Ultrasound assessment of postplacental copper intrauterine device position 6 months after placement during cesarean delivery

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Abstract

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Objective: The objective was to describe the sonographic position of copper intrauterine devices (IUDs) 6 months after insertion during cesarean delivery.

Study design: This prospective, observational study followed participants who received a copper IUD during cesarean delivery. We performed pelvic examination at 6 weeks and 6 months and sonography at 6 months to determine IUD position. Patients had additional examinations as needed to address complications.

Results: Sixty-nine participants provided outcomes through 6 months: 41 (59%) had correctly positioned IUDs, 21 (30%) had malpositioned intrauterine IUDs, 5 experienced expulsion (3 partial, 2 complete), and 2 had elective removal; 52 (75%) had missing strings. Missing strings at 6 weeks predicted an incorrect IUD position in 22 of 52 participants (positive predictive value 42%), and visible or palpable strings predicted a correct IUD position in 7 of 12 participants (negative predictive value 58%).

Conclusion: Although 59% of copper IUDs placed during cesarean were correctly positioned at 6 months, nearly one third were malpositioned.

Implications: Ultrasound may be indicated for patients receiving a copper IUD during cesarean delivery as checking IUD strings alone does not assure correct placement. Providers offering postpartum IUDs should ensure that appropriate processes for the evaluation and management of devices with missing strings or abnormal position are available to all patients regardless of insurance status.

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1. Introduction

With postplacental intrauterine device (IUD) placement, IUD expulsion occurs more often for devices placed within 10 minutes of placental delivery compared to those inserted during postpartum follow-up, or at times unrelated to pregnancy [1]. IUD placement during cesarean delivery (versus vaginal) and use of copper IUDs (versus levonorgestrel) are associated with lower expulsion rates [1,2].

In a prior study, pelvic sonography 6 months postpartum after copper IUD placement during vaginal delivery demonstrated IUD malposition in 15% and partial expulsion in 16% of participants [2]. In this study, we sought to evaluate IUD positional outcomes 6 months after copper IUD placement during cesarean delivery.

2. Materials and methods

We recruited adult English speakers between January 2016 and February 2018 who were at least 18 years of age, had cesarean delivery of a liveborn at 34 weeks 0 days’ gestation or greater and received a postplacental (PP) TCu380A IUD through routine obstetric care at the Hospital of the University of Pennsylvania. All participants provided written or verbal informed consent. The University of Pennsylvania Institutional Review Board approved the study.

We obtained clinical data from the delivery, IUD insertion and postpartum visits through medical record review. Participants not completing a routine postpartum visit with their obstetrician provider scheduled a research visit at 6 weeks postpartum, and all had a scheduled research visit at 6 months.

At the 6-week and 6-month evaluations, we performed speculum and bimanual examination to evaluate the presence or absence of IUD strings, and sonography to ascertain device position. We offered participants with a recognized IUD problem same-day contraceptive counseling, IUD removal and initiation of a new contraceptive method, if desired, with standard clinical charges incurred to the participant and their insurer. We also offered referrals and sliding-scale gynecological fees as needed.

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Our primary outcome was the proportion of correctly positioned original PPIUDs at 6 months. Secondary outcomes were expulsion (complete or partial), malposition, perforation and elective removal of original PPIUDs.

We defined partial expulsion as the distal end of the IUD below the internal cervical os on sonography or an IUD protruding through the external os [3]. We considered malposition as an IUD greater than 1 cm below the fundus (low-lying) or in an abnormal intrauterine orientation (axial rotation, transverse rotation, inversion) on transvaginal ultrasonography that did not meet criteria for partial expulsion [2].

To determine our sample size, we estimated that 15% of IUDs would be expelled by 6 months postpartum [4–9]. We selected a sample size of 150 participants to provide a 5% confidence interval (CI) around this expected expulsion percentage. We planned to enroll 200 participants, anticipating 25% loss to follow-up by 6 months.

We performed bivariate analyses to compare characteristics among those with a correct IUD position at 6 months to those with all other known IUD position outcomes and assessed differences between participants who did and did not complete study follow-up. We used one-way analysis of variance or Kruskal–Wallis tests for continuous variables and Fisher’s exact test for categorical variables as appropriate.

We managed study data in Research Electronic Data Capture software [10,11] and used Stata 14.2 (StataCorp, College Station, TX, USA) for analysis. We conducted all study activities as registered on ClinicalTrials.gov (NCT02706340).

3. Results

We enrolled 111 participants and had known final IUD position outcomes for 69 participants (Fig. 1). We discontinued recruitment early due to slow enrollment. We observed no significant demographic and baseline medical differences between participants with a correctly positioned IUD at 6 months and those with other IUD outcomes (Table 1). We found no significant differences in baseline characteristics in those who did and did not complete the study (Online Appendix 1).

Forty-one of 69 participants with a known 6-month outcome (59% [95% CI, 47%–71%]) had a correctly positioned device, 21 (30% [95% CI 20%–43%]) had a malpositioned IUD (Table 2), and 52 (75% [95% CI 64%–85%]) had missing strings at 6 weeks postpartum. We observed 5 (7% [95% CI 2%–16%]) expulsions (two complete and three partial). Two participants chose to remove their IUD. No perforations occurred.

Fig. 1. Study flow: recruitment, enrollment and IUD status of individuals receiving TCu380A IUDs during cesarean delivery.
approximately one third of our participants did not complete follow-up, discontinued enrollment early due to slow recruitment and approximately one third had a malpositioned IUD. Our results regarding IUD expulsion are consistent with prior data [5–7] but add to the literature by describing multiple intrauterine but abnormal IUD positions. Almost one third of participants experienced expulsion or the positional abnormalities we observed. Although our small sample demonstrates a low likelihood of IUD expulsion when placed at cesarean delivery, missing strings and abnormal IUD positions are common, which may make removal difficult. Patients must be informed of these possibilities during antenatal counseling, and providers should ensure that outpatient evaluation and management of PPIUDs are available to all patients regardless of insurance status.

### 4. Discussion

In this prospective study of patients who received a copper T380A IUD at the time of cesarean delivery, 59% had a correctly positioned IUD at 6 months postpartum. Only 7% of participants experienced expulsion, but nearly one third had a malpositioned IUD. Our results regarding IUD expulsion are consistent with prior data [5–7] but add to the literature by describing multiple intrauterine but abnormal IUD positions. Almost one fifth of participants who completed this study continued using an abnormally oriented IUD due to lost insurance and inability to afford the cost of removal. Given the United States’ history of reproductive coercion against marginalized groups [12], facilitation of PPIUD insertion should be balanced with policies that expand access to all patients regardless of insurance status.

Missing strings at the 6-week postpartum visit predicted an incorrectly positioned IUD in 22 of 52 participants (positive predictive value 42%), and visible or palpable strings predicted a correctly positioned IUD in 22 of 52 participants (positive predictive value 42%). At the end of the study, 11 (16% [95% CI 8%–27%]) participants continued using a malpositioned or partially expelled PPIUD due to the loss of pregnancy-related health insurance and inability to pay for medical care. No pregnancies occurred.

### Table 1

Demographic and baseline characteristics of subjects with TCu380A IUDs placed during cesarean delivery, reported by IUD position at 6 months postpartum

| Demographic/Baseline Characteristics | Total (N = 109) | Correct IUD position (n = 41) | Other IUD position outcome (n = 28) | Outcome unknown (n = 40) | P value* |
|-------------------------------------|----------------|-----------------------------|----------------------------------|-------------------------|---------|
| Age (years)                         | 27.9 ± 4.8     | 28.4 ± 5.2                  | 28.5 ± 4.6                       | 27.0 ± 4.8              | .84     |
| Race/ethnicity                      |                |                             |                                  |                         |         |
| Black/African-American              | 80 (73.4)      | 27 (65.9)                   | 23 (82.1)                        | 30 (75.0)               | .28     |
| White                               | 11 (10.1)      | 4 (9.8)                     | 2 (7.1)                          | 5 (12.5)                | .46     |
| Other/Unknown                       | 18 (16.5)      | 10 (24.4)                   | 3 (10.7)                         | 5 (12.5)                | .79     |
| Annual household income             |                |                             |                                  |                         |         |
| <$10,000                            | 29 (26.6)      | 8 (19.5)                    | 7 (25.0)                         | 14 (35.0)               | .82     |
| $10,000–$30,000                     | 29 (26.6)      | 14 (34.2)                   | 8 (28.6)                         | 7 (17.5)                | .52     |
| >$30,001                            | 51 (46.8)      | 19 (46.3)                   | 13 (46.4)                        | 19 (47.5)               | .87     |
| Parity                              |                |                             |                                  |                         |         |
| 1                                   | 18 (16.5)      | 6 (14.6)                    | 5 (17.9)                         | 7 (17.5)                | .75     |
| ≥2                                  | 91 (83.5)      | 35 (85.4)                   | 23 (82.1)                        | 33 (82.5)               | .12     |
| Relationship status                 |                |                             |                                  |                         |         |
| Single                              | 41 (37.6)      | 14 (34.2)                   | 13 (46.4)                        | 14 (35.0)               | .52     |
| With partner                        | 34 (31.2)      | 13 (31.7)                   | 6 (21.4)                         | 15 (37.5)               | .28     |
| Married or divorced                 | 34 (31.2)      | 14 (34.2)                   | 9 (32.1)                         | 11 (27.5)               | .91     |
| BMI (kg/m²)                         |                |                             |                                  |                         |         |
| 18–24.9                             | 16 (14.7)      | 7 (18.0)                    | 4 (14.8)                         | 5 (12.5)                | .51     |
| ≥25                                 | 84 (77.1)      | 32 (82.1)                   | 23 (85.2)                        | 29 (72.5)               | .12     |
| Gestational age                     |                |                             |                                  |                         |         |
| Preterm (34 weeks 0 day–36 weeks 6 days) | 7 (6.4) | 4 (9.8)                    | 2 (7.1)                          | 1 (2.5)                 | .71     |
| Term (≥37 weeks 0 day)              | 102 (93.6)     | 37 (90.2)                   | 26 (92.9)                        | 39 (97.5)               | .61     |
| History of cesarean delivery        | 75 (68.8)      | 26 (63.4)                   | 20 (71.4)                        | 29 (72.5)               | .34     |

Data are mean ± standard deviation or n (%).

* Tests comparing distribution of characteristics for the groups “Correct IUD position” and “Other IUD position outcome.”

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### Declaration of competing interests

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

Dr. Gurney is a Nexplanon trainer for Merck. Dr. Schreiber is a consultant for Bayer Pharmaceuticals and Athenium Pharmaceuticals and receives research funding from Society of Family Planning, Bayer Pharmaceuticals, Sebela Pharmaceuticals, Medicines360 and the Eunice Kennedy Shriver National Institute of Child Health and Human Development. Dr. Sonalkar receives research funding from Teva Pharmaceuticals, Sebela Pharmaceuticals, Medicines360 and the Eunice Kennedy Shriver National Institute of Child Health and Human Development. Dr. McClusky has consulted for Bayer Pharmaceuticals and Athenium Pharmaceuticals and receives research funding from Teva Pharmaceuticals, Sebela Pharmaceuticals, Medicines360. Dr. Sonalkar has consulted for Teva Pharmaceuticals, Sebela Pharmaceuticals, Medicines360 and the Eunice Kennedy Shriver National Institute of Child Health and Human Development.
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