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Original article

Transvaginal ultrasonography and color Doppler in female patients complaining of menorrhagia and using copper intrauterine contraceptive device

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Abstract

The goal of this study is to evaluate the correlation between abnormal uterine bleeding in IUD users and the position of IUD, uterine size, endometrial thickness, uterine artery Doppler [pulsitility index (PI); Resistivity index (RI)] using transvaginal ultrasound and Doppler.

100 women divided into two groups (50) women who have been using an IUD for at least 6 months, and experienced symptoms after placement of IUD in the form of menorrhagia may be in the form of increase in the amount and/or duration of the menstruation and (50): women who have been using an IUD for at least 6 months, and did not experience menorrhagia after insertion of IUD.

There is a possible relationship between the IUD location inside the uterine cavity and the abnormal uterine bleeding among IUD users. The higher the position of the IUD, the less the frequency of abnormal uterine bleeding associating the IUD, the IUD-F, IUD-M, IUD-E and IUD-IO distances may be utilized as good predictors for the IUD location inside the uterus. The PI and RI were significantly lower in women with IUD-induced menorrhagia than in those using IUD without complaining of menorrhagia.

1. Introduction:

The intrauterine device (IUD) is a widely used contraceptive tool of family planning around the world (1). The intrauterine device (IUD) is a long-acting, safe, and effective contraception method. Many different types of IUDs have been created since the 1900s (2).

Intrauterine devices (IUDs) with copper, which were originally marked in the early 1970s, are an essential contraceptive choice for 150 million women around the world (3).

The TCUZ80AIUD (copper T 380 An intrauterine device) is a widely used, safe, and effective contraception. After inserting the device, the user has up to 12 years of effective protection against unplanned pregnancies. The process is reversible as far as removal is concerned (4).

If pregnancy is suspected, any abnormal unexplained vaginal bleeding, acute vaginal, cervical, or upper genital tract infection is all contraindications to using an IUD (5).

The Tcu 380A is a non hormonal contraceptive device that works by releasing copper ions, which are spermicidal on their own. Furthermore, the device induces inflammation, resulting in a hostile uterine environment (6).

Abnormal uterine bleeding, pelvic discomfort, and dysmenorrhea are the most prevalent adverse effects associated with IUD usage. As a result, a high percentage of women are affected by premature stopping. Every year, an estimated 40 million women get an IUD, but between 5% and 15% of them stop using it after a year due to bleeding or discomfort (7).

In outpatient clinics, abnormal uterine bleeding is a frequent gynecological presentation, although it is often complicated and difficult to diagnose (8).

Because of its effect on different aspects of endometrial hemostasis, the IUD increases menstrual bleeding. Prostaglandins may be increased by using an IUD (PGI2 "Prostacyclin", PGE1). These prostaglandins promote vascularity, permeability, and platelet activity while inhibiting platelet activity. Menorrhagia is caused by an IUD that causes poor contractility of spiral arterioles in the spongey layer of the endometrium. In addition, fibrinolysis is increased with IUD as a result of capillary plexus injury, resulting in increased and longer menstrual bleeding (9).

According to studies, IUCD increases COX-2 expression, which leads to increased prostanoid production and singling, which may either boost the expression of pro-angiogenic factors like VEGF, PFGF, PDGF, Ang-1, and Ang-2 or inhibit the expression of anti-angiogenic genes like cathepsin-D. (10).

Abnormal uterine bleeding due to IUD is considered iatrogenic dysfunction uterine bleeding. Transvaginal ultrasonography has recently been shown to provide clear views of the uterus, including its size, location, myometrium, and endometrium. The location

of the IUD within the uterine cavity has been linked to the likelihood of bleeding (11).

Transvaginal pulsed Doppler ultrasound allows non invasive evaluation of uterine circulation (12).

Reduced vascular resistance in the uterine artery with accompanying increased blood flow to the uterus might produce alterations in the pulsatility index and resistance index in IUD users. Transvaginal color can be used to identify these changes Doppler (13).

Aim of this work is To evaluate the correlation between abnormal uterine bleeding in IUD users and IUD intrauterine orientation and uterine artery Doppler [pulsitility index (PI) ،Resistant index (RI)] using transvaginal ultrasound and Doppler.

2. Patients and Methods:

This is a cross section study.Done to women presenting to outpatient gynecology clinic at Fayoum General Hospital starting from July 2019 to July 2021.

100 women were enrolled in the study, who have been using IUD for at least 6 months.

Included women have been divided into two groups according of presence or absence of menorrhagia (increased duration and/or amount of menstrual bleeding) as a complaint.

Group I: 50 women using IUCD and complainting of menorrhagia, as bleeding group

Group II: 50 women using IUCD and not complainting of menorrhagia, as a control group.

2.1 Inclusion criteria:

1. Age: 20-45 years old.
2. IUD inserted at least for 6 months.
3. The study includes only the Copper T380A IUD.
4. Hormonal treatment has not been taken at least 2 months before study.
5. Non-steroidal anti-inflammatory drugs have not been taken at least 24hrs before examination.

2.2 exclusion criteria:

1. Presence of systemic cause of abnormal bleeding (e.g. thrombocytopenia and hypertension, hyperthyroidism, hyperporlactinemia .. etc)
2. Presence of local cause of abnormal bleeding (e.g. fibroid, polyp, cervical erosions, PID) By history and US.
3. Using anticoagulant medication.
4. Heavy menstrual bleeding.

2.3All patients were subjected to:

taking consent to participate in the study, all included women history was revised with special consideration to age, parity, duration of IUD use, timing of IUD insertion and history of other methods of contraception used prior to IUD insertion.

Menstrual history of all included women before and after IUD insertion was revised, including duration of the menstual flow and

number of napkins used per menstural flow , presence of inter menstrual spotting and presence of pelvic pain.

All included women underwent general, abdominal and pelvic examination (including speculum examination) to detect threads of IUDs and to exclude any possible general or local cause of abnormal bleeding or pelvic pain (e.g. polyp and erosion).

All included women had a transvaginal ultrasound performed after instructing the patient to evacuate the bladder. To avoid modification of artery impedance. Transvaginal U/S was done with women in supine position and her legs semi flexed and abducted to allow for easy manipulation of the vaginal probe at different angles with application of the push-pull technique.

Transvaginal ultrasonography (TVUS): to measure uterine size (length and width which are standardized 75mm and 50 mm according to radiopaedia) , as well as IUCD good position inside uterine cavity by measuring IUD-fundus; IUD-endometrium; IUD-myometrium and IUD-internal os distance.

Endometrial thickness was identified by measuring the distance in mm between the two basal layers of anterior and posterior uterine wall.

- Transvaginal pulsed Doppler (TVPD) on uterine arteries: using color Doppler to identify the main uterine artery at the level of the internal os then the mode was switched to pulsed Doppler and the blood flow velocity wave forms were displayed and the image frozen including at least three waveform signals. Then calculations of PI, RI for both uterine arteries.

- Both Transvaginal ultrasound and doppler were done between the 4th or 7thday of the menstrual cycle.

- Transvaginal ultrasound and doppler were done at Fayoum General hospital (by LOGIQ P5).

Ethical consideration:

1- Informed consent was taken from all patients before the start of study.

2- Approval from Beni – Suef ethical committee was taken before the start of the study with approval No : FMBSUREC/16062019/EL-SAYED

Statistical methodology

• Analysis of data was done by IBM computer using SPSS (statistical program for social science) as follows;

- Description of quantitative variables as mean, SD and range.

- Description of qualitative variables as number and percentage.

- Unpaired t-test was used to compare quantitative variables, in parametric data (SD < 50 % mean)

• P value > 0.05 insignificant

• P < 0.05 significant

• P < 0.01 highly significant [20].

3. Results:

This case-control study included 100 women who have been using an IUD for at least 6 months, presenting to outpatient gynecologic clinic at Fayoum General Hospital, during the period from July 2019 to July 2021 (done by LOGIQ P5 device) .

Subjects included in the study were divided into 2 groups.

Study Group I (n=50): women who experienced menorrhagia after IUD insertion.

Control Group II (n=50): women who did not experience menorrhagia after IUD insertion.

Table (1): Demographic Data of all Included Women

Age (Years) Range:	19 – 41
Mean ± SD:	31.5 ± 6.93
BMI Range:	19 -34
Mean ± SD:	26.5 ±4.08
Parity Range:	1 – 8
Mean ± SD:	3 ± 1.94
Timing of insertion of IUD [No. (%)]	
Postpartum:	47 (47%)
Postabortive:	10 (10%)
Postmenstrual:	43 (43%)
Duration of IUD Use (Months):	
Range:	6 – 120
Mean ± SD:	43.32 ± 33.82

Table (2): Difference between Study and Control Groups concerning Age

	Group I (study group)	**Group II (Control group)**
Number	50	50
Mean	29.35	30.85
St. Deviation	6.66	6.57
Minimum	19	20
Maximum	41	40

P = 0.843 , P > 0.05 Non-significant difference

Table (3): Difference between Study and Control Groups concerning BMI

	Group I (study group)	Group II (Control group)
Number	50	50
Mean	26.3	26.6
St. Deviation	+3.41	+4.08
Minimum	19	20
Maximum	32	34

P= 0.788 , p >0.05 Non-significant difference

Table (4): Difference between Study and Control Groups concerning Parity

	Group I (study group)	Group II (Control group)
Number	50	50
Mean	3	3
St. Deviation	2.2	2.1
Minimum	1	1
Maximum	8	6

P=0.253 , p >0.05 Non-significant difference

Table (5): Difference between Study and Control Groups concerning Timing of IUD Insertion .

Timing of IUD Insertion	Post-partum	Post-abortive	Post-menstrual	*P*	Sign.
Study Group [n=50]	26 (52%)	6(12%)	18 (36%)	>0.05	Non-Significant
Control Group [n=50]	21(42%)	4(8%)	25(50%)		

P = 0.554 , P > 0.05 Non-significant difference

Table (6): Difference between Study and Control Groups concerning Duration of IUD Use (Months).

	Group I (study group)	Group II (Control group)
Number	50	50
Mean	48.1	44.6
St. Deviation	35.78	30.71
Minimum	6	6
Maximum	120	100

P=0.754 ,p>0.05 Non-significant difference

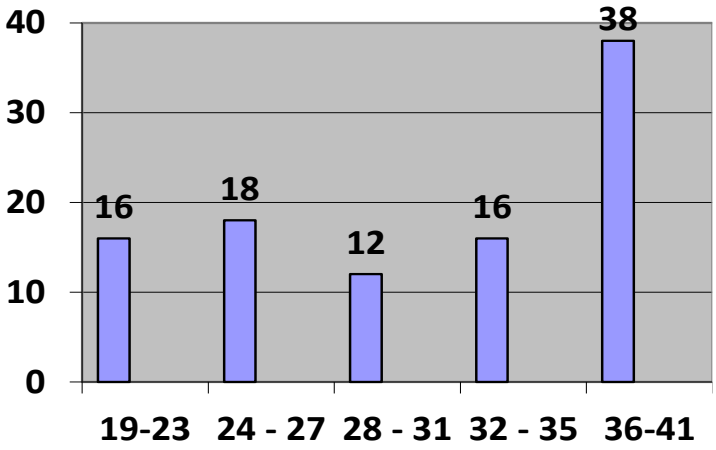


Fig. (1): Age Groups of Included Women

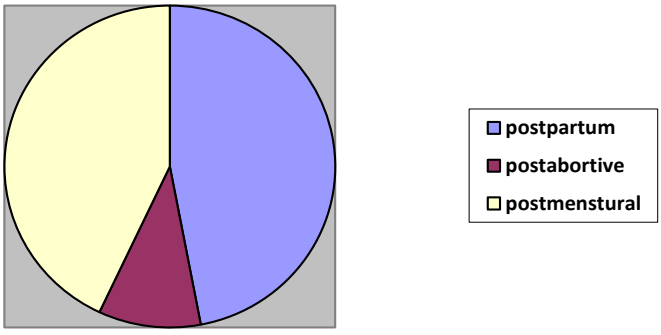


Fig. (2): Timing of IUD insertion in the study group

Table 7 shows difference between study groups concerning uterus dimensions and endometrial thickness. There were no statistically significant differences between groups concerning uterus dimensions and endometrial thickness measured.

Table (7): Difference between Study and Control Groups concerning Uterus Dimensions and Endometrial Thickness measured by TVS.

		Range	**Mean ± SD**	***p***	**Sign.**
Uterus Length (mm)	**Group I [n=50] (Study Group)**	65-90	73.5±9.62	>0.05	Non-Significant
	Group II [n=50] (Control Group)	63-100	80.68±14.58		
Uterus Width (mm)	**Group I [n=50] (Study Group)**	35-81	49.6±13.82	>0.05	Non-Significant
	Group II [n=50] (Control Group)	35-87	45.95±11.67		
Endometrial Thickness (mm)	**Group I [n=50] (Study Group)**	7-10	8.5±1.08	>0.05	Non-Significant
	Group II [n=50] (Control Group)	6-10	6.08±2.81		

- All are of Non-significant difference.

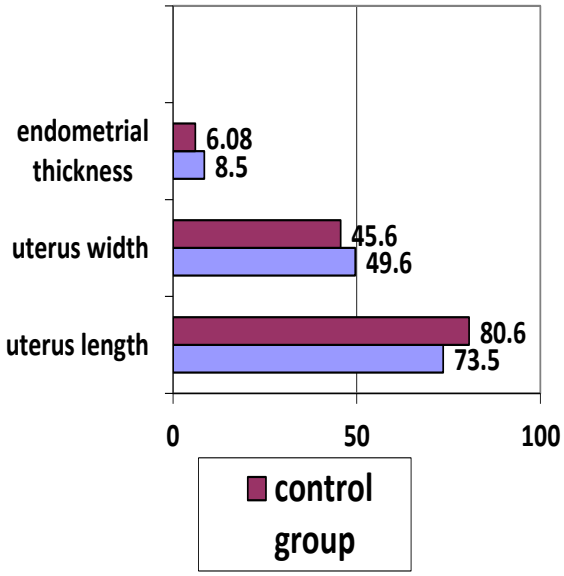


Figure (3) : Uterus length , width and endometrial thickness of participants

Table 8 shows comparison between different study groups concerning IUD-Fundus, IUD-Myometrium, IUD-endometrium and IUD-Internal os, measured by TVS. There were statistically Highly Significant between all groups concerning these parameters.

Table (8): Difference between Study and Control Groups concerning IUD measurement

		Range	Mean ± SD	*p*	Sign.
IUD-F (mm)	**Group I [n=50] (Study Group)**	21-50	38.3±12.27	<0.001	Highly Significant
	Group II [n=50] (Control Group)	10-25	18.27±3.53		
IUD-M (mm)	**Group I [n=50] (Study Group)**	5-4٠	12.80±8.14	<0.001	Highly Significant
	Group II [n=50] (Control Group)	4-12	6.97±3.17		
IUD-end (mm)	**Group I [n=50] (Study Group)**	4-26	12.1±3.7	<0.001	Highly Significant
	Group II [n=50] (Control Group)	1.5-8	2.84±2.72		

IUD-IO (mm)	**Group I [n=50] (Study Group)**	1-22	10.4±8.86	<0.001	Highly Significant
	Group II [n=50] (Control Group)	11-35	19.93±5.04		

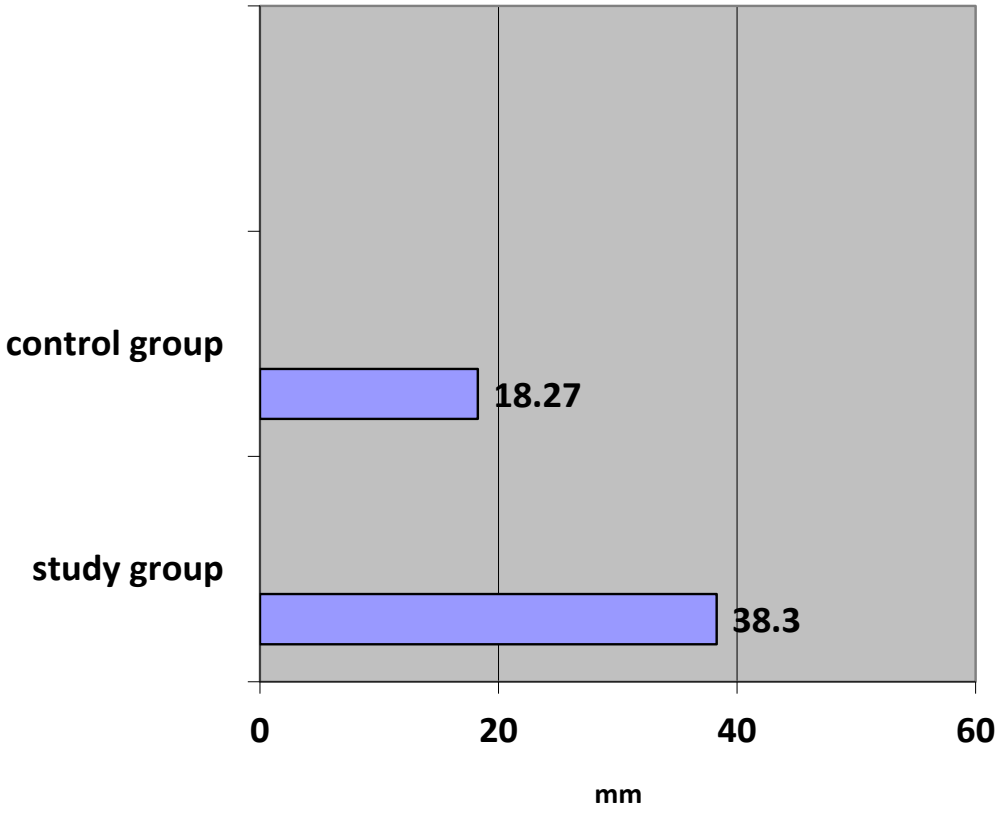


Fig. (4): Comparison between Study Groups concerning IUD-F

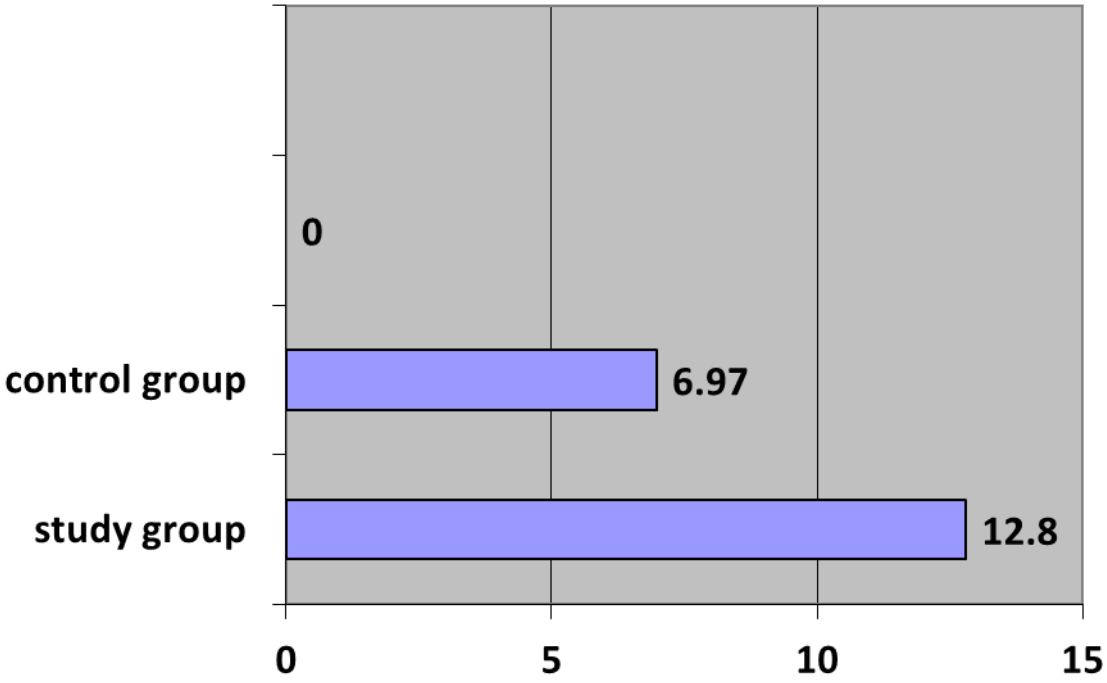


Fig. (5): Comparison between Study Groups concerning IUD-M

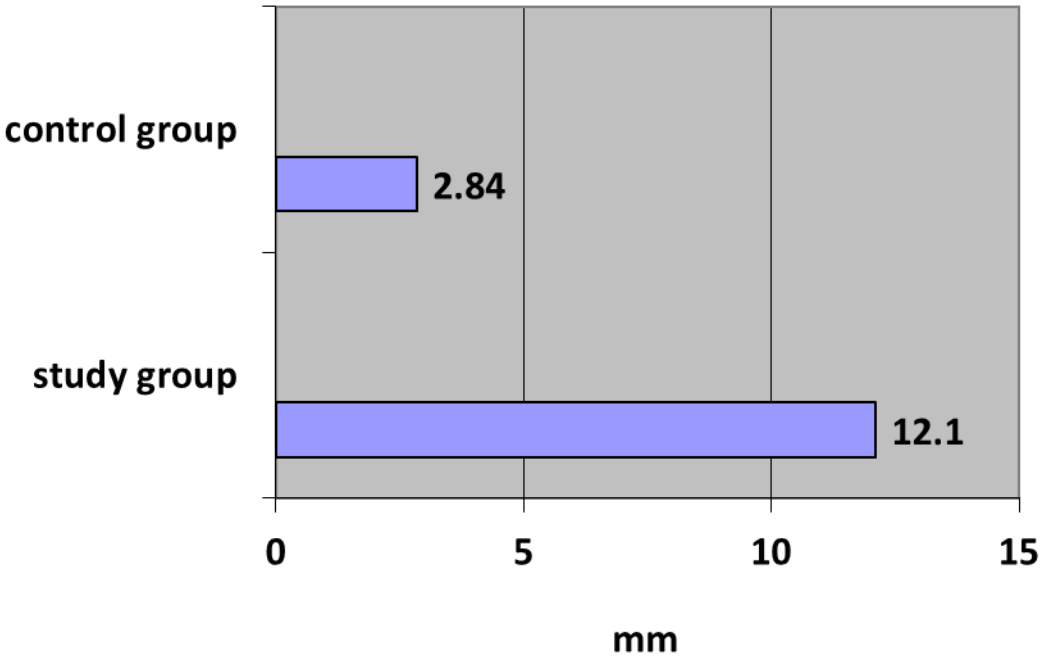


Fig. (6): Comparison between Study Groups concerning IUD-end

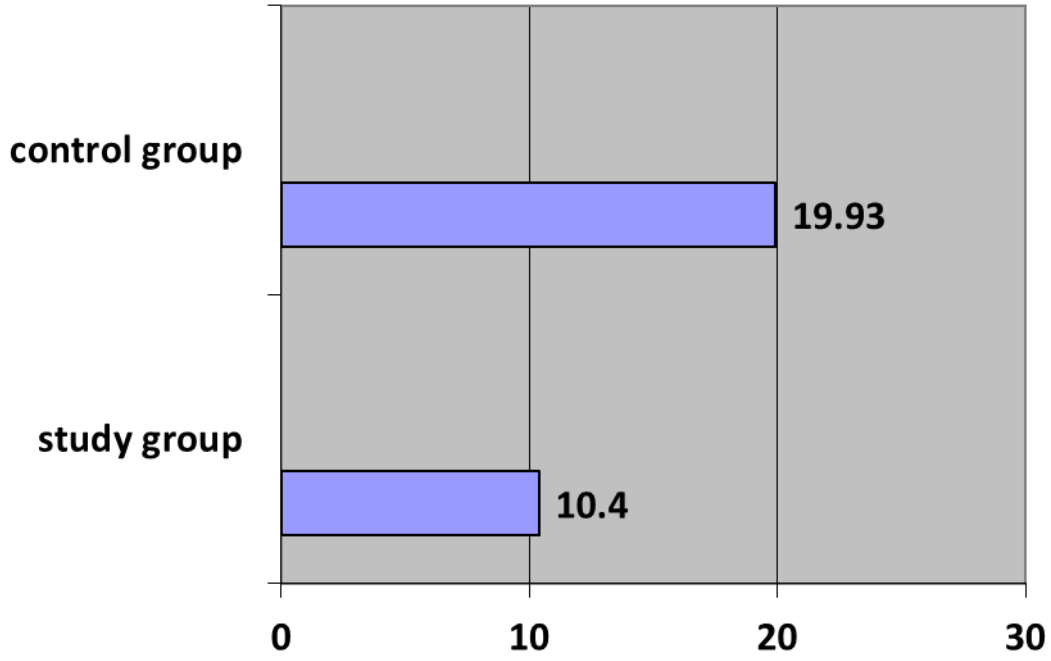


Fig. (7): Comparison between Study Groups concerning IUD-IO

Table (9): Sensitivity and specificity of IUD fundus, IUD myometrium, IUD endometrium and IUD IO in diagnosis of IUD induced menorrhagia .

Variable	Sensitivity	Specificity	AUC	p-value	Cut off point
IUD Funds	96%	84%	95.2%	<0.001	20.85
IUD myometrium	92%	90%	94.7%	<0.001	9.55
IUD endometrium	98%	96%	99.3%	<0.001	6.4
IUD IO	92%	80%	94.4%	<0.001	18.35

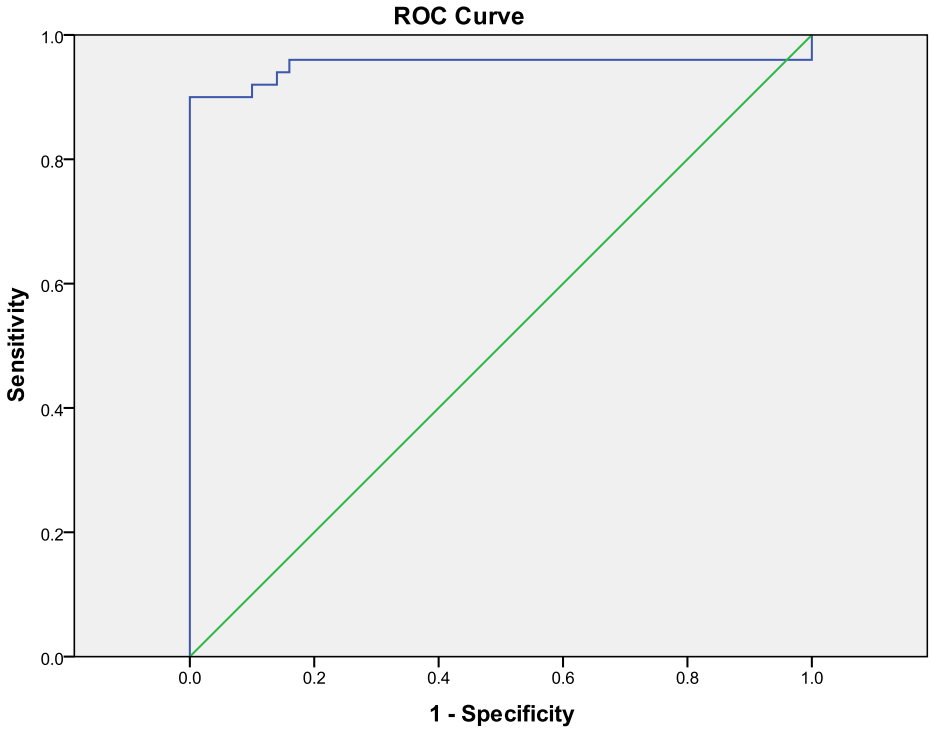


Figure (8): ROC curve for IUD Funds

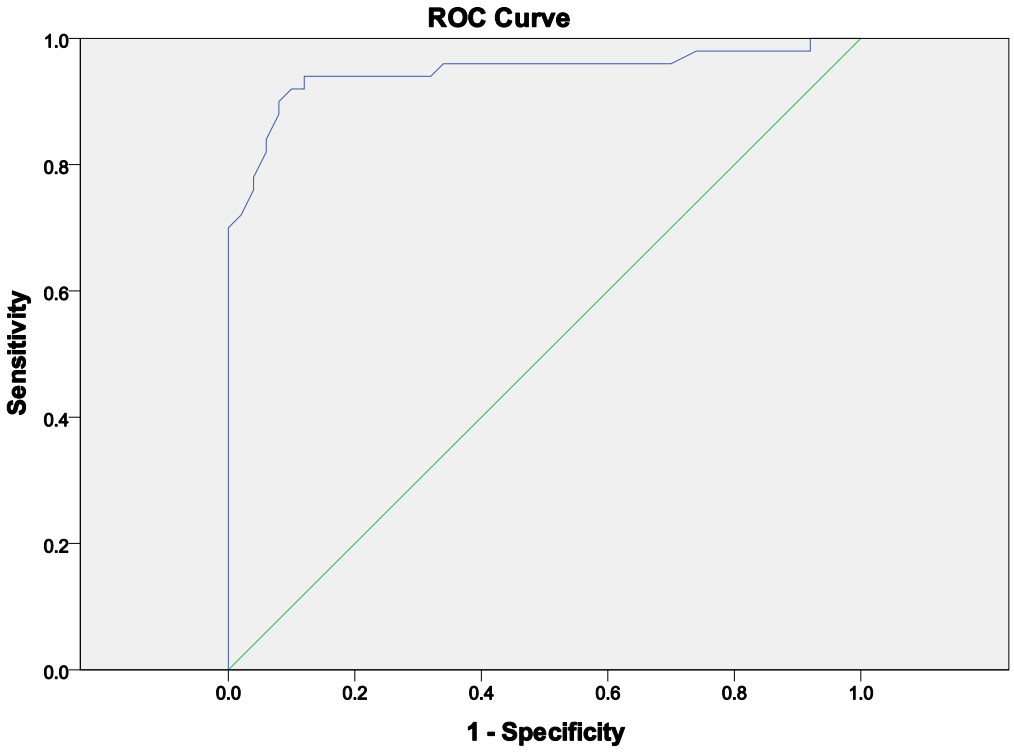


Figure (9): ROC curve for IUD myometrium

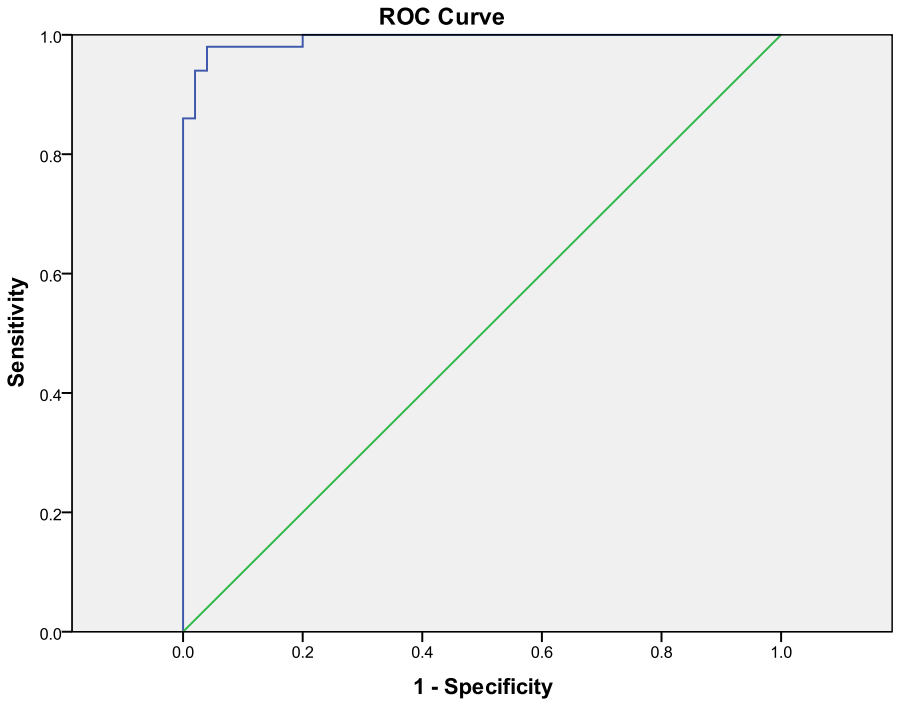


Figure (10): ROC curve for IUD endometrium

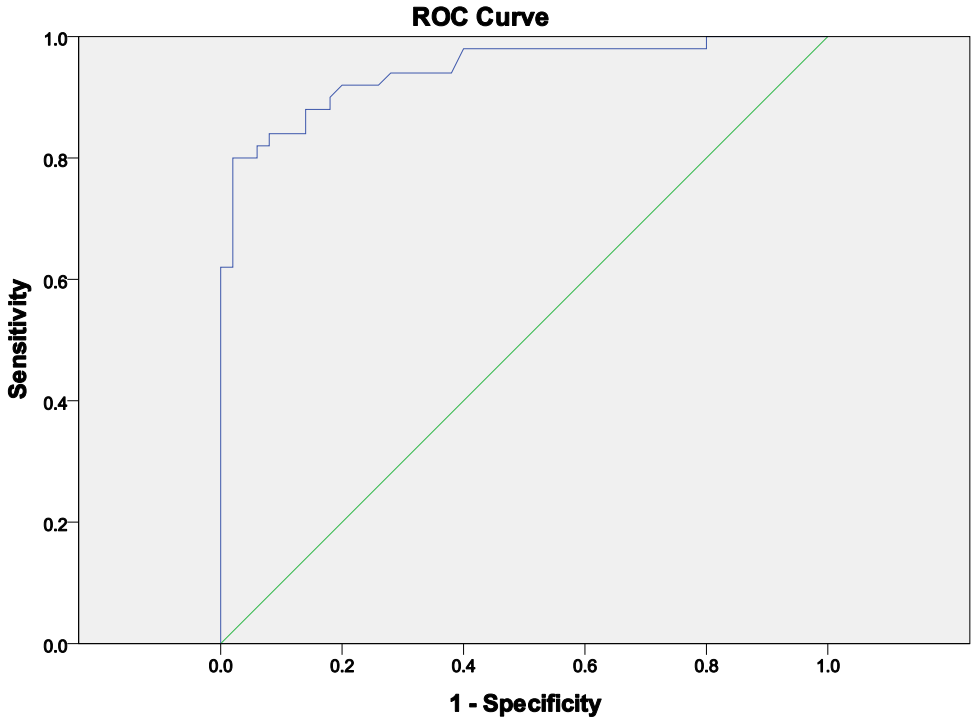


Figure (11): ROC curve for IUD IO

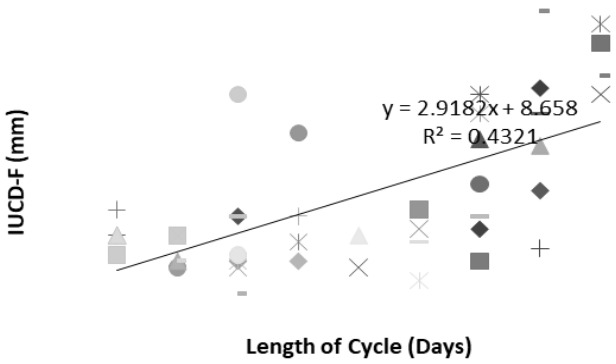
- The duration of menstrual flow and no. of napkins used in the days of menstrual flow were both significantly positively correlated to IUD-F, IUD-M and IUD-end, and significantly negatively correlated to IUD-IO (table 10). This also indicates that IUDs inserted away from the fundus or closer to I.O are associated with more incidence of menorrhagia.

Table (10): Correlation between Both duration of the menstrual flow and No. of Napkins used days of menstrual flow with IUD-F, IUD-M, IUD-end and IUD_IO measured by TVS.

		IUD-F	IUD-M	IUD-end	IUD-IO
duration of the menstrual flow (days)	**r**	0.656	0.628	0.618	-0.482
	p	<0.001	<0.001	<0.001	<0.001
No. of Napkins used in days of menstrual flow (Increase amount)	**r**	0.577	0.497	0.428	-0.462
	p	<0.001	<0.001	<0.001	<0.001

Table shows positive correlations between duration of the menstrual flow and each of IUD-F , IUD-M and IUD-end and negative correlation with IUD-IO ($p<0.001$).

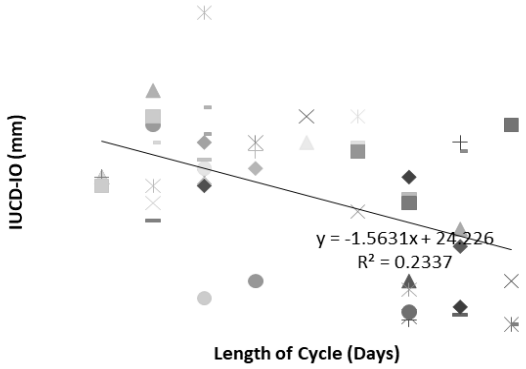
Similarly, the table shows positive correlations between number of napkins used in days of menstrual flow and each of IUD-F , IUD-M and IUD-end and negative correlation with IUD-IO ($p<0.001$).



r=0.656 ,p<0.001

Fig. (12): Correlation between duration of the menstrual and IUD-F

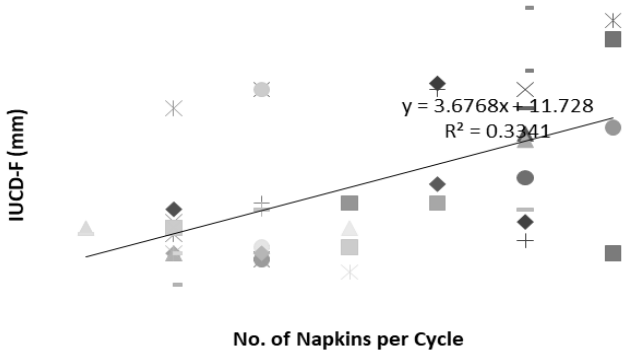
There is a positive correlation between duration of the menstrual flow and IUD-F



r= -0,482, p<0.001

Fig. (13): Correlation between duration of the menstrual and IUD-IO

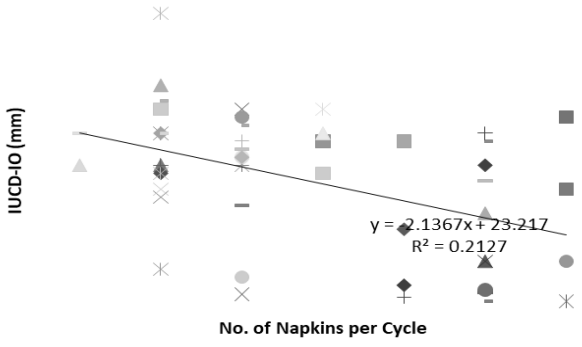
There is a negative correlation between duration of the menstrual flow and IUD-IO



r=0.577 , p<0.001

Fig. (14): Correlation between No. of Napkins per days of menstrual flow and IUD-F

There is a positive correlation between No. of Napkins days of menstrual flow and IUD-F



r= -0,462, p<0.001

Fig. (15): Correlation between No. of Napkins days of menstrual flow and IUD-IO

There is a negative correlation between No. of Napkins in days of menstrual flow and IUD-IO.

Table (11): Comparison between the PI of the women of the studied groups

	Group I Study group	**Group II Control group**
Minimum	1.65	1.87
Maximum	2.4	2.65
Mean	1.93	2.27
± SD	0.18	0.23
P value	<0.001 (Highly Significant)	

The PI was significantly lower in women of group I than in women of group II, P < 0.001**).**

Table (12): shows comparison between the RI of the women of the three groups

	Group I (Study group)	**Group III (Control group)**
Minimum	0.62	0.63
Maximum	0.78	0.88
Mean	0.679	0.80
± SD	0.058	0.091
P value	<0.001 (Highly Significant)	

The RI was significantly lower in women of group I than in women of group II, P <0.001).

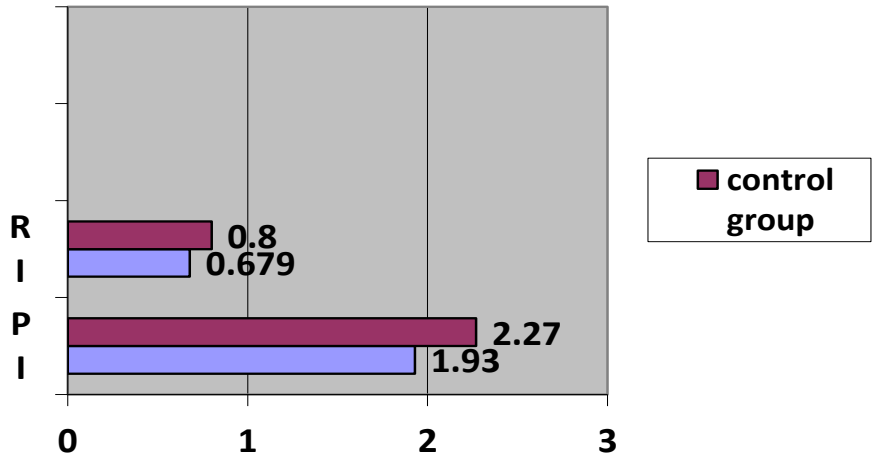


Figure (16): Comparison between study and control groups regarding PI and RI

Figure shows that PI of the study group 1.93±0.18 was significantly different from that of control group 2.27±0.23 , And RI of the study group 0.679±0.058 was significantly different from that of control group 0.8 ±0.091.

Table 13: Show the efficiency of PI and RI in detecting women with IUD complaining of excessive vaginal bleeding

	Sensitivity	Specificity	AUC	Cut-off point	PPV	NPV
PI	94.3%	87.1%	0.634	1.89	59%	85%
RI	88.2%	85.4%	0.671	0.65	86%	83%

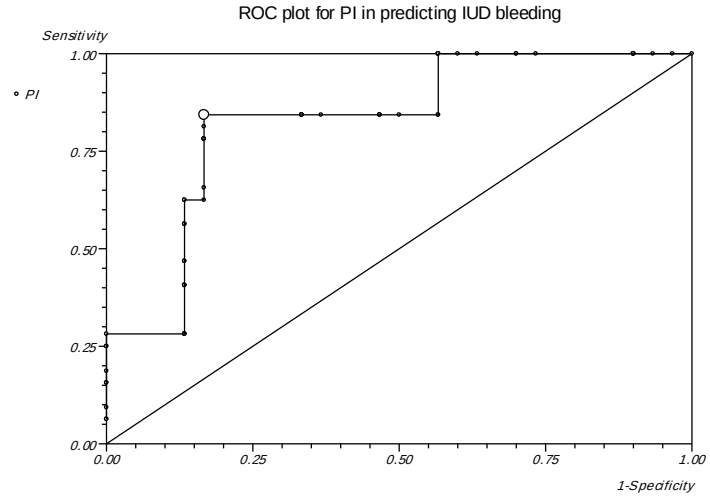


Figure 17: ROC plot for PI in predicting IUD bleeding

Shows that the ROC curve point outs that the best cut-off of PI for excessive vaginal bleeding was 1.89 (sensitivity 94.3%, specificity 87.1%).

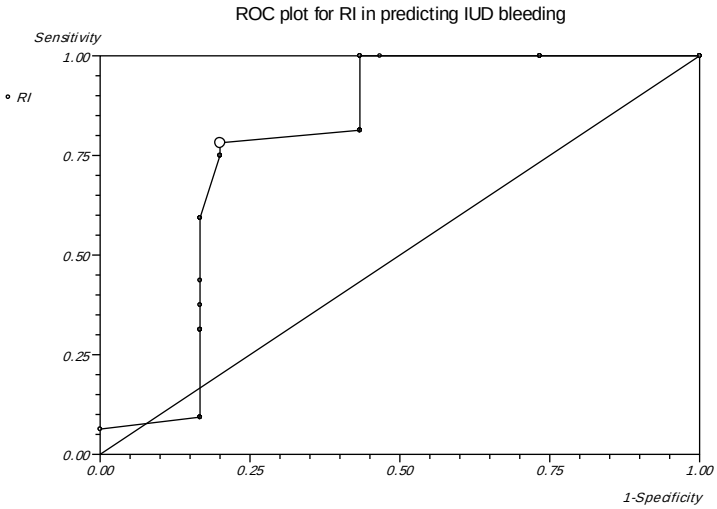


Figure 18: ROC plot for RI in predicting IUD bleeding

Shows that the ROC curve point outs that the best cut-off of RI for excessive vaginal bleeding was 0.65 (sensitivity 88.2%, specificity 85.4%).

4. Discussion:

An intrauterine contraceptive device (IUCD) is a highly effective and widely used method of birth control that has a low rate of failure If there are no complications (including irregular uterine bleeding, pelvic pain, perforation, expulsion, infection, and pregnancy). Transvaginal ultrasonography is used to rule out IUCD malposition and associated problems in symptomatic patients and in regular follow-up of asymptomatic women with IUCDs (14) .

Although the use of an IUCD is a very common practice for family planning and has been used for many decades, many side effects are still being reported after its insertion. As a result, a large number of patients have dysmenorrhea and abnormal uterine bleeding, which may lead to a high prevalence of withdrawal from the method (15).

A number of reasons have been proposed to explain IUCD-induced bleeding. Local vascular alterations in the endometrium, such as defects in the capillaries of the superficial stroma and eroded arteries at the surface, as well as enhanced vascularity of the superficial endometrium in tissue close to the IUCD, are examples of these. (16)

Ultrasound plays an important role in the examination of female internal genital organs, providing valuable information about the vascular features of these organs using Color

Doppler Sonography (CDS), notably via the transvaginal method (17) .

The purpose of this study was to test the hypothesis that copper IUCD-induced abnormal uterine bleeding is caused by an increase in uterine artery blood flow, and to see if transvaginal color Doppler can be used to identify women who are at risk of developing abnormal uterine bleeding after IUCD insertion.

This case-control research was done on 100 According of presence or absence of menorrhagia the patients were divided into two groups:

Group 1 (50 cases): cases complaining of menorrhagia.

Group 2 (50 cases): cases not complaining of menorrhagia.

The results of this study showed that there are no significant differences in age, parity or duration of use of the IUD between both groups. Results coincide with the work done by Faundes et al (18).

Also there was no significant difference found between the study and the control groups considering the uterine size. In the study and control group, the mean uterine length is (73.5±9.62mm, and 80.68±14.58 mm)

respectively and the mean uterine width is (49.6±13.82 mm, and 45.95±11.67) respectively . On the other hand Zhang stated that uterine length more than 70mm was associated with a decreased risk of removal due to bleeding (19).

In the present study, comparison of the IUD-M distance showed a statistically significant difference between the study and control group. The mean IUD-M distance is (12.80±8.14, and 6.97±3.17mm) in study and control groups respectively.

Faundes et al., on the other hand, used the 90th percentile considering the IUD-M distance in their study and discovered that it is 11 and 10 mm in the study and control groups, indicating a lack of correlation between the position of the IUD and bleeding and discomfort (20).

Also, in the present study there is a statistically significant difference between the study and control groups considering the IUD-E distance.

The mean IUD-E distance is (12.1 ± 3.7 mm, □ 2.84 ± 2.72) in the study and control groups respectively. The IUD-E distance was measured according to the recommendations of Faundes et al., who proposed that the IUD location in the uterine cavity is impacted by edometrium growth and thinning, and that this information should be taken into account when evaluating IUD position by sonography (20).

This finding is consistent with the findings of a research conducted by Aleem et al., who evaluated women who used TCu-380A and had bleeding and discomfort as a result of IUD use. The top-fundal distance was calculated (distance between the device top and the highest point in the uterine cavity). Approximately 50% of complainers had a top-fundal distance greater than 4mm, compared to 28% of non-complainers (21).

Faundes et al., on the other hand, conducted a research on 481 women who used TCu-200 or 380 devices for at least 6 months. 236 of the women reported bleeding and/or discomfort, whereas the remaining 245 had no complaints. In the study group, the 90th percentiles of the IUD-E, IUD-M, and IUD-F distances were 7, 11, and 27mm, respectively. It was similar to the control group (6, 10, and 28mm, respectively). (20).

When the generally accepted IUD-F distance of 25mm was used as the limit above which IUD removal would normally be recommended, and the 90th percentile of the IUD-endometrium or IUD-myometrium length was accepted as the gold standard, over 40% of women were false-positive for "incorrect" IUD position due to the lack of correlation between the presence of bleeding and pain and the IUD position.

Our study shows that there is statistically significant difference in the IUD – IO distance, in the study and control groups. The mean IUD – IO distance is (10.4±8.86mm, 19.93±5.04mm) in the study and control groups respectively.

Pakarinen et al., According to his study on the intracervical and fundal administration of levonorgestrel IUD for contraception, a fundal position of the levonorgestrel IUD would be associated with much less bleeding and pain symptoms and a higher likelihood of amenorrhea than a cervical location, and the length of time of bleeding decreased slowly in the cervical group, whereas a very steep decrease was noticed in the fundal group. He also advised that the levonorgestrel intracervical IUD be implanted as deeply as feasible if the users want reduced monthly bleeding or amenorrhea. Women who dislike amenorrhea, on the other hand, should have the device placed cervically. (22).

Our study shows that there is no statistically significant difference in the endometrial thickness between the study and control groups. The mean endometrial thickness is (8.5□1.08mm, and 6.08□2.81mm) in the study and control groups respectively.

This is consistent with Pakarinen et al findings on the levonorgestrel IUD, which found no association between endometrial thickness and days of bleeding or spotting in both groups. (22).

The results of our study revealed that PI and RI were significantly lower in women with IUCD -induced abnormal uterine bleeding than in those using IUCD with normal menstrual bleeding.

The PI was significantly lower in women of group I than in women of group II (mean 1.93 + SD 0.18 (group I versus) mean 2.27 + SD 0.23) group II, respectively, P < 0.001.

The RI was significantly lower in women of group I than in women of group II (mean 0.679+ SD 0.058) group I versus (mean 0.80+ SD 0.091) group II, respectively, P <0.001.

This indicates that the increase in uterine blood flow occurs only in cases of IUCD - induced abnormal uterine bleeding.

In comparison to the results of Frajndlich et al., transvaginal Doppler sonographic evaluation of the uterine artery blood flow was carried out. Resistance and pulsatility indices were examined in 101 women, 74 of whom used an intrauterine contraceptive device and 27 who did not use any form of contraception. The resistance and pulsatility values were considerably lower in the group of women who used intrauterine contraceptive devices and experienced abnormal bleeding than in the other groups. All other comparisons were non-significant, which supports our findings in the menorrhagia group (23).

Momtaz et al., The PI and RI of uterine arteries were measured in 68 women, 44 of whom were using an intrauterine contraceptive device and 24 of whom were not. The PI and RI appeared significantly lower in women with IUCD-induced bleeding than in women who did not use IUCD and did not complain of abnormal vaginal bleeding. Furthermore, no statistically significant variations in PI and RI were seen between women who used IUCD

without reporting of abnormal vaginal bleeding and women in the control group. They found that the PI was less than 2 in women who had IUCD-induced hemorrhage, while the mean PI in women who did not have problems from IUCD was 2.38 with the lowest PI being 1.98 (13).

Our results run in agreement with) Usama et al.2010 (in which PI and RI were observed to be considerably reduced in women with CIUD-induced abnormal uterine hemorrhage (24).

Amal El Anwar et al discovered a substantial increase in uterine artery blood flow in patients with CIUD adverse effects such as bleeding and pain, and they used 1.5 as a cut-off value for uterine artery PI for prediction of abnormal bleeding (25) .

Ebru Coskun et al. found only the left uterine artery pulsatility and resistance indices decreased statistically significantly while other Doppler parameters showed no change (26).

In a study by Evans T. Three-dimensional transvaginal ultrasound scans were performed on 180 women three to six months following the placement of an intrauterine device (IUD). Seventy-six women reported discomfort (group I), forty-four reported abnormal vaginal bleeding (group II), and sixty reported no complaint (group III). The distances between the top of the IUD and the inner endometrium E-IUD, the IUD and the fundus F-IUD, and the ends of the IUD to the uterine sidewall S-IUD were measured. All ladies had their uterine artery pulsitilty index assessed using a color Doppler. There were no statistically significant differences between the three groups in terms of E-IUD, F-IUD, and S-IUD. The mean uterine artery pulsitility index was considerably lower in women with IUD discomfort than in women with excess menstruation, and both had a lower mean pulsitility index than the control group (27).

Another study by Jamenez et al., Transvaginal color Doppler was used on 93 women to identify the pulsatility index (PI) and resistance index (RI) in the uterine artery. Three groups of women were formed. Group I consisted of 32 women using IUCD (TCu-380A) and complaining of menorrhagia or menometrorrhagia, group II of 30 women using IUCD with normal monthly flow, and group III of 31 women with normal menstrual flow and not using any contraceptive methods. Women with IUCD-induced abnormal uterine bleeding had considerably lower PI and RI than those with normal menstrual flow or women in the control group (28).

The result of these study agreed to a study performed by Nuray et al., In the research, 14 women (group I) experienced higher menstrual bleeding scores following IUCD (TCU380A) implantation, but 14 women (group II) had no increase bleeding ratings. On the third or fourth day of the menstrual cycle, color doppler sonography with 3-5 MHZ was performed on both groups before and 3-5 months after IUCD installation. There was no

significant difference in PI and RI values between the women (group I) with increased bleeding and (group II) without increased bleeding scores reported on their first visit. PI values of women with higher bleeding scores at their second visit, on the other hand, were substantially lower than those of women with no increased scores (p0.05) (29).

In contrast to our results

The results of this study are not in agreement with that reported by Ilkuner Mutlu et al., in which 120 women participated, 13 women seek IUD removal prior to the end of the research; eight because of severe monthly bleeding, two because their IUDs got dislocated, and three because of their partner's displeasure. Three more women did not submit to a post insertion doppler evaluation of uterine blood flow and were lost to follow-up. Any change in menstrual flow duration or the number of pads used by the patient was considered a meaningful alteration in menstrual status. The remaining 104 patients' uterine arterial blood flow was assessed using transvaginal pulsed doppler sonography by analyzing the PI and RI of the uterine arteries soon before and six months after the procedure. There were no statistically significant changes between before and post implantation. Cupper T380A IUCD (both p values > 0.05) (30).

Elmazny et al. results showed that in women with menorrhagia there was a significant increase in the endometrial and sub endometrial VI, FI, and VFI after IUD insertion, whereas the uterine artery PI and RI were not significantly different before and after IUD insertion (31).

O. Shen A et al, who did a research at Shaare Zedek Medical Center on 23 regularly menstruation women who chose to have a Cu medicated IUCD (Nova T) implanted for contraception. All patients underwent color Doppler studies of both uterine arteries before and after insertion, and the results revealed that there was no significant change in blood flow as a result of the presence of Cu medicated IUCD in either uterine artery, confirming our findings about our control group (which showed no significant changes in PI or RI) (32).

Stubblefield et al., One hundred and twenty regularly menstruation women were enrolled for the research. All had transvaginal uterine artery Doppler examination in the early follicular phase on two occasions: before the IUCD was inserted and six months afterwards. The uterine arteries' pre- and post-insertion resistance (RI) and pulsatility (PI) indices were evaluated. Doppler parameters were evaluated in patients who reported an increase in IUCD-mediated adverse effects against those who reported no change. All subjects' RI and PI before and after IUCD implantation were not considerably different (33).

5. Conclusion and Recommendations

There is a possible link between the location of the IUD within the uterine cavity and abnormal uterine bleeding among IUD users. The IUD-F, IUD-M, IUD-E, and IUD-IO distances show valiable positive data conserning the IUD position within the uterus and induced bleeding , with cut off points 20.85 , 9.55 , 6.4 and 18.35 beyond which IUD removal is recommended. Furthermore, our study revealed that PI and RI were considerably lower in women with IUD-induced abnormal bleeding with cut off points 1.89 and 0.65

Ultrasound should be a routine investigation performed following IUD placement to check the location of the IUD as well as in follow-up. the IUD-F, IUD END distance, can be used as good predictor for well-placed IUDwith cut off point 20.85 and 6.4 detecting PI and RI in the uterine arteries might be utilized to identify people at risk of experiencing heavy bleeding following copper IUD placement (as evidenced by lower PI and RI)

However, because the sample size is limited, it may be difficult to confirm these findings and make recommendations based on them. It is also proposed that further meta analysis research would be done on this topic to confirm or counteract these results.

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