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Assessing the Morphology of Uterus After Using Intrauterine Contraceptive Device on Ultrasonography

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Abstract
Although ultrasonography technology can be used to clarify the morphology of the uterus and position of intrauterine contraceptive device (IUCD), the relationship between both with symptoms should be elucidated. This study evaluated the sonographic findings, endometrial thickness and clinical associations in IUCD users. Total of 263 women were studied in THQ hospital, Layyah as a cross-sectional study. Evaluation of participant characteristics, position of the device in the uterus/pelvis, uterine findings, pelvic findings and menstrual symptoms. Group comparisons, Spearman correlations and multivariable logistic regression were reported. Mean age was 29.60 ± 5.97 years, and 88.6% used copper T devices. The devices were typically in 204 women (77.6%) and malpositioned in 59 (22.4%), with 36 being displaced, 16 embedded, and seven being expelled. No perforations reported. 26.0% (25 out of 96 women) had niches in their caesarean scars. In women with heavy menstrual bleeding, the endometrial thickness was higher in the copper T IUCD group compared to the hormonal IUCD group (6.50 versus 5.01 mm; $p < 0.001$); and greater in the copper T group compared to the non-IUCD group (6.50 versus 4.93 mm; $p < 0.001$). A correlation was observed between thickness and bleeding after insertion ($\rho = 0.53$; $p < 0.001$). Prolonged pain following insertion (OR = 4.57) and lower abdominal pain (OR = 3.09), but not heavy bleeding, was associated with malposition. The exploratory adjusted association with malposition was identified in the abortion history but was poor. There was no significant relationship between device position within the uterus or for the duration of use with endometrial thickness in the set of reported group comparisons.

Keywords: Intrauterine contraceptive device; uterine morphology; ultrasonography; device malposition; endometrial thickness; heavy menstrual bleeding.

1. Introduction

Intrauterine Contraceptive Devices are long acting contraception, either Copper T or Levonorgestrel-releasing Intrauterine system. They have local contraceptive activities including increased inflammatory response in endometria at the site of copper, and suppression of the endometrium at the site of levonorgestrel, as well as other local progestogenic effects of levonorgestrel (Ortiz & Croxatto, 2007). It is important to know these reactions when assessing the morphology and use of the uterus.

However, the adoption of contraceptives is low in Pakistan. PK was among the countries with a relatively low prevalence of contraceptive use (34%) among currently married women, and just 17% among whom it remained, had an unmet need for family planning (National Institute of Population Studies [NIPS] & ICF, 2019). Anything that reduces contraceptive coverage further limits access to contraception.A decrease in contraceptive coverage occurs whenever more is being taken away. In Pakistan, during a mobile outreach programme, side effects were reported to be the cause of 69.4% of the discontinuation of IUCDs, 19.4% discontinued their IUCDs within 10 months, and 56.5% of the women who discontinued did not use any other method (Azmat et al., 2013). The results indicate the significance of complaint assessment for assessing complaints which could jeopardize ongoing use.

Ultrasonography is considered the best imaging technique for the evaluation of IUCD position in patients who have pelvic pain, some bleeding or no retrieval strings. It is correctly positioned if its arms point towards the fundus and it is in the endometrial cavity. Abnormal positions are displacement, embedment, partial expulsion and perforation. Conventional imaging may fail to recognize some of the abnormalities in the area, especially when the tibia assumes a side-arm position, and three-dimensional ultrasonography may help improve the recognition of such subtler abnormalities (Nowitzki et al., 2015).

The sonographic evaluation can also help identify the thickness of the endometrium and whether there are uterine abnormalities present. This should be noted that the symptoms from the devices should also be taken into account along with the findings in the endo-metrium, and not only features related to malposition. In a prospective study of women with copper IUCD (100), heavy menstrual bleeding (HMB) women had thicker baseline endometrial thickness when compared to those without HMB (Attia et al., 2021). Furthermore, malposition was observed in 16.6% (N = 763) of placements in the eight-week follow-up in the first three-dimensional ultrasonography evaluation, with morbid obesity, previous uterine window/rupture and Copper device use as associated factors identified by Connolly and Fox (2022). These observations suggest the importance of analysing all these together; participant, obstetric and device characteristics.

Sonographic findings of IUCD users can be defined for use in clinical services in southern Punjab to offer locally relevant evidence when assessing and counselling for clinical services. After the device is inserted, however, abnormalities can only be concluded as being related to the device with baseline imaging. The current study was therefore designed to evaluate the uterine morphology ultrasonographically in IUCD users, to measure the thickness of the endometrium and to find any abnormalities in the endometrial structure as well as to take an account of the position of IUCD in the uterine cavity and associated clinical conditions.

2. Research Methodology

This descriptive cross-sectional study included 263 women using intrauterine contraceptive devices (IUCDs) at Tehsil Headquarter Hospital, Layyah, over four months. Participants were recruited through nonprobability purposive sampling. Eligible women were aged [confirm 15–49 or 18–49 years], had used an IUCD for at least [confirm minimum duration], reported regular menstrual cycles before insertion, and provided written informed consent. Pregnant women and those with bleeding disorders or previously diagnosed gynecological conditions, including fibroids, endometriosis, or polycystic ovary syndrome, were excluded.

Sample size was calculated for estimating mean endometrial thickness using $n = Z^2\sigma^2/d^2$, with a 95% confidence level, an expected standard deviation of 1.00 mm from Attia et al. (2021), and absolute precision of 0.1278 mm. The minimum requirement of 236 participants was increased to 263 to accommodate 10% nonresponse or incomplete assessments. The standard deviation was an approximation derived from pre-insertion measurements in women who subsequently developed heavy bleeding.

Demographic characteristics, reproductive history, device type, duration of use, and menstrual symptoms before and after insertion were recorded using a structured proforma. Investigators assessed uterine morphology, endometrial thickness, IUCD position, and associated pelvic findings. Pre-insertion menstrual characteristics were obtained retrospectively rather than through baseline imaging.

Data were analysed using IBM SPSS Statistics version 26.0 and Microsoft Excel. Continuous variables were summarized as means and standard deviations or medians and interquartile ranges, and categorical variables as frequencies and percentages. Between-group comparisons used independent-samples t tests, analysis of variance, Mann–Whitney U tests, or Kruskal–Wallis tests, as appropriate. Categorical associations were assessed using chi-square or Fisher's exact tests. Retrospectively reported pre- and post-insertion outcomes were compared using McNemar's and Wilcoxon signed-rank tests. Spearman correlation assessed associations between endometrial thickness

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and bleeding duration. Binary logistic regression examined factors associated with malposition, entering previous caesarean delivery, abortion history, parity, obesity, age, device type, and duration of use simultaneously. Odds ratios and 95% confidence intervals were reported, with statistical significance set at $p < 0.05$.
Ethical approval was obtained from the TIMES University, Multan, Pakistan. Participation was voluntary, written informed consent was obtained, and confidentiality was maintained.

3. Results

Table 1 summarizes the characteristics of 263 married women. Mean age was 29.60 ± 5.97 years, mean body mass index was 25.16 ± 4.01 kg/m², and mean parity was 3.79 ± 2.05. Most participants lived in rural or semi-urban areas (89.0%). Previous caesarean delivery was reported by 96 women (36.5%), and 39 (14.8%) had a history of abortion. Copper T devices predominated (88.6%); 24 women (9.1%) used a hormonal IUCD and six (2.3%) used other devices. Almost half had used their device for more than one year (47.5%), whereas 25.9% and 26.6% reported use for less than six months and six months to one year, respectively.

Table 1. Participant and intrauterine contraceptive device characteristics

Characteristic	Mean ± SD or n (%)
Age (years)	29.60 ± 5.97
Body mass index (kg/m²)	25.16 ± 4.01
Gravidity	4.00 ± 2.04
Parity	3.79 ± 2.05
Residence — urban / rural or semi-urban	29 (11.0) / 234 (89.0)
History of abortion	39 (14.8)
Previous caesarean section	96 (36.5)
Last delivery — vaginal / caesarean	179 (68.1) / 84 (31.9)
Device — Copper T	233 (88.6)
Device — Hormonal IUCD (LNG-IUS)	24 (9.1)
Device — Other	6 (2.3)
Use duration — Less than 6 months	68 (25.9)
Use duration — 6 months to 1 year	70 (26.6)
Use duration — More than 1 year	125 (47.5)

Note. N = 263. Values are mean ± SD or n (%). All participants were married. Rural and semi-urban residence are combined. IUCD = intrauterine contraceptive device; LNG-IUS = levonorgestrel-releasing intrauterine system; SD = standard deviation.

As shown in Table 2, 204 devices (77.6%) occupied a normal fundal position and 59 (22.4%) were classified as malpositioned. Displacement accounted for 36 cases (13.7% overall), most commonly a low-lying position (25 cases; 69.4% of displaced devices). Six devices were rotated and five were in the cervical canal. Embedment was identified in 16 women (6.1%), and seven devices (2.7%) were recorded as expelled. No perforated or extrauterine device was recorded. Mean endometrial thickness was 5.46 ± 0.92 mm. A uterine abnormality was recorded in 52 women (19.8%), and any abnormal sonographic finding in 113 (43.0%). A caesarean scar niche was present in 25 women, equivalent to 9.5% overall and 26.0% of those with previous caesarean delivery. Other individual findings were less frequent.

Table 2. Sonographic device position and uterine and pelvic findings

Sonographic finding	n (%) unless stated
Normal (fundal) position	204 (77.6)
Displaced	36 (13.7)
Low-lying in lower uterine segment	25 (9.5)
Rotated	6 (2.3)
In cervical canal (partial expulsion)	5 (1.9)
Embedded (arm in myometrium)	16 (6.1)
Recorded as expelled (no IUCD seen in cavity)	7 (2.7)
Perforated / extrauterine	0 (0.0)
Total malposition	59 (22.4)
Endometrial thickness, mean ± SD (mm)	5.46 ± 0.92
Endometrial thickness, median (IQR), mm	5.2 (4.9–5.8)

Any uterine abnormality	52 (19.8)
Caesarean scar niche	25 (9.5)
IUCD arm embedded in myometrium	16 (6.1)
Small intramural fibroid	8 (3.0)
Adenomyosis features (MUSA)	5 (1.9)
Thickened heterogeneous endometrium	9 (3.4)
Free fluid in pouch of Douglas	17 (6.5)
Simple functional ovarian cyst	14 (5.3)
Any abnormal sonographic finding	113 (43.0)

Note. N = 263. Values are n (%) unless specified. Indented entries are subcategories of displacement and must not be added again. Uterine and pelvic findings may overlap; embedment appears in both the position and uterine-finding lists. The uterine-abnormality composite requires confirmation. Absence from the cavity alone does not independently confirm expulsion. IQR = interquartile range; MUSA = Morphological Uterus Sonographic Assessment.

Figure 1A illustrates the predominance of normal fundal positioning and identifies displacement as the largest abnormal-position category. Figure 1B shows that caesarean scar niche was the most frequent selected uterine or pelvic finding, followed by free pelvic fluid and myometrial embedment. The two panels describe different classifications: individual findings in Figure 1B may coexist and therefore do not form mutually exclusive groups.

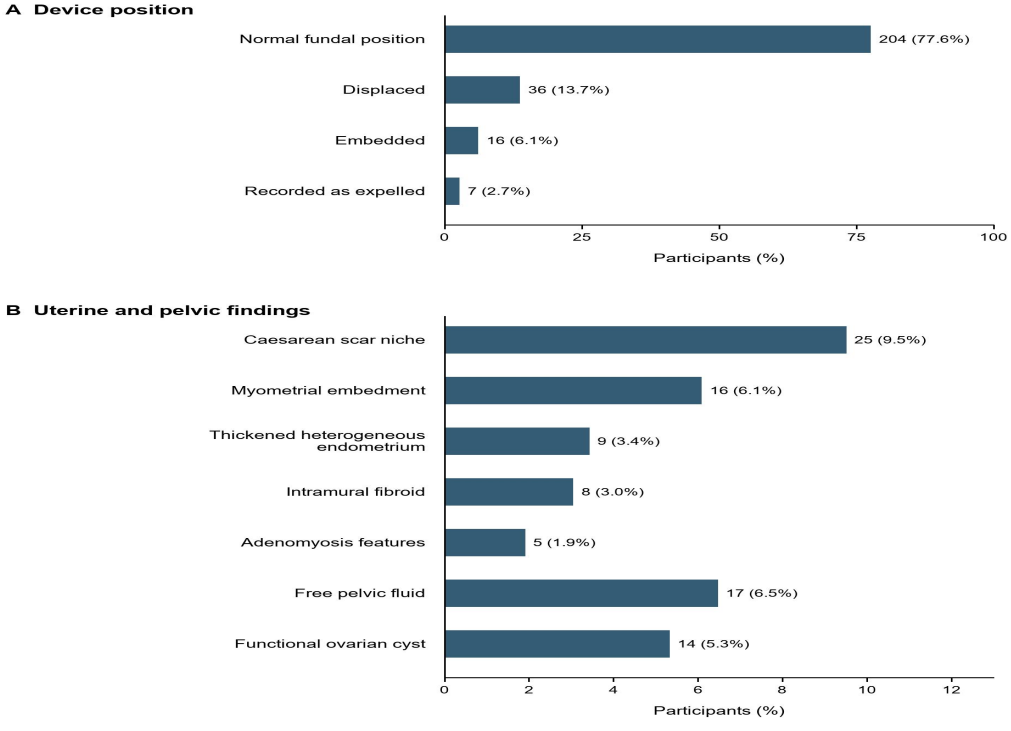


Figure 1. Distribution of device position and selected uterine and pelvic findings.

Note. (A) Device position. (B) Selected uterine and pelvic findings. Labels show n (% of 263 participants). Findings in panel B may overlap. Scar niche prevalence among women with previous caesarean delivery was 25/96 (26.0%).

Table 3 shows greater endometrial thickness among copper T users than hormonal IUCD users (5.52 ± 0.95 vs. 4.98 ± 0.37 mm; p = .008). Women with heavy menstrual bleeding had a thicker endometrium than those without heavy bleeding (6.50 ± 0.95 vs. 5.01 ± 0.39 mm; p < 0.001). Thickness did not differ significantly across duration-of-use categories (p = .217) or device-position categories (p = .196). Although the recorded-expulsion group had the highest mean thickness, it comprised only seven women and the overall comparison was not significant; no pairwise difference can be inferred.

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Table 3. Endometrial thickness according to device type duration of use bleeding and position

Comparison	Category	n	Mean ± SD (mm)	Median (IQR) (mm)	p
Device type	Copper T	233	5.52 ± 0.95	5.2 (4.9–6.0)	0.008[1]
	Hormonal IUCD	24	4.98 ± 0.37	5.0 (4.8–5.2)	
	Other	6	5.17 ± 0.55	5.2 (4.8–5.4)	
Duration of use	Less than 6 months	68	5.56 ± 0.99	5.2 (4.8–6.1)	0.217[2]
	6 months to 1 year	70	5.34 ± 0.94	5.2 (4.8–5.5)	
	More than 1 year	125	5.47 ± 0.87	5.2 (5.0–5.8)	
Heavy menstrual bleeding	Yes	79	6.50 ± 0.95	6.6 (5.9–7.1)	< 0.001[1]
	No	184	5.01 ± 0.39	5.0 (4.8–5.3)	
Device position	Normal	204	5.45 ± 0.91	5.2 (4.9–5.8)	0.196[2]
	Displaced	36	5.50 ± 0.75	5.3 (5.0–5.7)	
	Embedded	16	5.22 ± 0.94	4.8 (4.7–6.0)	
	Expelled	7	6.13 ± 1.64	5.5 (4.9–6.8)	

Note. [1] Mann–Whitney U test; [2] Kruskal–Wallis test. The device-type p value compares copper T with hormonal IUCD users, excluding the six other-device users. Each p value applies to its full comparison; blank cells do not represent separate tests. IQR = interquartile range; SD = standard deviation.

Endometrial thickness correlated positively with bleeding days after insertion (Spearman $\rho = 0.53$, $p < 0.001$), but not with reported bleeding days before insertion ($\rho = 0.03$, $p = 0.646$). Supporting menstrual data supplied with Table 3 showed a longer reported bleeding duration after insertion (5.93 ± 2.31 vs. 4.98 ± 1.15 days; Wilcoxon $z = -6.62$, $p < 0.001$). Heavy menstrual bleeding was reported by 79 women (30.0%) after insertion, compared with 20 (7.6%) before insertion (reported paired $p < 0.001$). These retrospective comparisons describe reported differences and do not establish causation.

In Table 4A, pain after insertion was more frequent with malpositioned than normally positioned devices (66.1% vs. 29.9%; OR = 4.57, 95% CI [2.47, 8.47]). Lower abdominal pain was also more frequent (40.7% vs. 18.1%; OR = 3.09, 95% CI [1.65, 5.81]); both associations had $p < 0.001$. No statistically significant association was identified for menstrual change, heavy menstrual bleeding, vaginal discharge, or fever. Heavy menstrual bleeding occurred in approximately 30% of both position groups.

In Table 4B, history of abortion was the only individual predictor with a reported adjusted association meeting $p < 0.05$ (adjusted OR = 2.30, 95% CI [1.08, 4.87], $p = 0.030$). Previous caesarean delivery, parity ≥ 5, obesity, age, hormonal device use, and use exceeding one year did not meet this threshold. However, the overall model was not statistically significant, $\chi^2(7) = 5.32$, $p = 0.621$, and Nagelkerke R^2 was 0.031. The Hosmer–Lemeshow result ($p = 0.017$) also raised a calibration concern.

Table 4. Clinical associations and exploratory adjusted factors for IUCD malposition

Panel A. Symptoms according to device position

Symptom	Malposition (n = 59)	Normal (n = 204)	Crude OR (95% CI)	p
Menstrual change after insertion	39 (66.1)	125 (61.3)	1.23 [0.67, 2.26]	0.500
Heavy menstrual bleeding	18 (30.5)	61 (29.9)	1.03 [0.55, 1.93]	0.929
Pain after insertion	39 (66.1)	61 (29.9)	4.57 [2.47, 8.47]	< 0.001
Lower abdominal pain	24 (40.7)	37 (18.1)	3.09 [1.65, 5.81]	< 0.001
Vaginal discharge	12 (20.3)	50 (24.5)	0.79 [0.39, 1.60]	0.506
Fever	1 (1.7)	10 (4.9)	0.33 [0.04, 2.67]	0.465

Note. Values are n (%). ORs compare symptom odds in women with malpositioned versus normally positioned devices. Reported tests were Pearson chi-square, except Fisher's exact test for fever. OR = odds ratio; CI = confidence interval.

Panel B. Multivariable logistic regression with malposition as the outcome

Predictor and contrast	Adjusted OR (95% CI)	p
Previous caesarean section (yes vs no)	1.27 [0.68, 2.35]	.451
History of abortion (yes vs no)	2.30 [1.08, 4.87]	.030
Parity ≥ 5 (vs < 5)	0.84 [0.41, 1.72]	.634
BMI ≥ 30 kg/m² (vs < 30)	1.12 [0.47, 2.65]	.801
Age (per year)	1.00 [0.95, 1.06]	.922
Hormonal IUCD (vs copper T)	1.05 [0.38, 2.86]	.929
Duration > 1 year (vs ≤ 1 year)	1.10 [0.61, 2.00]	.745

Note. All seven predictors were reportedly entered simultaneously. Model $\chi^2(7) = 5.32$, $p = .621$; Nagelkerke $R^2 = .031$; Hosmer–Lemeshow $p = .017$. Estimates are source-reported and were not reproduced from participant-level data. The analysed sample size and coding of the six other-device users require verification. BMI = body mass index; OR = odds ratio; CI = confidence interval.

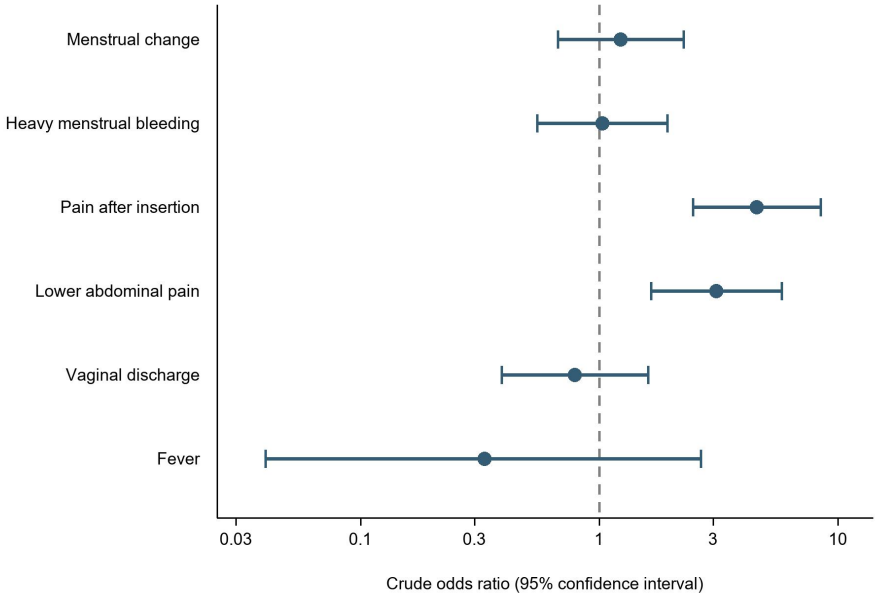


Figure 2. Crude associations between IUCD malposition and symptoms.

Note. Crude odds ratios and 95% confidence intervals from Table 4A. The dashed line indicates OR = 1; the horizontal axis is logarithmic. Figure 2 highlights the pain associations, whose intervals exclude 1. Intervals for the other symptoms cross 1; the wide fever interval indicates substantial imprecision.

4. Discussion

This study aimed to report the local uterine morphology and position of the Copper T in the predominantly rural or semi urban population of Layyah where almost 90% of the population had the Copper T (Table 1). The only problem recorded was malposition, occurring in about one in five women; and there were differences between the uterine thickness measured with the different devices and by women with heavy bleeding (Tables 2 and 3). Among mothers who changed menstruation, there was a clear association with malposition and pain (Table 4A and Figure 2). These results indicate that the location and type of the device and the endometrial properties could serve as different parts of the whole clinical symptom but was not tested if this was true in a symptom model together.

The mean parity of the study population was 3.79, and a high proportion had previous caesarean delivery. The findings might not be directly transferable to populations with varying reproductive experiences or contraceptive

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methods because of these characteristics and the small hormonal-device group. The hospital-based sample also represents women who could be assessed at one time and does not reflect the incidence of complications amongst all women receiving an IUCD.

The malposition tendency of 22.4% reported in this study is higher than the 16.6% reported by Connolly and Fox (2022) who regularly underwent 3D ultrasonography within 8 weeks of placement. The contrast may be due to differences in scanning indications, time since insertion, device composition as well as case definitions. The present cross-sectional estimate is not intended to imply that position in the baseline is less accurate, or that migration to a greater degree was more common, as position and migration are not reported.

Malposition was noted in 18.9% (296) of the users of the devices identified in this study, with the lower uterine segment and cervix being the most frequent abnormal positions, as reported by Doulaveris et al. 2024. This is consistent with the large number of low-level devices found in the displaced devices sample in this study (Table 2 and Figure 1A). Their estimate of malposition for previous caesarean delivery and large scar defects differs significantly from the nonsignificant estimate for caesarean-history found here. Niche size was not graded for the present study, and the weak multivariable model precludes any definite conclusion in this regard to the influence of caesarean history.

Of the participants, 6.1% exported embedment. In contrast, van der Heijden et al. (2024) found that 24.4% of hormone-device users had the sign of side-arm embedment by performing a three-dimensional transvaginal ultrasonography. Lower here does not imply a lower underlying frequency of detection as this is dependent on the imaging technique, the type of device and when the assessment is made. Importantly, they did not find any association between embedment and any negative bleeding or pelvic pain. The current analysis accounts for displacement, embedment and recorded expulsion, meaning that the pain association does not have to counter their embedment-specific result.

There was no perforation recorded, similar to other larger studies with no significant perforation. There was an incidence rate of 0.21% of IUD perforation in the APEX-IUD population over one year, reported by Fassett et al. (2023). It is not possible to conclude that there was no absorption record on 263 women and that is an equivalent to a zero incidence for the cumulative incidence calculated in a longitudinal study. In other words, the present cross section observation is not directly comparable with the cumulative incidence calculated using a longitudinal study. Plus, the seven devices that were reported as being ejected had no visualization report in the cavity. If no evidence of rupture or exclusion is present for an extrauterine site, this is considered provisional.

A difference in thickness between the local tissue effect is the copper T user versus the hormonal device user (Table 3) is in line with previous reported differences. The use of levonorgestrel causes dominant local glandular atrophy and stromal decidualization (Ortiz and Croxatto, 2007) and copper makes the inflammatory response greater. In this sample, the mechanisms are used as a biological context but not a shown explanation due to the lack of histology and inflammatory markers. The thickness difference observed might also be subject to the specific device used, the phase of the menstrual cycle, and/or the underlying indication for bleeding.

Heavy bleeding had a higher thickness difference than did the device position: Mean thickness was 6.50 mm associated with heavy bleeding and 5.01 mm associated with no heavy bleeding. In a prospective copper-device study, Attia et al. (2021) found that variation of Doppler indices of UAs occurred between placentas that had heavy bleeding and those without. They do help in discussing the physiology of bleeding which does not, however, confirm endometrial thickness as a prediction test in the current patient population. Reported post-insertion bleeding days correlate with concurrent thickness, so there is no indication as to whether symptoms preceded thickness.

In Sweed et al. (2020), women with heavy bleeding after women who developed heavy bleeding after copper device insertion had higher gains in descriptors of endometrial vascularity. This provides a potential vascularity explanation to the current thickness–bleeding relationship. But there is a difference between thickness and vascularity: Doppler based result is not provided in present article. Therefore, it is not possible to claim a thickening, vascular uterus as an established mechanism here. Similarly, if a thickness variation is not detected between any of the groups of durations, the absence does not indicate that an individual woman's endometrium is not changing over the course of the duration.

Lower abdominal and pain after insertion were significantly more common among women with malpositioned devices (Table 4A). More recently, Benacerraf et al. (2009) reported greater pain in women with abnormally located devices and demonstrated a useful presentation of the reconstructed coronal view for the detection of embedded arms. Both local irritation and mechanical interaction with myometrium are plausible explanations which were not measured in this study. Additionally, pain might affect referrals for imaging, and the observed association would be subject to potential effects from the hospital sampling process.

In comparison, malposition group and normal position group had almost the same frequency of heavy bleeding, and

the crude odds ratio was close to 1 (Figure 2). This pattern dispute is the result of the use of excessive bleeding as a surrogate for malposition in this sample. It does not prove that this does not result in bleeding at some point: The position was not shown to have no role in bleeding, position subtypes were combined, and position-type for device was not resolved in comparing the symptoms. The difference between the nonsignificant association and proof of an absence of relationship is especially relevant for fever; only a few events had a wide confidence interval.

It was found that 26.0% of participants who had had a caesarean delivery had scar niche, showing the importance of documenting the scar during morphological evaluation. Their occurrence should not be characterized as a symptomatic disorder of scars, or to IUCD use. The characteristics of fibroids and adenomyosis were few (Table 2). Harmsen et al. (2022) make a distinction between direct and indirect MUSA characteristics and highlight the importance of standardized description. Thus, the five cases should be referred to as sonographic characteristics of adenomyosis and not as confirmed cases of adenomyosis.

A reported adjusted odds ratio of 2.30 was found for abortion history in relation to malposition (Table 4B). In miscarriages, Hooker et al., 2014 observed intrauterine adhesions and noted that repeated dilatation and curettage (D&C) is an important associated factor. Although it is a plausible hypothesis to offer, abortion history will not confirm instrumentation or adhesions. Information on management of previous abortions or cavity adhesions was not provided with the results. No mechanistically or predictively meaningful interpretation may be drawn from this association, due to the poor overall model, the calibration concern, and the ambiguous other-device coding.

However, cross-sectional data will not enable the conclusion that observed morphological changes were due to the use of IUCD or that the presence of pain was preceded by malposition or that endometrial thickness predicted bleeding. The information from conventional retrospective reports is susceptible to recall error and is not the same as prospectively recorded baseline information. The timing in the menstrual cycle, the timing for insertion, technique by the operator and device indications need clarification. Precision is limited by the small hormonal group and other groups, the rare outcomes, and multiple exploratory comparisons; caution is needed when interpreting these results.

The analysis was conducted at the aggregated level and the tests reported as well as the adjusted estimates could not be reproduced separately. In both compositions - uterine-abnormality and any-abnormal-finding - the definitions need to be confirmed, as "any" cannot be added to a "uterine" category. Furthermore, an inconsistent relationship exists between fever and endometrial findings, limiting interpretation of the infection. Pelvic fluid and/or abnormal endometrial appearance does not constitute infection. These results suggest that the position of the device and the uterine morphology are factors that should be taken into account when assessing symptoms but do not provide an indication of follow up schedule and/or threshold for intervention. Relationships in time and clinical relevance would be better defined with prospective assessment using baseline imaging, a uniform menstrual-cycle timing (in terms of days), clear definitions of the concepts of displacement and expulsion, and a specification of adjusted analyses. The present study offers descriptive and hypothesis-generating evidence for such purpose but not a validated prediction model.

5. Conclusion

In this study, it was found that the different relationships between the various sonographic uterine findings, the characteristics of the device and the symptoms were evident with 263 women using IUCDs. Most devices were in a normal position in the fundus; however, a malposition was recorded in 22.4 % of women. The most common positional abnormal position was displacement, usually of the lower segment of the uterus. Myometrial embedment was found in less cases (seven devices were documented as being expelled, and no perforation was documented). The recorded expulsion category counted any devices that were not reported in the uterine cavity, not when they were independently seen outside of the cavity. The thickness of the endometrium was influenced by the device type as well as a bleeding status. The thickness of the endometrium was greater in women using a copper device than in those using a hormonal device, and those who reported heavy bleeding had significantly greater thickness than women who did not report heavy bleeding. There were similar findings between the bleeding duration after insertion and thickness. But no significant differences in thickness were found between the different duration-of-use or device-position groups.

A higher risk of pain after insertion, and a lower likelihood of abdominal pain was linked to malposition. Menstrual change, heavy bleeding, vaginal discharge and fever did not demonstrate a significant association with malposition. These results can differentiate the symptom profile of altered device positioning from the differences that occur between the endometrium and heavy bleeding. Likely the most common uterine abnormal findings were Caesarean scar niches discovered in about one quarter of women having previously been given a Caesarean delivery. Fibroids and

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adenomyosis were rare. History of abortion revealed a suggestive (but not robust) exploratory association with malposition; however, it was associated with poor overall poorly calibrated regression performance. The findings are for concurrent patterns of morphology and clinical presentation, but do not indicate that IUCD-treatment caused the clinical presentation or resulted in uterine abnormalities.

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