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Original Research Article

The role of uterine artery colour doppler in intrauterine contraceptive device IUCD – Related Abnormal Uterine Bleeding

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ABSTRACT

This study was conducted to assess the role of Uterine Artery Colour Doppler velocimetry in prediction of intrauterine contraceptive device (IUCD) - Related Abnormal Uterine Bleeding. From this study, we concluded that the initial pre-IUCD insertion measurement of uterine artery Doppler PI and RI indices can be used as an useful predictor in Cu-T associated AUB, thus help in reducing the number of IUCD removal and non-compliance by the patient within the first year of insertion.

1. Introduction

Intrauterine contraceptive devices (IUCDs) are one of the most commonly used contraceptive devices worldwide. Though quite an effective contraceptive method, it has some side effects, most common being Abnormal Uterine Bleeding, dysmenorrhea and pelvic pain.[1–3]

The Abnormal Uterine Bleeding (AUB), mostly heavy menstrual bleeding (HMB) – in women with IUCD is mainly because of cyclooxygenase isoenzyme 2 (COX-2) up-expression which in turn increases production of prostacyclin (PGI2) and PGE1, thereby increasing the endometrial vascularity, vascular permeability and platelet function inhibition.[1–3] IUCDs also increase fibrinolysis by injuring the capillary plexuses of the endometrium.[1,4,5] It is seen that cu-containing IUCD users have almost 30-50% more blood loss than average. It is not surprising that 10-20% of cu-IUCD users want to get the device removed during the first year of insertion itself.[1,5,6] Increased development of micro-vascularization of sub-endometrium has been observed in women complaining of IUCD-induced HMB.[1,6,7]

Based on other such studies and observations published in the scientific research papers, PI and RI of uterine artery were investigated for the detection of vascular changes of the uterus in women with an IUCD in situ.

The study was conducted with the aim to assess the role of colour Doppler velocimetry of the uterine artery as a potential prediction of IUCD- related AUB.

2. Materials and Methods

Study type: Hospital-based, multi-centric ,prospective, observational study.

Place of study: OBG dept, SGT Medical College, Gurugram, Haryana, North India & MMIMSR, Ambala, Haryana

Study duration: 2 years

Sample size: 100

100 women attending Gynaecology-OPD (Family Planning Clinic) of two medical colleges of Haryana state

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(Gurugram & Ambala districts) of north India, who had Cu-T (IUCD) inserted within last 4 months were included in this study.

They were divided into 2 groups.

1. Group 'A' (50 patients) – with Abnormal Uterine Bleeding
2. Group 'B' (50 patients) – without AUB

2.1. Inclusion criteria

The following were included in the study population

1. Women 20-40 years in age regular menstrual cycles.
2. No h/o any medical disease or coagulation disorder.
3. No h/o any hormonal treatment for at least 3 months prior to Cu-T insertion.
4. No h/o intake of any NSAIDs drugs at least 24 hours prior to examination.

2.2. Methodology of data collection

After proper written informed consent, all the participants were subjected to a detailed and thorough history taking, including obstetric history, menstrual history, h/o use of other contraceptive devices before Cu-T, personal, past medical + surgical history, family history, socio-demographic parameters.

Then they were thoroughly examined –

1. General physical examination.
2. Systemic examination – CNS, CVS, Respiratory system.
3. Gynecological examination.

P/A: any distention, lump, tenderness etc.

P/S: To visualize the IUCD – thread and

To exclude any other local causes of bleeding

e.g., polyp, ulcer, varicose vein, growth etc.

P/V (bimanual exam) – uterine size, position

Any other uterine/adnexal causes of HMB

Thereafter, transvaginal ultrasonography (TVS) with pulsed Doppler was performed on Day 5 of menstrual cycle (after patient had evacuated the bladder).

All the doppler parameters were measured between 9 AM to 11 AM so as to eliminate diurnal variation in results. TVS was done using a 7.5 MHz probe on Hitachi USG machine by the same experienced radiologist to overcome inter-observer and instrumental error.

2.3. Data analysis

All the data thus collected were tabulated, sorted and statistically analyzed by using the STATA software (release 12.1, Stata corp.). Receiver operating characteristics (ROC) curve analysis was utilized to assess the predictive value of PI and RI of the uterine artery at the highest levels of sensitivity and specificity.

3. Results & Observations

In our study on 100 women, 50 (50.00 %) did not have any Abnormal Uterine Bleeding and the other half (n=50) had AUB after insertion of Cu-T as IUCD for contraception.

Table 1: General characteristics

Characteristics	Variables
Mean Age (years)	28.01+/- 2.83
Parity	
-P1	25
-P2	33
≥ P3	42

Table 2: Baseline characteristics of the patients

Variable	Group 'A' (Control group)(n=50)	Group 'B' (Study group)(n=50)
Average age (years)	28 (18-36)	28 (20-35)
Parity		
P1	17	19
P2	16	18
≥P3	27	23
Educational Qualifications		
-Illiterate	28	31
-Primary school	08	06
-Secondary school	10	08
-Graduate	02	01
-Post-graduate	02	04
Area of residence		
-Rural	29	39
-Urban	21	11
Religion		
-Hinduism	44	35
-Islam	02	10
-Sikhism	13	15
-Christianity	01	00

Table 3: Uterine artery doppler findings

Variable	Group 'A' (Control group)(n=50)	Group 'B' (Study group)(n=50)
Average PI	2.19(1.73-2.64)	2.03(1.74-2.81)
Average RI	0.89(0.69-1.06)	0.82(0.70-1.02)

Lower Uterine Artery PI and RI was significantly associated with AUB as depicted in Table 2. The area under curve (AUC) of the PI & RI for prediction of heavy menstrual bleeding (HMB) was 0.666 (95% CI: 0.569 – 0.763) ('p' value = 0.002, significant) and 0.703 (95% CI: 0.609 – 0.797) ('p' value <0.001) (significant) respectively. The optimal cut-off value for PI of the Uterine Artery was set at <2.09 with sensitivity of 58.30 % and specificity of 61.67 %. Similarly, the cut-off value for RL of the uterine

artery was set at <0.83 with a sensitivity of 53.33 % and specificity of 66.67 %. These cut-off levels were seen to be associated with Abnormal Uterine Bleeding (AUB) with heavy menstrual bleeding (HMB).

4. Discussion

Intrauterine contraceptive device (IUCD) especially Cu-containing ones is one of the most commonly used contraceptive device worldwide, although its wide use is marred by some side effects – Abnormal Uterine Bleeding in the form of heavy menstrual bleeding (HMB), being the foremost complaint. This AUB can be quite distressing to the user, causing Iron Deficiency Anemia, so much so that up to a fourth of patients end up getting the device removed in the 1^{st} year after its insertion.[1,6,7]

Therefore, measurement of the predictive factors can help us in identifying these patients who are high-risk for having significant IUCD – related AUB. This, in turn, will reduce the over-all post-IUCD complication numbers and thus improve patient compliance, acceptance and trust of the women opting for this method of contraception.

Our study was conducted with the aim to assess the uterine artery Doppler indices in relation to AUB as a predictor of the risk of heavy bleeding – before insertion of Cu-T. In our study, we observed that lower PI and RI were significant in predicting future IUCD-related AUB. We also calculated cut-off for the uterine artery PI and RI (PI < 2.09 and RI <0.83) which were associated with AUB.

There have been quite a few studies in different parts of the world on the role of uterine artery Doppler indices in prediction of IUCD related HMB.[1,7–9] Attia et al had published a study on 100 women by measuring Uterine artery doppler PI and RI before IUCD insertion and these patients were followed up for 6 months. Lower PI and RI Doppler indices were found to be significantly associated with prospective HMB. Based on the ROC curves, they suggested cut-offs for uterine Artery PI <= 2.02 (sensitivity 95.8%, specificity of 100% and AUC of 0.97 at 'p' <0.001) and RI <= 0.83 (sensitivity 93.8%, specificity 100% and AUC 0.949 at 'p' <0.001).

However not all studies have reported significant association.[1,6–10] Mutlu et al found no major change in uterine artery blood flow PI and RI in patients having HMB, dysmenorrhea and dyspareunia after IUCD (Cu-T) insertion.[1,10] However, all such studies were single – centre with small sample size, therefore, it requires multi-centric studies with larger sample sizes to have any significant input in the knowledge and research in this area.

5. Conclusion

From our study we conclude that the initial pre-IUCD insertion measurements of uterine artery Doppler PI and RI indices can be a useful tool in predicting Cu-T related AUB which remains the major cause of removal of the same within the first year of use. This can be further used for counselling the patients to consider alternative method of contraception so as to achieve the best patient satisfaction.

6. Abbreviation

IUCD: Intrauterine contraceptive device, HMB: Heavy menstrual Bleeding, AUB: Abnormal Uterine Bleeding, PI: Pulsatility Index, RI: Resistance Index, USG: Ultrasonography.

7. Conflict of Interest

None.

8. Source of Funding

None.

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