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ORIGINAL ARTICLE

Uterine Artery Doppler Indices in the Various Causes of Abnormal Uterine Bleeding Confirmed with Histopathology

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ABSTRACT

Background: All disturbed pattern of bleeding which arises due to different reasons such as anovulation, pregnancy, uterine abnormalities and coagulopathies is termed as abnormal uterine bleeding (AUB). Abnormal uterine bleeding is present in many forms such as heavy bleeding, short menstrual cycle, excessive and heavy menstruation, uterine bleeding at irregular period, excessive and prolonged uterine bleeding. Abnormal uterine bleeding is mostly caused by benign findings such as endometrial hyperplasia or atrophy or benign polyps. Around 5–12% of Abnormal uterine bleeding results from Endometrial Cancer.

Objective: Uterine artery Doppler indices in various causes of abnormal uterine bleeding confirmed with histopathology.

Methodology: A Cross-sectional Analytical study was conducted at Shireen Ultrasound Clinic Peshawar, Pakistan. This study enrolled a purposive sample of 162 patients presenting with abnormal uterine bleeding with the age between 18 to 80 years. The examination was performed with Toshiba Nemio 20(Xario Prime with TVS Probe frequency range 7-14MHz) .The Resistive index(RI), Pulsatility index(PI), mean and standard deviation were calculated for the continuous variables.

Results: A total of 162 patients were enrolled in our study. The mean age of patients was recorded 38±5 years. In this study, the histopathological findings were as follow, 8.6% adenomyosis,12.3% endometrial hyperplasia, 43.3% leiomyoma's, 17.3% polyp, 2.5% endometrial carcinoma and 16% non-specific findings so the most common cause of abnormal uterine bleeding was leiomyoma's with mean of Right Uterine artery (U-A) PI and RI was 3.33±1.23 and 0.83±0.03 respectively and left U-A PI and RI was 2.95±1.17 and 0.84±0.03 respectively while the least common cause was endometrial carcinoma with mean of Right U-A PI and RI was 2.54±1.08 and 0.52±0.01 respectively and of Left U-A PI and RI was 1.62±0.00 and 0.52±0.00 respectively.

Conclusion: From our study we concluded that the uterine artery RI in endometrial carcinoma causing abnormal uterine bleeding is low and in benign condition like polyp, hyperplasia and fibroids is high.

Keywords: Uterine bleeding, Carcinoma, Fibroids, Hyperplasia, Trans-vaginal ultrasound

INTRODUCTION

Abnormal Uterine Bleeding (AUB) is the most common and frequent condition notice, more than 70 % of pre and post-menopausal periods it is noticed in gynecology department.[1]The abnormal uterine bleeding is present in many forms such as heavy bleeding, short menstrual cycle, excessive and heavy menstruation, uterine bleeding at irregular period, excessive and prolonged uterine bleeding.[2] AUB is mostly caused by benign conditions such as endometrial hyperplasia or atrophy or benign polyps.[3] Around 5–12% of AUB results from Endometrial Cancer.[4]

In the past, the gold standard for clinical investigation of postmenopausal bleeding was institution-based dilatation and curettage (D&C), but now there are a number of office-based methods, such as endometrial biopsy and hysteroscopy, for the evaluation of women with this complaint and endometrial biopsy has almost completely replaced D&C. Outpatient endometrial biopsy performed with a Pipelle sampling device (Cooper Surgical, Trumbull, CT) is simple to perform, relatively inexpensive, and highly sensitive in detecting endometrial carcinoma.[5]

The Trans-vaginal ultrasonography (TVU) is suitable for patients with AUB at the time of presentation or assessment in the outpatient department. There are a lot of benefits of scans for a gynecologist expert to cope up with the patient complaints and findings of the scan in a better way. So better scans make the clinician to go through with good management and keep away from unnecessary surgeries in one group and plan better surgery in another group. Trans-vaginal scan (TVS) is combined with endometrial sampling in one-stop approach in patients with AUB to diagnose and manage better.[6] The Image quality of Trans-vaginal route is good because the field of view is small and the probe is in close relation with the endometrium, so endometrial thickness and pathologies inside the endometrial cavity are better visualized.[7, 8]

Trans-vaginal scan sensitivity vary from 84 to 100 percent and specificity of 81 to 100 percent in polyp. Trans-vaginal has a sensitivity and specificity in sub mucosal fibroid diagnosis is 100 percent and 96 percent respectively. TVS has a sensitivity and specificity for adenomyosis 53-89 percent and 75 to 96 percent respectively.[9]

Doppler ultrasound is safe and non-invasive technique in the evaluation of abnormal uterine artery blood flow pattern. It can calculate the indices like RI, PI in numerical value (continuous variable).Its observed that abnormal uterine bleeding is caused by myriads of condition ranging from endometritis to endometrial CA. However, it is important to compare these Doppler indices of the uterine artery in different causes of AUB, for better and timely management of uterine abnormalities Therefore the aim of our study is to determine the Doppler indices of the uterine artery in the various causes of abnormal uterine bleeding by Trans-vaginal ultrasound and compare these indices of uterine arteries in various causes of abnormal uterine bleeding.

MATERIALS AND METHODS

A cross sectional analytical study enrolled a purposive sample of patients presenting with abnormal uterine bleeding from November 2021 to June 2022.The study was approved by the Ethical Review Committee OF University Of Lahore. The study was conducted at Shireen Ultrasound Clinic Peshawar, KPK Pakistan. Trans-vaginal sonography were carried out for all the patients during this period to detect the various causes of abnormal uterine bleeding. All those patients with a clinical manifestation of abnormal uterine bleeding, aged between 18 to 80 years, having a complaint of abnormal uterine bleeding were included. All unmarried and pregnant women were excluded from the study population. Ultrasonography was performed, using Toshiba Nemio 20 (Xario Prime with frequency range 7-14 MHz TVS probe). Patients were positioned in a lithotomy position and a TVS transducer was inserted. During the examination, The American Institute of Ultrasound in Medicine (AIUM) guidelines were followed.[10] the privacy of the patient was kept as a priority during the sonographic examination. Uterus was evaluated in the long and short axis view as shown in Figure 1 to 4.

The Following parameters were studied in each case

- Sonographic data regarding the Size and echogenicity of the uterus, endometrial thickness. Were obtained with Gray Scale
- The focal lesion if any, then its echogenicity, location and its relation with endometrium were noticed.

- The uterine artery indices like RI and PI bilaterally were obtained in each case by using Doppler sonography. (Figure 1 to 4)

The frequency and proportion of various causes of abnormal uterine bleeding were tabulated. Data were evaluated with the help of Statistical Package for the Social Sciences (SPSS) software (SPSS 24, IBM, Armonk, NY, United States of America).The mean, standard deviation, and range are used to describe descriptive data. The RI and PI of the uterine artery were compared in various conditions leading to abnormal uterine bleeding.

RESULTS

Table 1: Distribution of Women According to Histopathological Findings

Findings	Frequency	Percent
Adenomyosis	14	8.6
Endometrial carcinoma	4	2.5
Hyperplasia	20	12.3
Leiomyoma's	70	43.3
Non-specific findings	26	16.0
Polyp	28	17.3
Total	162	100.0

Table 2: Mean of Right and Left U-A Pi and Ri According to Histopathological Findings

Histopathological Findings		Rt U-A PI	Rt U-A RI	left U-A PI	left U-A RI
Polyp	Mean	3.15	0.72	1.91	0.74
	N	28	28	28	28
	Std. Deviation	1.46	0.07	0.42	0.02
Hyperplasia	Mean	2.94	0.74	1.98	0.75
	N	20	20	20	20
	Std. Deviation	1.05	0.03	0.50	0.02
Leiomyoma	Mean	3.33	0.83	2.59	0.84
	N	70	70	70	70
	Std. Deviation	1.23	0.03	1.17	0.03
Adenomyosis	Mean	3.16	0.92	2.92	0.92
	N	14	14	14	14
	Std. Deviation	0.60	0.01	0.42	0.01
Endometrial Carcinoma	Mean	2.54	0.52	1.62	0.52
	N	4	4	4	4
	Std. Deviation	1.08	0.01	0.00	0.00
Non-specific Findings	Mean	3.76	1.10	4.19	1.07
	N	26	26	26	26
	Std. Deviation	1.47	0.30	1.85	0.27
Total	Mean	3.31	0.86	2.65	0.86
	N	162	162	162	162
	Std. Deviation	1.33	0.20	1.33	0.18

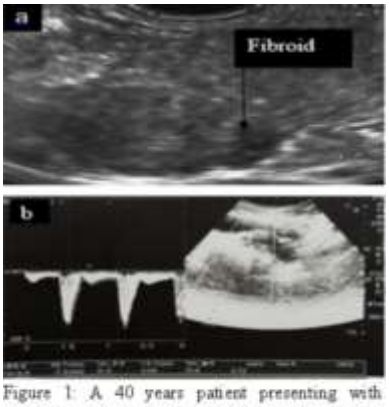

Figure 1: A 40 years patient presenting with abnormal uterine bleeding (a)Grey scale image of her uterus shows posterior wall leiomyoma which is pointed by an arrow (b)Doppler image of the Right U-A show RI=0.84 and PI=2.32

The study was performed on total 162 patients with the mean age of 38 ±5 Years ranging from 18 to 80 years. In this study, the histopathological diagnosis was calculated as shown in TABLE 1. The mean RI of the right and left uterine artery in various causes of abnormal uterine bleeding was given in TABLE 2. In abnormal uterine bleeding the mean RI of Right uterine artery was 0.8 ±0.21 with a significant p value (0.00) while the mean RI in left uterine artery was 0.8 ±0.18 with a significant p value (0.00).

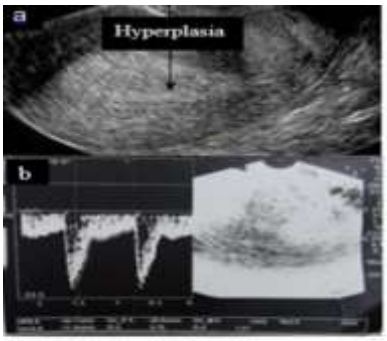

Figure 2: A 36 years patient presenting with abnormal uterine bleeding (a)Grey scale image of her uterus shows endometrial hyperplasia which is pointed by an arrow (b)Doppler image of the Left U-A show RI=0.75 and PI=1.86

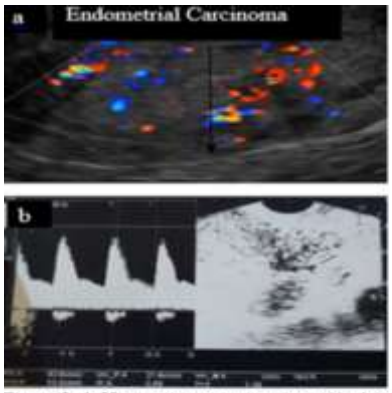

Figure 3: A 55 years patient presenting with abnormal uterine bleeding (a)Grey scale image of her uterus shows Endo Ca, Appointed by an arrow (b)Doppler image of Right U-A artery shows RI=0.56 and PI=1.29

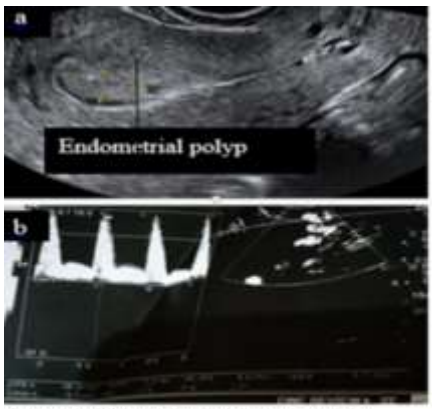

Figure 4: A 39 years patient presenting with abnormal uterine bleeding (a)Grey scale image of her uterus shows endometrial poly as shows in figure by an arrow (b)Doppler image shows left U-A RI=0.77 and PI=2.87

DISCUSSION

Data of 162 patients with the age between 18 to 80 years old from community was included and presented with abnormal uterine bleeding .In this study the mean age of the women reported with abnormal uterine bleeding was 38±5 Years while in another study conducted by Angela Pascual et al was reported 44±6years and Bhattacharjee S et al reported in 2016 in his study that most of the female presented with AUB were belong to age group 30-45 years .[11-12]

It our study the most common cause of abnormal uterine bleeding was leiomyoma's (Figure 1) which were found in about 70 (43.3%) out of 162 cases similarly in a study of N Bhavani et al[13], Bharat Talukdar et al[14], also found that the most common cause of abnormal uterine bleeding are Fibroids. Our study is also comparable with the findings narrated in a prospective study by Shagufta Shaheen et al., in which 47.10% cases had leiomyoma's.[15] Similarly A study conducted Abdel Maboud et al. in which 50 cases were reported with abnormal uterine bleeding, 35 out of 50 cases were benign endometrial lesions causing abnormal uterine bleeding and carcinoma were reported in about 15 cases.[16] So our findings are similar with the findings of this study.

According to Sujith K et al. (2014) titled "Study of histopathological patterns of endometrium in abnormal uterine bleeding" Endometrial hyperplasia was the most common histopathological findings causing abnormal uterine bleeding in about 25% cases while 4% endometrial carcinoma is responsible for lest common causing of abnormal uterine bleeding which is the most common uterine malignancy.[17] In our study,43.3% leiomyoma's (Figure 1)is a major cause of AUB and about 4.6% endometrial carcinoma (Figure 2) which is the least common cause in our study.

A prospective study conducted by Zainab Sami Yaseen, et al, in Iraq showed that the mean uterine artery RI for the endometrial Hyperplasia is 0.77, polyp is 0.78 and in carcinoma it is 0.53.[18] In another study conducted by Dragojević et al. showed that the mean RI for the endometrial carcinoma is 0.52.[19] The results of all these studies are concordant with ous findings since we calculated mean RI OF right and left U-A in polyp 0.72±0.07 and 0.74±0.02 in polyp , 0.74±0.03 and 0.75±0.02 in hyperplasia and 0.52±0.01 and 0.52±0.04 in carcinoma respectively(TABLE 2).

In our study the mean Right and Left U-A PI in polyp (Figure 4) was 3.15 ±1.46 and 1.91 ±0.42 respectively and the mean Right and Left U-A PI in endometrial carcinoma was 2.54 ±1.08 and 1.62±0.00 respectively, A prospective study conducted by Lieng et al. in 2018 showed that mean U-A PI for the endometrial polyp is 1.65±0.82 and for carcinoma is 1.47±0.98.[20] So the Doppler indices calculated in this study is comparable with our findings.

Kucur et al stated in his study that between RI and endometrial pathologies a significant association was represented with negative Correlation and in cancer pathologies than benign endometrial lesions, the mean RI was reported significantly lower.[21]

In the investigation of Abdel Maboud et al. he expressed that the mean RI of uterine arteries in instances of endometrial carcinomas fundamentally lower than in different pathologies.[16]

Bano et al. stated that utilizing RI=0.81 as upper limit/cut off value for differentiating non-malignant and malignant endometrium, 62.5%sensitivity, 53.33% specificity, - 26.3% Positive predictive value and 84.2% negative predictive value.[22]

In this way, that Doppler assessment is useful in the diagnostic workup of endometrial pathologies and it adds more information with the grey scale ultrasound in differentiating non-malignant from malignant endometrial lesions, Their decision concurs by the study of Arslan et al.[23] who expressed that Doppler ultrasound might be useful in patients who had a little risk of endometrial carcinoma and were exposed to invasive procedures.

CONCLUSION

The uterine artery RI in malignant conditions like endometrial carcinoma causing abnormal uterine bleeding is low and in benign conditions like polyp, hyperplasia and fibroids is high. Noninvasive procedure like TVS is a sensitive and specific mean to differentiate the various causes of AUB thereby minimizing the need of invasive procedures. Therefore we recommend its use in Out-Patient departments of gynecology and radiology which will not only minimize the patient admission burden on hospitals but also will save the patients from undergoing invasive procedure. Trans-vaginal Doppler assessment is recommended for the patients having uterine lesions which is the most common cause of abnormal uterine bleeding, to differentiate benign from malignant lesions.

REFERENCES

1. Mahajan N, Aggarwal M, Bagga A. Health issues of menopausal women in North India. J Midlife Health 2012; 3:84-7.
2. Kumar P, Malhotra N. Clinical types of abnormal uterine bleeding. In: Kumar P, editor. Jeffcott's Principle of Gynecology. 7th Ed. New Delhi: Jaypee Brothers Medical Publishers (P) Ltd.; 2008. p. 599.
3. Widrich T, Bradley LD, Mitchinson AR, Collins RL (2006) Comparison of saline infusion sonography with office hysteroscopy for the evaluation of the endometrium. Am J Obstet Gynecol 174:1327–1334
4. Timmerman D, Deprest J, Bourne T, Van den Berghe I, Collins WP, Vergote I (2008) A randomized trial on the use of ultrasonography or office hysteroscopy for endometrial assessment in postmenopausal patients with breast cancer who were treated with tamoxifen. Am J Obstet Gynecol 179:62–70
5. S Kayastha. Study of endometrial tissue in dysfunctional uterine bleeding. Nepal Med Coll J. 2013;15(1):27-30
6. Mohamed MH, Shanab WSA. Role of uterine artery Doppler in assessment of unexplained infertility. Egyptian Journal of Radiology and Nuclear Medicine. 2021;52(1):1-10.
7. Abdelsalam M. Characterization of FemaleInfertilityusing Ultrasonography: Sudan University of Science and Technology; 2021.
8. Gelbaya TA, Potdar N, Jeve YB, Nardo LG. Definition and epidemiology of unexplained infertility. Obstetrical & gynecological survey. 2014;69(2):109-15.
9. Gelbaya TA, Potdar N, Jeve YB, Nardo LG. Definition and epidemiology of unexplained infertility. Obstetrical & gynecological survey. 2014;69(2):109-15.
10. Bacha R, Manzoor I, Gilani SA. Sonographic presentation of rice bodies in subacromial-subdeltoid chronic bursitis. The ultrasound journal. 2019;11(1):16.
11. Pascual A, Graupera B, Tresserra F, Ubeda A, Hereter L, Rodriguez I et al. Color Doppler transvaginal ultrasound for detecting intrauterine disorders in patients with abnormal uterine bleeding; Gynaecol Perinatol. 2005;14(4):157-60.
12. Bhattacharjee S, Jamra Y, Sharma S, Dongre N. A study of role of colour doppler in evaluation of abnormal uterine bleeding at medicine and gynecology departments at a tertiary care institute of central India. Int J Reprod Contracept Obstet Gynecol 2016;5:989-93
13. N Bhavani, Avanthi Sathineedi Aradhana Giri, Sangeeta Chippa, V S Prasannakumar reddy A study of correlation between abnormal uterine bleeding and thyroid dysfunction. International Journal of Recent Trends in Science and Technology. 2015; 14(1):131-135.
14. Bharat Talukdar, Sangita Mahela; "Abnormal uterine bleeding in perimenopausal women coorelation with sonographic findings and histopathological examination of hysterectomy specimen" year. 2016; I7(2):73-77.
15. Goldrath MH, Husain M. The hysteroscopic management of endometrial leiomyomatosis. The Journal of the American Association of Gynecologic Laparoscopists. 1997;4(2):263-7.
16. Abdelmaboud, N. M. & Elsaid, H. H. Role of transvaginal ultrasonography and colour Doppler in the evaluation of postmenopausal bleeding. Egyptian Journal of Radiology and Nuclear Medicine 46, 235–243 (2015).
17. Sajitha K. Shetty K Padma, Jayaprakash Shetty K, Kishan Prasad HL, Harish S Permi. Panna Hedge Study of histopathological patterns of endometrium in abnormal uterine bleeding year. Chris med Journal of health and research 1(2):76-81.
18. Yasmeen ZS, Al-Waely NK, Khazaaii EA. The role of transvaginal and Doppler ultrasound in differentiating benign from malignant endometrial pathologies in women with postmenopausal bleeding. Revista Latinoamericana de Hipertension. 2020 Jul 1; 15(3):206-10.
19. Dragojević S, Mitrović A, Dikić S, Canović F. The role of transvaginal colour Doppler sonography in evaluation of abnormal uterine bleeding. Archives of gynecology and obstetrics. 2005 Apr;271(4):332-5.
20. Erinanc H, Toprak E. Increased expression of nestin and VEGF in endometrial polyps: an immunhistochemical study. Int J Clin Exp Pathol. 2016 Jan 1; 9(7):7458-6
21. Kucur, S. K. Contribution of spiral artery blood flow changes assessed by transvaginal color Doppler sonography for predicting endometrial pathologies. Dicle Medical Journal/Dicle Tıp Dergisi 40, 345–349
22. Bano I. A Study of Endometrial Pathology by Transvaginal Color Doppler Ultrasonography and its Correlation with Histopathology in Post-menopausal Women. 002(April):134–9;
23. Arslan, M. et al. Transvaginal color Doppler ultrasonography for prediction of pre-cancerous endometrial lesions. International Journal of Gynecology and Obstetrics 80, 299–306