



**A PROSPECTIVE STUDY ON ROLE OF ULTRASOUND IN THE EVALUATION OF
UTERINE FIBROIDS IN PERI-MENOPAUSAL FEMALES WITH
HISTOPATHOLOGICAL CORRELATION**

Vivek Kumar Garg¹ and Manjula Sharma*²

¹Department of Radiodiagnosis, NSCB Zonal Hospital Mandi, Himachal Pradesh, India.

²Medical Officer, Civil Hospital, Sundernagar, Himachal Pradesh, India.

***Corresponding Author: Manjula Sharma**

Medical Officer, Civil Hospital, Sundernagar, Himachal Pradesh, India.

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ABSTRACT

Background- Abnormal uterine bleeding (AUB) is a very common and debilitating condition in perimenopausal females with a significantly high morbidity and mortality. Uterine fibroids remain one of the most significant etiologies for AUB. Our goal for this study was to evaluate the role of ultrasounds in assessing uterine fibroids and to find its diagnostic accuracy in the diagnosis of uterine fibroids in comparison to current histopathological tests.

Methods- This was a prospective study conducted at Department of Radiodiagnosis, NSCB Zonal Hospital, (Mandi, Himachal Pradesh), an urban secondary health center in India. The study was carried out for a period of 6 months from March 2021 to August 2021. Based on predetermined criteria of inclusion and exclusion, 60 perimenopausal females were inducted in the study. All the patients enrolled for the study were counselled and due informed consent for the ultrasounds was taken. Statistical analysis was done using IBM SPSS Statistics 20 and sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and diagnostic accuracy were derived. Gold standard test for comparison with ultrasound findings was histopathological evaluation.

Results- A bulk of the uterine fibroids observed were in intramural location, showing hypoechoic echotexture. The sensitivity, specificity, PPV, NPV and diagnostic accuracy in comparison to histopathological correlation was found to be 88.89%, 86.67%, 95.24%, 72.22% and 88.33% respectively. **Conclusion-** Based on our study, it was found that, ultrasound was very sensitive and specific in diagnosing uterine fibroids. Being most of our patient belong to rural background and ample availability of ultrasound in our setup, we propose ultrasound as primary investigative modality for work up of abnormal uterine bleeding in perimenopausal age group.

KEYWORDS: Ultrasound, abnormal uterine bleeding, uterine fibroid, histopathological.

BACKGROUND

AUB is a very significant clinical entity. AUB presenting as heavy menstrual bleeding is a common condition affecting approximately 14-25% of women of reproductive age group^[1,2] and may have significant impact on their physical, social, emotional and material quality of life.^[3] Along with the direct impact on the woman and her family, there are significant costs to both economy and health service. A US study reported financial losses of >\$2000 per patient per annum due to work absence and home management costs.^[4] As India is still a developing country and most of our patients come for a rural back ground and limitation of advanced diagnostic techniques limited to metropolitan cities, prompt and cost friendly diagnosis of uterine fibroids is of utmost importance. Patients with abnormal uterine bleeding constitute around 5-10% of cases visiting the outpatient gynaecological clinic. Uterine fibroids are the most common cause of abnormal uterine bleeding in perimenopausal age group. Fibroids occurs in 20-40% of

women during reproductive age and 11-19% in perimenopausal age.^[5] The slow growing asymptomatic fibroids are seen more frequently in 30% of multiparous women belonging to perimenopausal age. They are considered as the most common benign tumor in this age group.^[6] They are derived from smooth muscle cells with intervening fibrous tissue in between.^[7] Fibroids are associated with subfertility, miscarriage, preterm labour and obstruction of labour. In addition, they may cause discomfort and pressure symptoms, typically urinary. In rare circumstances, at larger sizes, they may cause compression of the renal tract and pelvic vasculature leading to impaired renal function and venous thromboembolism, respectively. Conversely, many women with fibroids will be entirely asymptomatic.^[8] However, many women most commonly present to gynaecological services with AUB and associated iron-deficiency anaemia. For women with uterine fibroids, everyday life is often disrupted and fibroids remain a leading indication for hysterectomy.^[9,10] Depending upon

the location of uterine fibroids in the uterine parenchyma, they can be further sub-divided into 3 main types, intramural (arising from myometrium), submucosal (noted within the endometrium) and subserosal (lying beyond serosal layer of uterus). The most common fibroids are intramural. Submucosal fibroids are although rare but present with severe bleeding.^[11] The current modalities of diagnosis of Uterine fibroids are hysteroscopy with tissue sampling for histopathological correlation or cross-sectional imaging techniques like ultrasound or Magnetic resonance imaging (MRI). The major drawback of hysteroscopy is requirement of anesthesia, invasiveness and lack of affordability.^[12,13] MRI albeit superior to ultrasound in imaging of uterine fibroids has its own limitations in the form of limited coverage of MRI in India, time consuming and financial implications of MRI in comparison to ultrasound. Ultrasound however due to its multiple recent advancements and cost friendly nature, has evolved as first line imaging modality for precise evaluation of size, number and location of fibroid, thereby making it possible to plan appropriate treatment algorithm for patients.^[14] Formation of necrotic degeneration, calcification, hyaline degeneration or haemorrhagic degeneration are some of the common complications of uterine fibroids.^[15]

Despite of presence of proper history and physical examination, Gynaecologists are often unable to identify the cause of abnormal menstrual bleeding. Newer Diagnostic modalities and techniques are emerging over time thereby helping gynaecologists to plan an appropriate treatment algorithm for patients with menstrual ailments. Previously dilatation and curettage were considered as investigation of choice to diagnose an intrauterine lesion. It is an invasive procedure performed under anesthesia, at times becomes risky in patients with recurrent bleeding.^[16] Our hospital being a caterer to a large population of rural area, several of whom are females with complaints of perimenopausal bleeding. Abnormal uterine bleeding remains an important cause of mortality and morbidity in our rural setup. Ultrasonography plays a pivotal role in the assessment of abnormal uterine bleeding due to its wide availability, good resolution, low cost and no risk of radiation exposure. The aim of our study was to study the role of ultrasounds in the detection of uterine fibroids among 60 perimenopausal women who presented to gynaecological department with complaints of abnormal uterine bleeding and to compare diagnostic accuracy with gold standard test of histopathological correlation.

METHODS

This study was carried out in the Department of Radio-diagnosis, Netaji Subhash Chandra Bose Zonal Hospital Mandi, a secondary care urban health hospital, which caters to a large rural population of surrounding areas. It was a cross sectional form of study conducted over a span 6 months (March 2021 – August 2021). The sample size for this study was selected on the basis of predefined

exclusion and inclusion criteria. Study population included 60 perimenopausal females in 40-50 years of age group who visited gynaecology clinic with complaints of abnormal menstrual bleeding or alteration in menstrual cycles. Patients with abnormal bleeding in other age groups that is before 40 years and beyond 50 years were excluded. Those not giving consent for study, post-operative patients and those undergoing treatment for other gynaecological malignancy were also excluded.

Ethical clearance was obtained from the institution. Whole procedure was explained to the patient prior to the beginning of ultrasound examination and consent was obtained from them. A female attendant was always present with patient during ultrasound examination. Transabdominal scan with full bladder was performed using 3-5 MHz convex probe and whenever needed transvaginal scan using 5-11 MHz probe frequency with empty bladder. Patient was asked to lie down comfortably in a supine position. Transabdominal probe was placed in the suprapubic area over the bladder and was caudally angled to obtain longitudinal section of uterus, cervix and vagina. Then the orientation was changed to transverse section by angling the probe. While doing so, vaginal walls, cervix and body of uterus were studied. For transvaginal scan, the patient was placed in the lithotomy position after having emptied her bladder. Transvaginal probe was covered with sterile latex condom and secured by a rubber band in order to prevent cross-contamination. Before the condom was pulled over the shaft of the probe, a small amount of acoustic gel was inserted inside the tip of the condom. Further to facilitate the probe insertion, it was coated with the acoustic gel. The transducer was inserted into the vagina. Initially, a longitudinal scan was done followed by transverse scan. Ultrasound findings were noted in terms of size, shape, location, echogenicity of fibroid was noted. Vascularity was assessed with colour Doppler. Patients subsequently underwent Dilatation & Curettage or endometrial biopsy or Hysterectomy procedure as indicated by the gynaecologists. These tissue specimens were then sent to the Histopathology section of Department of Pathology. Later on, tissue processing was done followed by routine haematoxylin and eosin staining. Ultrasound finding were confirmed by histopathology.

STATISTICAL ANALYSIS

Statistical analysis was done using IBM SPSS Statistics 20 and sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and diagnostic accuracy were derived.

RESULTS

Table 1: Most of the fibroids detected on ultrasound were of intramural type, accounting for 83.3 % of cases (50 cases).

Echogenicity of fibroid	Number	Percentage
Hypoechoic	40	66.6%
Isoechoic	5	8.3%
Hyperechoic	5	8.3%
Heterogenous	10	16.6%
Total	60	100%

Table 2: 7(11.6%) cases were found to be in submucosal location whereas only 3(5%) cases were noted in subserosal location.

Location of fibroids	Number	Percentage
Intramural	50	83.3%
Submucosal	7	11.6%
Subserosal	3	3.5%

Out of 60 sonographically detected fibroids, 40 were confirmed on histopathological correlation to be uterine leiomyomas. Hematoxylin & Eosin-stained section confirmed findings of fibroid showing smooth muscle bundle arranged in fascicles or whorls and are separated by intervening fibrovascular stroma in between.

Table 3: Ultrasound with Histopathological Correlation in Evaluation of Fibroids.

		Histopathological Diagnosis		Total	Sensitivity	Specificity	PPV	NPV	Accuracy
		Positive	Negative						
Ultrasound	Positive	40	2	42	88.89%	86.67%	95.24%	72.22%	88.33%
	Negative	5	13	18					
Total				60					

The sensitivity of ultrasound in detecting fibroid was found to be 92.11%. Specificity was 91.67%, the positive predictive value (PPV) was 97.22% and negative predictive value (NPV) was 78.57%. Ultrasound had a diagnostic accuracy of 92% {Table 3}.

DISCUSSION

Uterine fibroids are slow growing benign tumours arising from smooth muscle cells of the myometrium. Slow growing asymptomatic fibroids grow to huge size with minimal menstrual disturbances.^[6] They often present with pressure symptoms in multiparous women. Most of these are intra mural fibroids which are confined to the myometrium. Often the patient reports with feeling of heaviness of abdomen and lower abdominal pain. Another distressing feature of uterine fibroids is abnormal uterine bleeding in the form of heavy bleeding, heavy and prolonged menstrual cycle, irregular or intermenstrual bleeding. Abnormalities in menstrual patterns may lead to significant debilitating health problems in females. Uterine fibroids have attributed to major cause of bleeding in perimenopausal period. Detailed evaluation of these patients through proper clinical examination and imaging modalities like

ultrasonography plays an instrumental and decisive role in finding out the exact cause of abnormal bleeding, thereby aiding gynaecologists and surgeons to plan an appropriate treatment and surgical intervention if required. This study aims at evaluating fibroids or leiomyomas through ultrasound modality and correlating them with histopathological findings. In the present study, out of 60 ultrasound detected fibroids, majority of the fibroids were found to be intramural in location comprising 83.3% followed by fibroids in submucosal region (11.6 %). Similar findings were reported by Sarkodie BD et al.^[17] who carried out a study on Ghanaian women and evaluated ultrasound characteristics and patterns of uterine fibroids. He found a predominance of intramural fibroids comprising 57.8%. Subserosal fibroid were reported to be second most common type of leiomyomas in his study. Study conducted by Handa K et al.^[18] on ultrasound evaluation of uterine fibroids reported predominance of intramural fibroids followed by submucosal fibroids.

Most of the fibroids on ultrasound appear as hypoechoic masses with whorls of blood vessel surrounding the lesion, clearly seen on colour-doppler (figure 1,2).

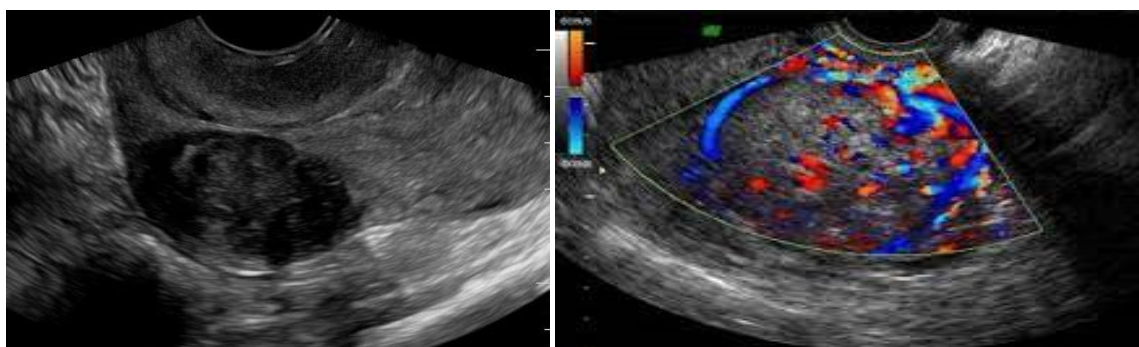


Figure 1: A well-defined hypoechoic mass lesion in intra-mural location noted involving posterior myometrium on trans-vaginal ultrasound.

Figure 2: Colour doppler showing large vessels surrounding the hypoechoic lesion with vascular pedicles seen entering the lesion.

Our study also clearly indicates that the most common type of echogenicity of uterine fibroid is hypo echogenicity(66.6%) with intra-mural location as the most common location(83.3%). During pathological study of tissue specimen, Hematoxylin and Eosin [H and E] stained section showed smooth muscle cells arranged in whorl pattern with intervening fibrovascular stroma suggestive of fibroid. In the present study it was observed that the sensitivity, specificity, positive predictive value and negative predictive value of sonography for intrauterine fibroid was found to be 88.89%, 86.67%, 95.24%, 72.22% and 88.33% respectively. The diagnostic accuracy of ultrasound was found to be Talukdar B *et al.*^[19] studied the sensitivity, specificity, positive predictive value, negative predictive value of uterine fibroids which was 89.13%, 89.47%, 87.23%, 91.07% respectively, which was similar to our study. Study conducted by Hanafi M *et al.*^[20] showed sensitivity, specificity, positive predictive value and negative predictive value of fibroid was 96.38%,96%,99.25%and 82.76% respectively. These findings are concordant with our present study. Dipi RM *et al.*^[21] showed that sensitivity, specificity, positive predictive value, negative predictive value of transabdominal sonogram for uterine fibroid was 88.9%, 88.6%, 80% and 93.9% respectively while that of Transvaginal sonography [TVS] was 94.9%, 91.4%, 85% and 97% respectively.

CONCLUSION

As indicated in our study and also in the previous studies mentioned, it is absolutely clear that, ultrasound whether transabdominal or transvaginal plays a pivotal role in the accurate diagnosis of uterine fibroids. Ultrasound, mainly transabdominal, should be as a first line investigative modality in patients who suffer from abnormal uterine bleeding by offering the advantage of being non-invasive. Moreover, it is cost effective, safer, and widely accessible. It aids gynaecologists by providing detailed information about the location, size, characteristics and vascularity of the fibroids and also determines its relation to adjoining pelvic organs. This helps in formulating a suitable medical or surgical management workup for the patients. Though it cannot substitute histopathology which is considered as the gold standard but definitely improvises detection of fibroids or leiomyoma and contributes by reducing false positive results. Better diagnostic accuracy of fibroid on ultrasound diminishes invasive procedures in patients. It is a non-ionising and affordable modality for patients. Ultrasound is a best diagnostic tool in developing countries like India where majority of the population is rural based and cannot afford the cost of CT and MRI.

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