

## “Role of Three Dimensional Transvaginal Ultrasound in the Assessment of Uterine Lesions”

Dr. Naitri Vipinbhai Patel

(3<sup>rd</sup> year Resident in SMIMER Medical College, Surat).

1. Dr. Nipa Patidar (Associate Professor, SMIMER Medical College, Surat)
2. Dr. Kishan Padaliya (Senior Resident, SMIMER Medical College, Surat)
3. Dr. Nehal Diwanji (Professor, SMIMER Medical College, Surat)
4. Dr. Kejal Patel (3<sup>rd</sup> year Resident, SMIMER Medical College, Surat)
5. Dr. Avni Virolia (2<sup>nd</sup> year Resident, SMIMER Medical College, Surat)

---

### **Aims and Objectives: -**

To evaluate the value of Transvaginal 3D ultrasonography in the detection of uterine pathology and uterine anomalies .

### **Materials and methods:**

We included 30 patients in our study, age range between 21-40 years. The main complaint of these patients was either vaginal bleeding and reproductive failure (recurrent abortion or infertility). Procedure done: 2D Transvaginal Sonography and 3D Transvaginal Sonography for all cases in lithotomy position.

### **Result –**

Among 30 patient examined using 2D and 3D transvaginal ultrasonography .

Nine cases had normal uterine cavity and no uterine pathology. Three patients had endometrial polyps . Five patients had uterine fibroids either single or multiple. Five patients had uterine cavity anomalies. Seven cases had thickened endometrium . One cases had ectopic pregnancy. 2D transvaginal ultrasound failed to diagnose one patient with uterine fibroid and 3 patients with uterine anomaly which were detected on 3D transvaginal ultrasound. Furthermore 3D transvaginal ultrasound determining the exact location of uterine fibroids which further aids in management decisions

### **Conclusion –**

- 3D Transvaginal ultrasonography is a useful tool especially in investigation of uterine anomalies.
- 3D Transvaginal ultrasonography more helpful, especially when it comes to determining the exact location of uterine fibroids which further aids in management decisions
- 3D Transvaginal ultrasonography can be used as an added tool for uterine lesion to increase accuracy and to lower the rate of missed diagnosis.

**Keywords: -** 2D and 3D Transvaginal Sonography, Uterine anomalies , Uterine pathology.

---

Date of Submission: 13-02-2023

Date of Acceptance: 26-02-2023

---

### **I. Introduction**

Two-dimensional ultrasound (2DUS) is commonly used for assessing uterine and endometrial pathology. This technique is widely used as a first line imaging technique in women with suspected uterine pathology and its role for diagnosing different uterine and endometrial anomalies has been well-established. It has been shown that this technique is useful in the diagnosis of some kinds of uterine congenital malformations, fibroids, adenomyosis and endometrial polyps. The uterine lesions examined with Transvaginal 2D Ultrasonography are confined to the transverse and sagittal planes, which can provide an insufficient view of the uterus and its associated pathologies (1). 3D U/S is a simultaneous multiplaner 3 axis sectional image presented on the same screen. All three planes are located in a separate window and each of them can be rotated at 90 degrees to each other in all three axis.(2) The uterus can be visible in the coronal plane on 3D Ultrasonography scans, which is rarely observed on standard B-mode scans. Transvaginal 3D Ultrasonography therefore provides a unique diagnostic tool for non-invasive detection of congenital uterine abnormalities and uterine pathology.(3)

## II. Materials And Method

The study was conducted in SMIMER Hospital. Cases were recruited from the outpatient gynecological clinic . 30 Cases were included in the study period between September 2022- December 2022. They were recruited based on their complaint which were either vaginal bleeding and reproductive failure (recurrent abortion or infertility).

Age range between 21-40years.

We performed 2D and 3D Transvaginal ultrasound on Voluson S8 sonography machine

Patient is given lithotomy position.

The 2D TV Ultrasound images were acquired first. With the transducer positioned in the sagittal plane of the body, a minimum of two longitudinal sections of the uterus were recorded.

The 3D TV Ultrasound images were acquired by displaying a B-mode image of a longitudinal section through the uterus with ET in the midline. The ‘region of interest’ was set to include the whole of the uterus, and the angle of acquisition was set at 80°. The 3D TV US was initiated and the transducer automatically swept through the outlined region. Postprocessing was applied to the 3D volumes to create the reconstructed coronal section through the uterus.

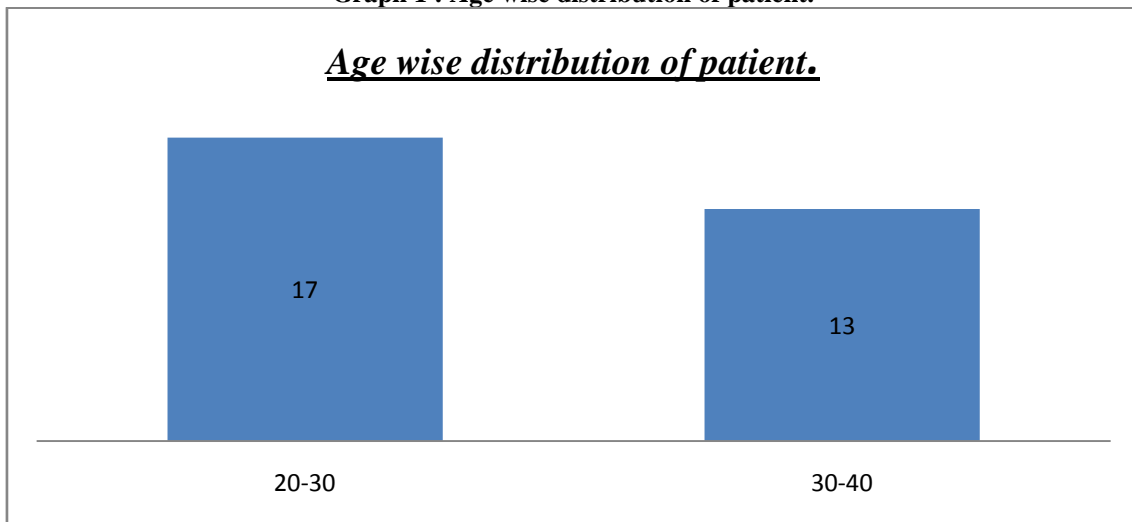
## III. Result

We examined 30 patient by both Transvaginal 2D and 3D Ultrasonography in age group ranging from 21-40 years who presented with complains of vaginal bleeding and reproductive failure (recurrent abortion or infertility).

**30 female patients were examined, majority between age 20-30. (Age ranging form 21-40) .( Graph 1)**

**Most common chief complain being abnormal uterine bleeding. (Table1)**

**Graph 1 : Age wise distribution of patient.**



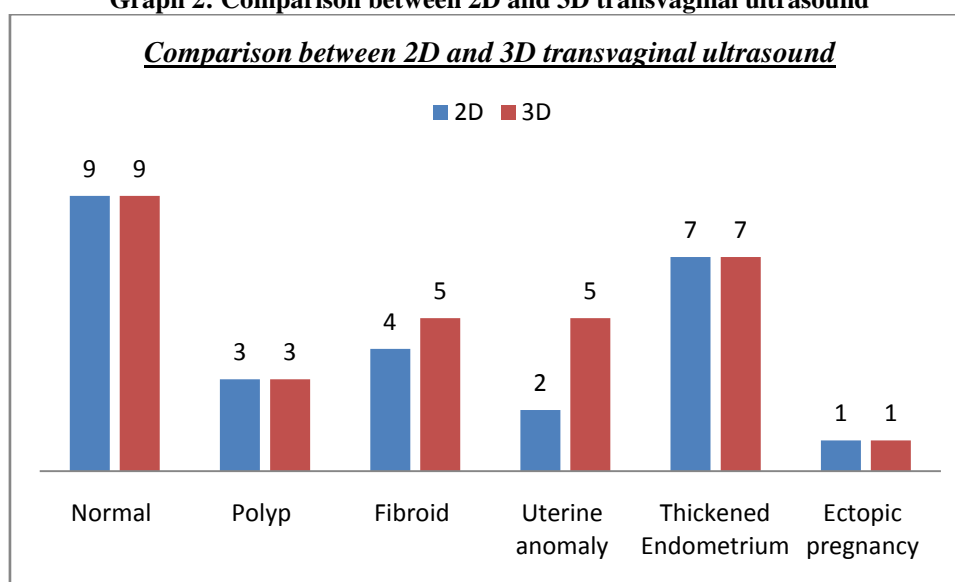
**Table 1: Chief complaints of the patients**

Complaints	Number of patients
Abnormal uterine bleeding	21
Recurrent pregnancy loss or infertility	09
Other associated complain: Lower abdominal Pain, Loss of weight, Weakness	05

**Table 2: Comparison between 2D and 3D transvaginal ultrasound**

Findings	2D	3D	Total
Normal	9	9	9
Polyp	3	3	3
Fibroid	4	5	5
Uterine anomaly	2	5	5
Thickened Endometrium	7	7	7
Ectopic pregnancy	1	1	1

**Graph 2: Comparison between 2D and 3D transvaginal ultrasound**



Among 30 patient examined using 2D and 3D transvaginal ultrasonography .

**A. Nine cases had normal uterine cavity and no uterine pathology. The findings were similar both in 2D and 3D transvaginal sonography. (Figure 1)**

**B. Three patients had endometrial polyps which were efficiently diagnosed both in 2D and 3D transvaginal sonography.**

**C. Five patients had uterine fibroid either single or multiple. 2D transvaginal sonography could detect only four cases of singular/multiple fibroid. 3D transvaginal sonography could detect fibroids more efficiently along with the exact relation/location of fibroid in the uterus.**

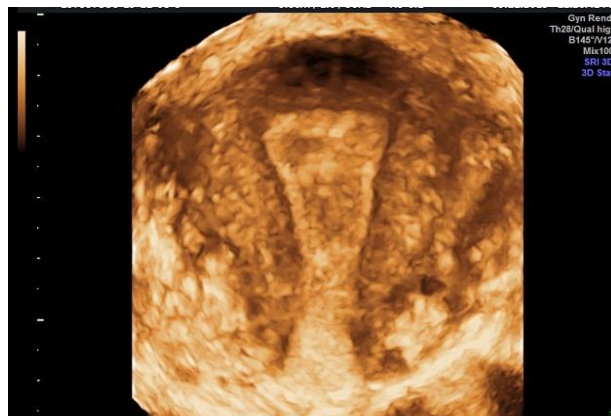
**D. Five patients had uterine cavity anomalies, among which 2D transvaginal ultrasound could only diagnose two uterine anomaly. 3D transvaginal ultrasound aided in diagnosing three more patients with uterine anomaly. (Figure 2 , Figure 3 , Figure 4)**

**E. Seven cases had thickened endometrium . The findings were similar both in 2D and 3D transvaginal sonography. Both were equally efficient.**

**F. One case had ectopic pregnancy. Though 2D transvaginal ultrasound could detect the cornual pregnancy, 3D transvaginal ultrasound could precisely locate the lesion with adjacent involvement. (Figure5 , Figure 6)**

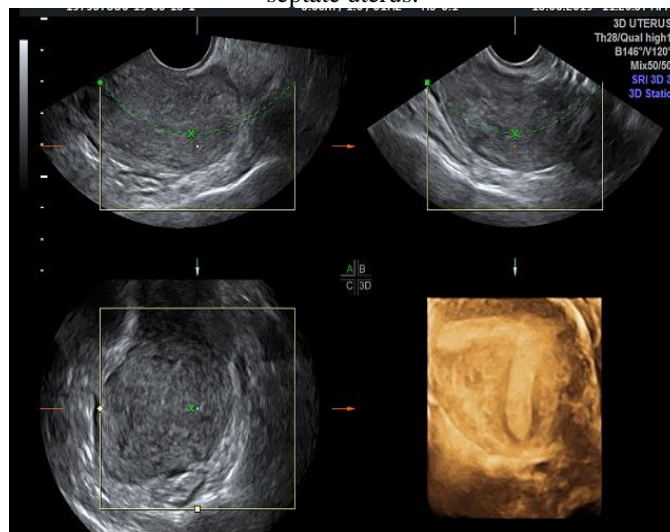
**Figure 1**

A 32 years old female patient presented with history of abnormal vaginal bleeding. Transvaginal 2D and 3D sonography was performed and the study was normal for this patient.



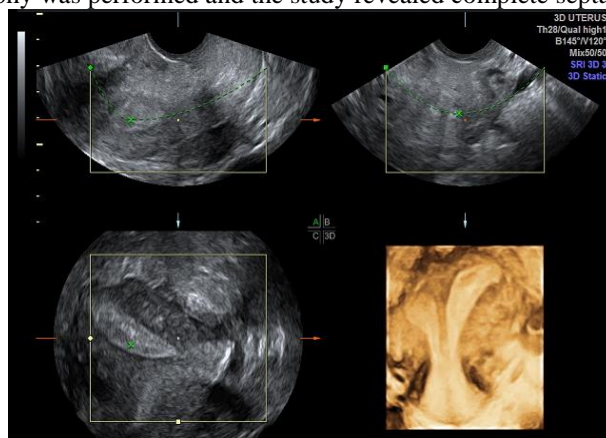
**Figure 2:**

A 28 years old female patient presented with history of repeated misabortion. Transvaginal 2D sonography was performed and the study was normal for this patient. However Transvaginal 3D sonography revealed partial septate uterus.



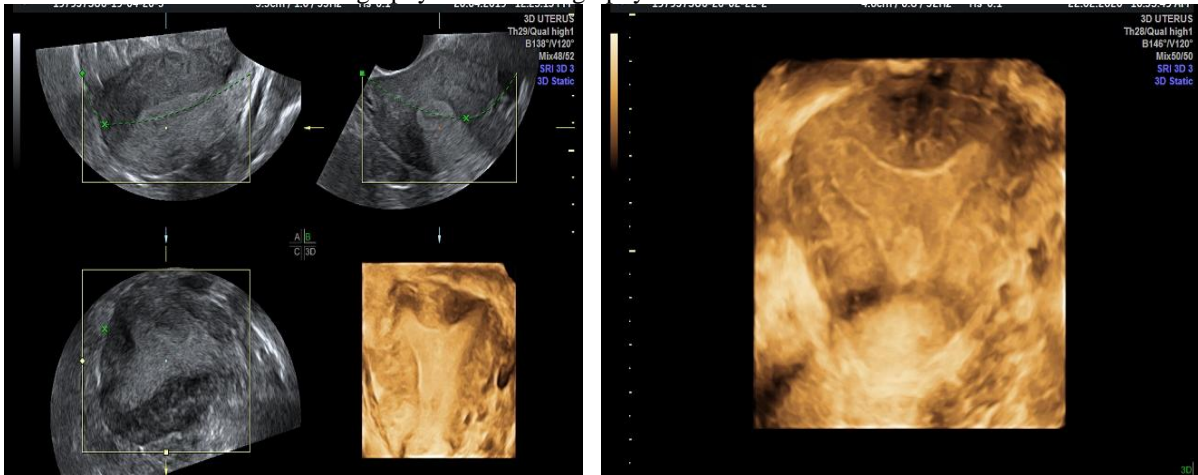
**Figure 3:**

A 26 years old female patient presented with history of primary infertility. Transvaginal 2D sonography and 3D sonography was performed and the study revealed complete septate uterus.



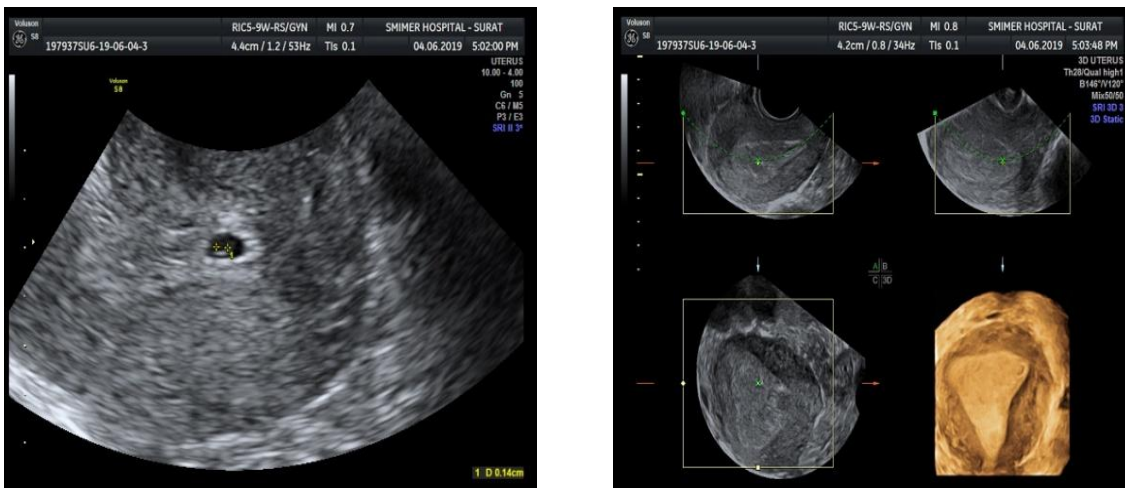
**Figure 4 :**

A 28 years old female patient presented with history of abnormal vaginal bleeding . Transvaginal 2D sonography and 3D sonography showed arcuate uterus.



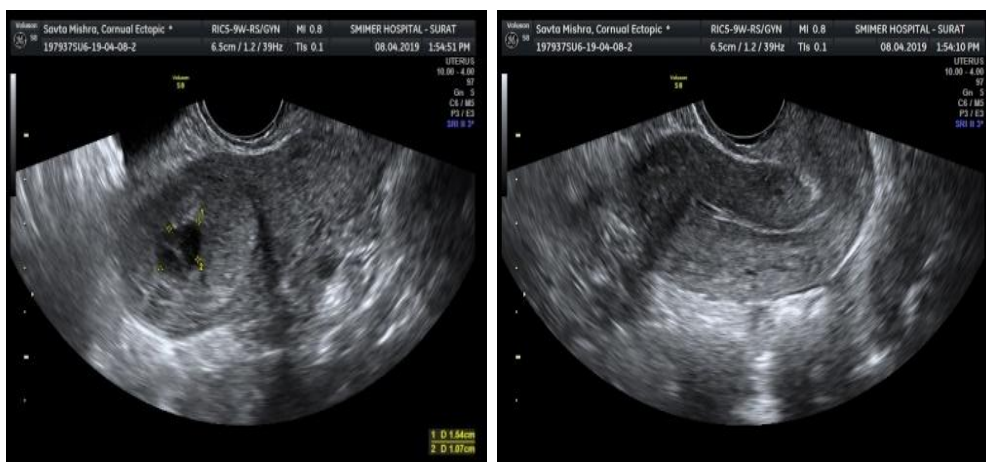
**Figure 5 :**

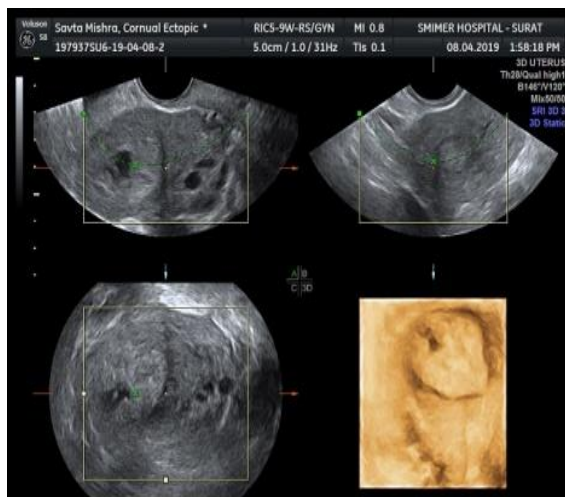
A 23 years old female patient presented with history of abnormal vaginal bleeding . Transvaginal 2D sonography and 3D sonography showed normal intrauterine pregnancy.



**Figure 6 :**

A 32 years old female patient presented with history of abnormal vaginal bleeding and abdominal pain. Transvaginal 2D sonography and 3D sonography was conducted and study revealed cornual ectopic pregnancy





#### IV. Discussion

Transvaginal 2D sonography is widely used as a screening method for uterine pathology, however with the advent of 3D transvaginal ultrasonography, this has clearly been called into question, particularly with regard to uterine cavity anomalies and uterine cavity lesions.

Being easy, non invasive office procedure it definitely surpass the HSG( hysterosalpingography) in evaluating the uterine cavity being a rather minimal invasive test whereas HSG is invasive with requiring the use of iodinated contrast agents and exposure to radiation. Further more it visualize the frontal plane of the uterus which is not seen by HSG. (4)

Two dimensional sonography has various restrictions even though it is frequently used due to its adaptability and affordable price. In comparison to other approaches, the sensitivity of 2D transvaginal ultrasound is quite poor, especially when demonstrating fundal contour. The coronal image of the uterus, which is typically not possible on 2D transvaginal ultrasound, is one of the most helpful scan planes obtained on 3D transvaginal ultrasound. (4) This perspective is a useful tool for problem solving since it helps to distinguish between distinct Mullerian duct anomalies, such as didelphys uteri, septate, unicornuate, and bicornuate. (5) Data gathering is quick, and images can be saved for subsequent analysis and repeated as often as needed.

Fibroids or uterine myomas are common. They are typically categorised as intramural, subserosal, and submucosal depending on where they are found. Submucosal fibroids are a frequent cause of subfertility, early pregnancy loss, and irregular uterine bleeding. An accurate determination of the location of the uterine fibroids is necessary for minimally invasive surgery to treat them. A hysteroscopic treatment called transcervical excision of submucosal uterine fibroids makes it possible to remove fibroids without performing open surgery. Despite the fact that the diagnostic accuracy of 2D and 3D transvaginal ultrasounds is nearly identical, the spatial and reconstructed image of the uterus produced by the 3D frontal view is more helpful, especially when it comes to determining the exact location which further aids in management decisions.(6)

The same is applied for the endometrial thickness and the diagnosis of Hyperplasia where the volume of the endometrium measured by 3D transvaginal ultrasound may offer a better chance in proper evaluation of the management. (7)

The diagnosis of uterine ectopic pregnancy can be made with 2D transvaginal ultrasound, but a 3D transvaginal scan can provide precise location information, such as the distinction between angular and cornual, cervical, and scar lesions, allowing for more precise diagnosis in every situation.(8)

#### V. Conclusion

- 3D Transvaginal ultrasonography is a useful tool especially in investigation of uterine anomalies.
- 3D Transvaginal ultrasonography more helpful, especially when it comes to determining the exact location of uterine fibroids which further aids in management decisions
- 3D Transvaginal ultrasonography can be used as an added tool for uterine lesion to increase accuracy and to lower the rate of missed diagnosis.

#### Financial support and sponsorship:

Nil.

#### Conflicts of interest:

There are no conflicts of interest.

### References

- [1]. Merz.E. Three dimensional transvaginal ultrasound in gynecological diagnosis. *Ultrasound Obstet Gynecol* 1999; 4: 81-6
- [2]. Steiner H, Staudach A, Spitzer D, Graf AH, Wienerroither H. 3D ultrasound in obstetrics and gynecology: technique, possibilities and limitation. *Hum Reprod* 1994; 9: 1773-8
- [3]. Balen.FG, Allen CM, Gardener JE, Siddle.NC, Lees WR. Three-Dimensional reconstruction of ultrasound images of the uterine cavity. *Br J radiol* 1993; 66: 588-91.
- [4]. Smith B. The Practical Application and Clinical Use of Modern 3D Ultrasound Technology in Gynaecology, Europe: Toshiba Medical Systems Corporation, 2011. 12. Abuhamad A. The Z technique: an easy approach to the display of the mid-coronal plane of the uterus in volume sonography. *J Ultrasound Med* 2006; 25: 607–12.
- [5]. Salim R, Woelfer B, Backos M, Regan L, Jurkovic D. Reproducibility of three-dimensional ultrasound diagnosis of congenital uterine anomalies. *Ultrasound Obstet Gynecol.* 2003;21:578–582
- [6]. Wamsteker K, Emanuel MH, de Kruif JH. Transcervical hysteroscopic resection of submucous fibroids for abnormal uterine bleeding: results regarding the degree of intramural extension. *Obstet Gynecol.* 1993;82:736–740.
- [7]. Gruboeck K, Jurkovic D, Lawton F, Savvas M, Tailor A, Campbell S. The diagnostic value of endometrial thickness and volume measurements by three-dimensional ultrasound in patients with postmenopausal bleeding. *Ultrasound Obstet Gynecol.* 1996;8:272–276.
- [8]. Tanaka Y, Mimura K, Kanagawa T, Kajimoto E, Takahashi K, Kakigano A, et al. Three-dimensional sonography in the differential diagnosis of interstitial, angular, and intrauterine pregnancies in a septate uterus. *J Ultrasound Med.* 2014;33:2031–2035.

Dr. Naitri Vipinbhai Patel, et. al. “Role of Three Dimensional Transvaginal Ultrasound in the Assessment of Uterine Lesions.” *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 22(2), 2023, pp. 59-65.