eight-one study participants were recruited during the study period and they all had CuT380A PPIUCD insertions and returned for their 6 weeks visit. No attrition was recorded in this study because the Principal Investigator ensured that the contact addresses of the Participants were domiciled within the State where the study was conducted. Phone numbers of the participants were collected to remind them of their 6 weeks visit when it was necessary. Because, most post-partum women would return for immunization of their babies at 6 weeks, this may have contributed to the 100% follow up in this study. The majority of the study participants were in the age group 31-40years and their mean ages were 34.9years and 33.2years for the vaginal and trans-caesarean groups respectively and statistically comparable (p value=0.32). Aswarthy S. et al [22] reported that the majority of participants belonged to 20-25years of age. This was largely due to the fact that the participants were from rural areas and less educated, in contrast to this study where all the participants were domiciled within an Urban area. The modal age group of 31-40years in this study may be due to the fact that most of the mothers had tertiary education and started their reproductive careers later than their rural counterparts.

A significantly higher proportion of those that had trans-caesarean insertion were multiparous, 92.6%, compared to those that had vaginal insertions, 74.1% (x2 =7.27, p=0.03). There are increased morbidities associated with repeat caesarean sections, hence prolonging inter-pregnancy interval and reducing family size could be some of the reasons for the increased proportion of multiparous women in the trans-caesarean group.

Table 4. Types of complications by method of insertion of IUCD

Complication	Vaginal N=54 (%)	Trans C/S N=27 (%)	Fisher exact	P value
Cramps				
No	51 (94.4)	27 (100.0)	1.56	0.55
Yes	3 (5.6)	0 (0.0)		
Abnormal vaginal discharge				
No	51 (94.4)	27 (100.0)	0.56	0.45
Yes	3 (5.6)	0 (0.0)		
Abnormal uterine bleeding				
No	52 (96.3)	26 (96.3)		
Yes	2 (3.7)	1 (3.7)	0.00	1.00
Invalid	4 (7.4)	1 (3.7)		

Table 5. Rate of removal of IUCD by method of insertion of IUCD

IUCD Removed	Vaginal N=54 (%)	Trans C/S N=27 (%)	χ2	P value
No	43 (79.6)	25 (92.6)		
Yes	7 (13.0)	1 (3.7)	2.32	0.31
NA	4 (7.4)	1 (3.7)		

NA – not applicable

The rate of PPIUCD expulsion in this study was high; it was higher in the vaginal delivery group 13% compared to the trans-caesarean group 7.4%, but it was not statistically significant (x2

=0.56 p-value=0.45). Okafor et al reported PPIUCD expulsion rate of 2.5% over a 12 months period. [17] Aswarthy et al reported 1.8% (2 cases of expulsion) in the vaginal delivery group and no expulsion in the caesarean group. [22] Halder et al reported 4% and 2% for vaginal and trans-caesarean insertions respectively [14] while Supriya et al reported expulsion rates of 6% and 2% in the vaginal and trans-caesarean groups respectively.[13] Gupta et al found an expulsion rate of 6.6% in vaginal insertions and 2% in caesarean insertions. [20] Fundal placement is key in reducing the incidence of PPIUCD expulsions.

The commonest PPIUCD complications in this study was Missing strings; 81.5% in the trans-caesarean group and 51.9% in the vaginal group respectively and it is statistically significant (p=0.01). This was a concern for the participants. The study done by Reetu et al reported 55.1% and 22.1% in the trans-caesarean and vaginal group respectively. [16] which was contrary to the finding of this work. Babita et al [11] reported 22.8% and 12.9% in caesarean and vaginal group respectively. While Reetu et al and Babita et al excluded expulsions from the cases of missing strings, expulsions were included in the definition of missing strings in this study and this could have led to the disparity in figures. Furthermore, almost all caesarean deliveries were done electively and not during advanced labour. Coiling of the CuT380A thread inside the uterine cavity may be due to closed or incompletely dilated internal cervical os and this may have contributed to the higher incidence of missing strings in trans-caesarean insertions. Those with their IUCDs still in-situ as demonstrated by a pelvic ultrasound were all reassured and were to be followed up regularly with ultrasound while those with expulsions were offered interval replacement of IUCD or alternative contraceptive options.

A total of 3 (5.6%) participants reported mild lower abdominal cramps at the six weeks visit. These cases were all seen in the vaginal delivery group 3(5.6%) but the difference between the two groups was not statistically significant, (p value= 0.55). Those who had cramps were treated with non-steroidal anti-inflammatory drug i.e. Tablet diclofenac. A study reported 2.7% and 2% in the vaginal and trans-caesarean insertions respectively [20] with no significant statistical difference.

Also, the total number of participants who reported abnormal vaginal discharge were 3(5.6%) and they were all in the vaginal delivery group. Pelvic examination confirmed the vaginal discharge and it was attributed to vaginal candidiasis, after ruling out a pelvic infection. This was also not statistically significant (p value 0.45). Those that had vaginal candidiasis were all treated with clotrimazole cream. Similar studies reported no statistical differences. [11,16,20]

Abnormal bleeding pattern was observed in 2(3.7%) women in the vaginal group and 1(3.7%) in the trans-caesarean group and this difference was not statistically significant (x2 = 0.00, p-value=1.00). Gupta et al [20] reported 3.3% and 5.3% in the vaginal and trans-caesarean group respectively with no statistical difference.

In this study, abnormal bleeding occurred within 6 weeks. It is unclear if IUCD insertion was responsible for this finding or due to other possible causes like secondary PPH from retained products. The two participants with this outcome in the vaginal group had manual vacuum aspiration with Karman syringe and one participant with abnormal bleeding in the trans-caesarean group also had the IUCD removed with the aid of alligator forceps.

The overall rate of removal is 9.9%. It is higher in the vaginal group (13%) compared to the trans-caesarean group (3.7%) but not statistically significant (p-0.31%). Of the seven women who had removal in the vaginal group, 3 had removal with retrieval hook at six weeks, due to spousal refusal and two women had removal with Alligator forceps due to missing string. The remaining two participants had removal with Karman syringe at 2 weeks due to abnormal bleeding per vagina. Farah et al reported an overall removal rate of 4% at six weeks [23].

Aswarthy et al reported no removal in the two groups at six weeks. [22] Babita et al [11] found that rate of removal at six weeks was higher in post-placental (15.2%) compared to caesarean group (10.8%).In this present study, the spouses were readily available during the counseling session for the trans-caesarean group and this may explain the low removal rate found for trans-caesarean insertions. It may also be that women in the caesarean group are highly motivated to continue their contraception having undergone

an operation that will necessitate a longer recovery period and adequate wound healing.

5. CONCLUSION

Immediate postpartum CuT380A contraception, irrespective of route of insertion, is convenient, effective, and safe. Although there is a relatively higher incidence of missing strings, including expulsions after vaginal PPIUCD insertions, post-partum contraception should be encouraged. This will help to reduce high unmet contraceptive needs in our environment and loss to follow up following facility childbirth. However, this is not a replacement to interval IUCD insertion.

7. RECOMMENDATIONS

1. Based on the findings of this study, both options of trans caesarean or transvaginal postpartum IUCD insertions should always be explored whenever possible. Immediate postpartum intrauterine device insertions could be incorporated in our existing maternal and child health care services.
2. Counseling is critical during the antenatal and postpartum period, in order to achieve a high acceptance rate especially in low resource settings.

Strength of the study: The findings from this study generated information and experience about CuT380A PPIUCD which will guide counseling of pregnant mothers on post-partum family planning.

Limitations of the study: This study did not assess efficacy of post-partum IUCD insertions in terms of pregnancy rate because of short term follow up. Also, the sampling technique may have introduced some bias in data interpretation thus, may not be a true reflection of the general population.

Line of future study: A large scale prospective study that will have a longer follow up period is necessary to confirm the findings of this hospital-based study.

CONSENT AND ETHICAL APPROVAL

Ethical approval: An ethical approval was obtained from the Health Research and Ethics Committee of the Federal Medical Centre Asaba. The participants were counseled and information given was geared towards improving maternal health. The data obtained from this study was handled with utmost confidentiality. Written consent was obtained after each participant voluntarily wished to participate in the study.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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