



Accuracy of Pre- Intrauterine Contraceptive Device Insertion Doppler Ultrasound in Prediction of IUCD Induced Heavy Menstrual Bleeding

Thesis

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

سببناك لا علم لنا
إلا ما علمتنا إنك أنت
العليم العظيم

صدق الله العظيم

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ABSTRACT

Background: Previous studies reported changes in the local vasoactive substances production within the endometrium with subsequent increase in vascularity as a possible mechanism of Intrauterine contraceptive device (IUCD) induced heavy menstrual bleeding. This research was held a larger sample size to assess the role of Power Doppler velocimetries of the uterine arteries, endometrium and subendometrium vascularization as a predictor of IUCD induced heavy menstrual bleeding.

Objective: To assess uterine artery, endometrial and subendometrial microvascularization indices in relation to heavy menstrual bleeding as a predictor the risk of bleeding before IUCD insertion. Null hypothesis of this study: There is no difference between uterine artery Doppler indices, endometrial and subendometrial microvascularization before and after insertion IUCD. Question of this study: Can Doppler ultrasound predict the risk of bleeding before IUCD insertion?

Patients and Methods: We conducted this Prospective cohort study to assess uterine artery, endometrial and subendometrial microvascularization indices in relation to heavy menstrual bleeding as a predictor the risk of bleeding before IUCD insertion. Patients dived to group A corresponded to women with IUCD- induced heavy menstrual bleeding and Group B included patients who not present heavy menstrual bleeding.

Results: Endometrium FI & VFI significantly increased with time in heavy and non-heavy menstrual bleeding cases. Endometrium FI & VFI (basal and month-3) and their elevation was significantly higher in heavy menstrual bleeding cases. Endometriaum VFI had highest significant diagnostic performance in the prediction of heavy menstrual bleeding, followed by Subendometrium VI. Endometriaum VFI ≥ 0.18 had highest significant diagnostic characteristics in the prediction of heavy menstrual bleeding, followed by Subendometrium VI ≥ 3.75 .

Conclusion: The IUD modified subendometrial mcicrovascularization of those patients who presented with IUD-induced menorrhagia, through changes in the production of prostaglandins leading to increase in subendometrial, endometrial and uterine artery blood flow.

Keywords: Intrauterine Contraceptive Device, color Doppler, heavy menstrual bleeding

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List of Contents

| Title | Page No. |
|---|-----------------|
| List of Tables | i |
| List of Figures | iii |
| List of Abbreviations..... | vi |
| Protocol | |
| Introduction | 1 |
| Aim of the Work..... | 3 |
| Review of Literature | |
| Heavy Menstrual Bleeding..... | 4 |
| Intrauterine Device..... | 47 |
| Doppler and its Role in Assessment of Heavy Menstrual Bleeding | 61 |
| Patients and Methods..... | 76 |
| Results | 95 |
| Discussion | 123 |
| Summary and Conclusion..... | 144 |
| Recommendations | 148 |
| References | 149 |
| Arabic Summary | — |

List of Tables

| Table No. | Title | Page No. |
|--------------------|---|----------|
| Table (1): | Additional bleeding symptoms indicative of an inherited bleeding disorder..... | 8 |
| Table (2): | Differential Diagnoses of HMB in Adolescents..... | 9 |
| Table (3): | Causes of secondary menorrhagia | 9 |
| Table (4): | Signs, Symptoms, and Red Flags of Bleeding Disorders..... | 10 |
| Table (5): | Important Consideration. | 11 |
| Table (6): | Focused history for evaluation of HMB..... | 12 |
| Table (7): | Focused physical exam for evaluation of HMB.... | 17 |
| Table (8): | Tiered approach to the investigation of HMB..... | 20 |
| Table (9): | Current Medical and Surgical Treatments Involved in the Management of Heavy Menstrual Bleeding..... | 21 |
| Table (10): | Comparison of Future Medical Treatments | 39 |
| Table (11): | Differences between the copper and hormonal IUD..... | 55 |
| Table (12): | Demographic characteristics among the studied cases and according to heavy menstrual bleeding..... | 95 |
| Table (13): | PBAC score among the studied cases and according to heavy menstrual bleeding. | 96 |
| Table (14): | Uterine artery, subendometrium and endometrial indices among all the studied cases..... | 97 |
| Table (15): | Demographic characteristics according to heavy menstrual bleeding..... | 98 |
| Table (16): | PBAC score according to heavy menstrual bleeding. | 99 |
| Table (17): | Uterine artery PI according to heavy menstrual bleeding..... | 100 |

List of Tables Cont...

| Table No. | Title | Page No. |
|--------------------|---|----------|
| Table (18): | Uterine artery RI according to heavy menstrual bleeding..... | 102 |
| Table (19): | Subendometrium PI according to heavy menstrual bleeding..... | 104 |
| Table (20): | Subendometrium RI according to heavy menstrual bleeding..... | 106 |
| Table (21): | Subendometrium VI according to heavy menstrual bleeding..... | 108 |
| Table (22): | Subendometrium FI according to heavy menstrual bleeding..... | 110 |
| Table (23): | Subendometrium VFI and according to heavy menstrual bleeding..... | 112 |
| Table (24): | Endometrium VI according to heavy menstrual bleeding..... | 114 |
| Table (25): | Endometrium FI according to heavy menstrual bleeding..... | 116 |
| Table (26): | Endometrium VFI according to heavy menstrual bleeding..... | 118 |
| Table (27): | Diagnostic performance of basal Doppler findings in the prediction of heavy menstrual bleeding..... | 120 |
| Table (28): | Diagnostic charactersitics of basal Doppler findings cutoff points in the prediction of heavy menstrual bleeding..... | 122 |

List of Figures

| Fig. No. | Title | Page No. |
|---------------------|---|----------|
| Figure (1): | The PALM-COEIN classification of causes for abnormal uterine bleeding in nonpregnant women of reproductive age..... | 6 |
| Figure (2): | Pictorial Blood Assessment Chart..... | 15 |
| Figure (3): | Treatment options for heavy menstrual bleeding in women with inherited bleeding disorders | 21 |
| Figure (4): | The fibrinolytic pathway | 25 |
| Figure (5): | Synthesis and signalling of prostaglandins | 27 |
| Figure (6): | X-ray confirming levonorgestrel intrauterine system perforation at time of insertion..... | 32 |
| Figure (7): | Doppler ultrasound..... | 62 |
| Figure (8): | Graphical representation of Doppler effect..... | 64 |
| Figure (9): | Pulsatility Index..... | 66 |
| Figure (10): | 3D power Doppler indices of subendometrium of a case of menorrhagia. | 82 |
| Figure (11): | Transvaginal ultrasonography and color Doppler of left uterine artery at day 3 of the cycle before insertion of IUD. | 82 |
| Figure (12): | Transvaginal ultrasonography and color Doppler of left uterine artery at day 3 of the cycle after insertion of IUD..... | 83 |
| Figure (13): | 3D power Doppler indices of subendometrium of a case of non heavy menstrual..... | 83 |
| Figure (14): | 3D power Doppler indices of subendometrium of a case of menorrhagia | 84 |

List of Figures Cont...

| Fig. No. | Title | Page No. |
|---------------------|--|----------|
| Figure (15): | Female using IUD and complaining of menorrhagia with increased subendometrial blood flow (decreased subendometrial PI & RI). | 84 |
| Figure (16): | Case with increased subendometrial blood flow. | 85 |
| Figure (17): | Case with increased subendometrial 3D power Doppler indices (VI, FI, VFI)..... | 86 |
| Figure (18): | Case with increased subendometrial blood flow (increased VI, FI, VFI). | 87 |
| Figure (19): | Case with normal uterine blood flow (No significant changes in uterine PI & RI). | 88 |
| Figure (20): | Female using IUD without abnormal uterine bleeding with normal 3D power Doppler indices. | 89 |
| Figure (21): | Case with normal subendometrial blood flow (No significant changes in VI, FI, VFI). | 90 |
| Figure (22): | Case with normal uterine blood flow (no significant changes in uterine PI & RI). | 91 |
| Figure (23): | Case with normal subendometrial blood flow (no significant changes in VI, FI, VFI). | 92 |
| Figure (24): | Flow chart of the studied cases. | 95 |
| Figure (25): | Heavy menstrual bleeding among the studied cases. | 96 |
| Figure (26): | Comparison according to heavy menstrual bleeding regarding PBAC score. | 99 |
| Figure (27): | Comparison according to heavy menstrual bleeding regarding uterine artery PI. | 101 |

List of Figures Cont...

| Fig. No. | Title | Page No. |
|---------------------|---|----------|
| Figure (28): | Comparison according to heavy menstrual bleeding regarding uterine artery RI..... | 103 |
| Figure (29): | Comparison according to heavy menstrual bleeding regarding subendometrium PI. | 105 |
| Figure (30): | Comparison according to heavy menstrual bleeding regarding subendometrium RI. | 107 |
| Figure (31): | Comparison according to heavy menstrual bleeding regarding subendometrium VI. | 109 |
| Figure (32): | Comparison according to heavy menstrual bleeding regarding subendometrium FI. | 111 |
| Figure (33): | Comparison according to heavy menstrual bleeding regarding subendometrium VFI. | 113 |
| Figure (34): | Comparison according to heavy menstrual bleeding regarding endometrium VI. | 115 |
| Figure (35): | Comparison according to heavy menstrual bleeding regarding endometrium FI. | 117 |
| Figure (36): | Comparison according to heavy menstrual bleeding regarding endometrium VFI. | 119 |
| Figure (37): | ROC curve of basal Doppler findings in the prediction of heavy menstrual bleeding. | 121 |

List of Abbreviations

| Abb. | Full term |
|---------------|---|
| ASU | Ain-Shams University |
| AUB | Abnormal uterine bleeding |
| AUB/HMB | AUB is described as either HMB |
| AUB/IMB..... | AUB is intermenstrual bleeding |
| CBC | Complete blood cell count |
| CD..... | Color Doppler |
| CIUD | Copper intrauterine contraceptive device |
| COCP..... | Combined oral contraceptive |
| CW | Continuous wave Doppler |
| DDAVP | 1-deamino-8-D-arginine vasopressin |
| DMPA..... | Depot medroxyprogesterone acetate |
| DOACs..... | Direct oral anticoagulants |
| ERC | Ethics Research Committee |
| FI | Flow index |
| FIGO..... | International Federation of Gynecology and Obstetrics |
| FSH..... | Follicle stimulating hormone |
| GnRH..... | Gonadotropin-releasing hormone |
| HMB | Heavy menstrual bleeding |
| HRT | Hormone-replacement therapy |
| IA | Incidence angle |
| IBD | Inherited bleeding disorder |
| ISTH BAT..... | The International Society on Thrombosis and Haemostasis Bleeding Assessment Tool |
| IUDs | Intrauterine devices |
| IUS | Intrauterine system |
| LARC | Long-acting reversible contraception |
| LH..... | Luteinizing hormone |
| LNG..... | Levonorgestrel |
| LNG-IUS | Levonorgestrelreleasing intrauterine system |
| LUVO | Laparoscopic bilateral uterine artery occlusion |
| MBL..... | Menstrual blood loss |

List of Abbreviations Cont...

| Abb. | Full term |
|------------------------|--|
| MCMDM-1 | Molecular and Clinical Markers for the Diagnosis and Management of Type 1 VWD |
| NSAIDs | Non-steroidal anti-inflammatory drugs |
| OA..... | Oral anticoagulant |
| PAEC..... | Progesterone receptor modulator associated endometrial changes |
| PBAC..... | Pictorial blood assessment chart |
| PCOS..... | Polycystic ovary syndrome |
| PD..... | Power color Doppler |
| PFDs..... | Platelet function disorders |
| PG..... | Prostaglandin |
| PGE..... | Prostaglandin E |
| PGI..... | Prostacyclin |
| PGI ₂ | Prostaglandin I ₂ |
| PI..... | Pulsatility index |
| POP..... | Progesterone only pill |
| PW..... | Pulsed Wave Doppler |
| RBC..... | Red blood cell |
| RFVTA..... | RF volumetric thermal ablation |
| RI..... | Resistance index |
| SLE..... | Systemic lupus erythematosus |
| SPRMs..... | Selective progesterone receptor modulators |
| TVS..... | Transvaginal sonography |
| TXA..... | Thromboxane |
| UAE..... | Uterine artery embolization |
| UPA..... | Ulipristal Acetate |
| VFI..... | Vascularization flow index |
| VI..... | Vascularization index |
| VWD..... | Von Willebrand disease |
| VWF..... | Von Willebrand factor |

evaluation of reproductive processes; to examine the blood supply toward the uterine artery, endometrial and the subendometrial region (*Dubiel et al., 2010*).

AIM OF THE WORK

To assess uterine artery, endometrial and subendometrial microvascularization indices in relation to heavy menstrual bleeding as a predictor the risk of bleeding before IUCD insertion.

INTRODUCTION

The copper intrauterine contraceptive device is the most commonly used method of long acting reversible contraception worldwide (*de Souza and Geber, 2006*).

The most important copper IUCD-related side effect is increased menstrual bleeding approximately 30-50%, often combined with cramping. The menstrual blood may be excessive to the extent of causing iron deficiency anemia (*Fouda et al., 2010*).

These changes are responsible for a removal rate of 4%–15% during the first year after IUCD insertion (*Jiménez et al., 2006*).

The effect of the copper IUCD on uterine hemodynamics and its relationship with the pathophysiology of IUCD induced heavy menstrual bleeding are still not well clarified (*Reddy et al., 2014*).

By using three-dimensional (3D) Doppler analysis, only a few studies have demonstrated an increase in subendometrial vascularization in women with IUCD-induced heavy menstrual bleeding (*El-Mazny et al., 2013*).

Using power Doppler provides the possibility of quantifying vascularization within a given volume of interest. This technique could be a unique noninvasive tool for the