

**EVALUATION OF DYSFUNCTIONAL UTERINE BLEEDING BY  
TRANSVAGINAL SONOGRAPHY VERSES  
HYSTEROSCOPY AND ITS CORRELATION WITH  
HISTOPATHOLOGY**

**DISSERTATION SUBMITTED IN FULFILLMENT OF THE  
REGULATIONS FOR THE AWARD OF  
M.D. OBSTETRICS AND GYNAECOLOGY**



**DIVISION OF OBSTETRICS AND GYNAECOLOGY**

**PSG INSTITUTE OF MEDICAL SCIENCES & RESEARCH**

**THE TAMILNADU DR.M.G.R. MEDICAL UNIVERSITY**

**GUINDY, CHENNAI, TAMILNADU, INDIA.**

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## CERTIFICATE

This is to certify that **dr. B. Yogeta** has prepared this **Dissertation Entitled Evaluation Of Dysfunctional Uterine Bleeding By Transvaginal Sonography Versus Hysteroscopy And Its Correlation With Histopathology**, under my overall supervision and guidance in the institute of psg institute of medical sciences and research, coimbatore in partial fulfillment of the regulations of tamil nadu dr . m.g.r medical university for the award of m.d. degree in obstetrics and gynaecology.

GUIDE

## **DECLARATION**

I hereby declare that this dissertation entitled EVALUATION OF DYSFUNCTIONAL UTERINE BLEEDING BY TRANSVAGINAL SONOGRAPHY VERSUS HYSTEROSCOPY AND ITS CORRELATION WITH HISTOPATHOLOGY was prepared by me under the direct guidance and supervision of Dr.prof T.V. CHITRA MD,DGO,DNB,PSG hospitals,coimbatore. The dissertation is submitted to the Dr M.G.R medical university in partial fulfillment of the university regulations for the award of MD degree in obstetrics and gynaecology.This dissertation has not been submitted for the award of any degree or diploma.

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## **INTRODUCTION:**

Dysfunctional uterine bleeding is defined as a state of abnormal uterine bleeding without any clinically detectable organic pelvic pathology. Currently it is defined as a state of abnormal bleeding due to anovulatory cycles.

Abnormal uterine bleeding can arise from a bewildering number of sources. Some of the few common conditions causing “**ABNORMAL UTERINE BLEEDING**” for which the reproductive age women approach gynecologist are

Anovulation associated

Pregnancy complications

Submucous Fibroids

Endometrial Polyps

Infection associated

Coagulation Abnormalities

IUD Complications

The Primary goal in evaluation of abnormal uterine bleeding is to establish specific diagnosis in the most efficient and least invasive manner possible. History and physical examination would provide a sound base for further evaluation.

However, a contemporary, safe and comprehensive evaluation relies on diagnostic procedures, which makes the core of this study. Off the various

etiologies for AUB, this study aims at evaluating endometrial polyps, Anovulation, submucous fibroids and endometrial Hyperplasia in particular.

This study was undertaken to analyze the accuracy of Transvaginal sonography Verses Hysteroscopy and its correlation with histopathology for the diagnosis of DUB.

Various diagnostic procedures are used and being used in the diagnosis of DUB starting with history and physical examination followed by various diagnostic methods but now, the current trend is the use of Hysteroscopy.

### **Hysteroscopy:**

The history of hysteroscopy can be divided into three periods.

- Early period - During which, for technical reasons contact hysteroscopy was a necessity
- Middle period - During which panoramic hysteroscopy was introduced
- Late period - Period during which panoramic ,contact and micro hysteroscopy with modern technology

The use of Hysteroscopy dates back to 18<sup>th</sup> century when it was first used by Desormeaux (1865) followed by Pantaleoni (1869) for isolating uterine polyp and cauterisation. Nitze (1879) used endoscope marking the modern beginning of hysteroscopy.

### **Techniques of Hysteroscopy:**

In the presence of excessive uterine bleeding (or) menstruation, hysteroscopy cannot be performed satisfactorily regardless of the distending medium and should therefore be avoided.

To perform hysteroscopy during an episode of bleeding either because of an emergency or due to medical treatment requires skill and the difficulties depends on

- The magnitude of bleeding
- The available instrumentation.
- The technique used
- The experience of hysteroscopist



## 1. CO<sub>2</sub> DISTENDING MEDIUM

The presence of blood can cause

- The formation of gas bubbles
- Obstruction of the gas channels by blood clots.
- The pressure of gas will force a pool of blood over the posterior wall leaving the cornua abnormalities undetected at this site.

## 2. DEXTRAN: (HYSKON)

- First used to clear cavity of blood,
- Anaphylactic reaction
- Fluid overload.
- Electrolyte imbalance

## 3. CONTACT HYSTEROSCOPY:

Instruments maintain contacts with mucosa there by presenting  
technique modification

## RECENT ADVANCES:

Endoscopies with 6mm or less calibre which can be easily inserted without cervix dilatation and it has light source by fiberoptic mechanism to provide a clear field.

## HYSTEROSCOPIC FINDINGS IN PATIENTS WITH DUB:

1. Reproductive age -

Submucous fibroids, endometrial Hyperplasia

Endometrial polyps most common pathology

2. Pregnancy related bleeding

3. Menopausal

Hyperplasia, polyps, myomas Endometrial carcinomas

Endometrial Atrophy

**NORMAL ENDOMETRIUM**

The different physiological stages of endometrium is determined based on four criteria

1. Thickness
2. Colour
3. Vasculature
4. Consistency of mucous membrane

Normal endometrium undergoes continuous change throughout menstrual cycle.

At the end of late proliferative phase when the mucosa reaches the peak of its thickness it appears as hyperplasia.

Thick indurated pale pink mucosa with tiny vessels that fragments on pressure.

**SECRETORY PHASE:**

The mucosa is thin and wavy but its color becomes grayish translucent with numerous vessels under caliber and sinus in shape.

### **HYPERPLASIA:**

- Simple Hyperplasia - resembles preovulatory endometrium
  
- Polypoid Hyperplasia - easy to make out with panoramic hysteroscopy.
  
- Cystic hyperplasia - clearly visible in contact hysteroscopy
  
- Focal hyperplasia - Missed by curetage/hysterogram

### **FEATURES SUGGESTIVE OF ENDOMETRIAL HYPERPLASIA**

- Increased Endometrial thickness
- Non homogenous endometrial regeneration
- Increased vascularisation
- Ciliate images
- Cystic dilatation
- Necrotic areas
- Polypoidal formations
- Irregular arrangement and concentration of the glandular orifices.

If one or more of the above feature suggest the diagnosis of endometrial hyperplasia confirmation would be made based on endometrial biopsy.

### **FUNCTIONAL POLYPS:**

1. Lined with mucosa and respond to ovarian hormones
2. Small in size
3. Participate unevenly in menstrual shedding
4. Broad based and soft with color and vasculature resembling surrounding endometrium.

Differential Diagnosis – Focal Hyperplasia.

### **Non-Functional Polyp's:**

1. Insensitive to progesterone
2. Sensitive to estrogen
3. Increase in size with long pedicle and gets flattened between uterine walls
4. Triangular in shape
5. Red yellow in color with distal end ecchymosis
6. Mobile and slips away from hysteroscope

### **SUBMUCOUS MYOMA'S:**

1. Round protrusion slugging towards the uterine lumen.
2. Overlying endometrium – atrophied and light in color than the surrounding mucosa.

3. Due to hard consistency the tip of the hysteroscope feels resistance.
4. If pedunculated it is difficult to differentiate from endometrial polyps.
5. If extends to cervix tip, appears reddish and flattened.

### **Advantages:**

Unnecessary curettes will be avoided.

### **ENDOMETRIAL ATROPHY:**

1. Mucous membrane reduced to a transparent film and it reveals underlying muscle bundles of myometrium.
2. Petechiae if present tends to bleed.
3. Cystic atrophy – glands dilated covered with atrophied epithelium and it appears as more translucent blue grey spheres .

### **ADNENOMYOSIS:**

Visualise the entrance of diverticula connecting with the cavity and appears as various dark depressions.

### **TRANSVAGINAL SONOGRAPHY:**

Out patient assessment and investigation are changing the management of common gynecological conditions. The need to avoid the unnecessary cost of multiple out patient visits and in In-patient admission adds to the development of Transvaginal sonography.

Transvaginal sonography now has a pivotal role in the assessment of gynecological patients in almost all areas of specialty. Transvaginal probes provide high resolution images of the pelvic organs, Providing reliable and reproducible information. The first report of Transvaginal sonography was attributed to **KRATOCHWIL** (1969) Transvaginal sonography was delayed until early mid – 1980's when it was first used to evaluate infertility problems in Japan and united states.

Patients with early pregnancy problems and acute gynecologic conditions are ideally selected for ultrasound assessment.

An accurate scan can enable the clinician to avoid surgery in some cases and select the correct surgical approach in others. In women with menstrual disorder, Transvaginal sonography can be combined with out patient endometrial sampling techniques as part of a one step approach to diagnosis and management. This study aims to deal with the role of Transvaginal sonography and hysteroscopy in diagnosing abnormal uterine bleeding and to compare the results with histopathology.

## **EQUIPMENT AND TECHNIQUE:**

### **Minimum requirement**

Transvaginal probes (5-7.5MHz)



Transabdominal transducer (3.5 MHz) to produce optimal images.  
Cleaning of probe with antimicrobial agents (70% alcohol) is essential to control cross infection.

### **EXAMINATION TECHNIQUE:**

1. Advancement or withdrawal of the transducer along the axis of the vagina .
2. Angling the transducer by pointing the tip from side – side or anterior to posterior.
3. Rotating the transducer along its axis

### **ADVANTAGE:**

1. Advantage of TVS is its ability to place the high frequency transducer nearer to the region of interest permitting optimal visualization of uterus.
2. In clinical situation, where transabdominal ultrasound cannot visualize the area of interest and in conditions like obese patients or in retroverted or retroflexed uterus.

### **TRANSVAGINAL ULTRASOUND – ITS ROLE IN AUB:**

In patient hysteroscopy under general anesthesia is no longer considered acceptable practice as first line strategy for the management of abnormal uterine bleeding.





Hysteroscopy is currently still the Gold standard for uterine cavity evaluation, however Transvaginal sonography with or without addition of saline as negatives contrast agent compares favorably,

### **ULTRASONOGRAPHIC FINDINGS:**

The endometrium appears as an echogenic interface in the central uterus. Sonographic measurements of normal endometrial thickness correlate well with actual endometrial thickness.

### **ENDOMETRIAL THICKNESS:**

			(mm)
➤	Proliferative Phase	-	4 – 7
➤	Secretory Phase	-	8 – 14
➤	Atrophic (Post Menopausal)	-	< 5
➤	Thickened Endometrium	-	>14

### **ENDOMETRIAL POLYP'S:**

1. Polyp's are echogenic structures with a fairly homogenous texture without disruption of the myometrial - endometrial interface
2. They appear as diffuse or focal thickening of endometrium greater than expected for that age group
3. In comparison to hysteroscopy TVS is at least as good as hysteroscopy for detecting these lesions.
4. Polyp's may be microscopic or macroscopic as large as 5cm in size.

### **CLASSIFICATION OF ENDOMETRIUM DURING MENSTRUAL**

### **CYCLE BY SONOGRAPHY**

**Bald** and **Hackeloer** classified endometrium using TVS during menstrual cycle.

**TYPE I -** Endometrium in menstrual phase  
Endometrium appears as thin broken regular echogenic surface with numerous hypoechoic areas.

**TYPE II -** Endometrium in early proliferative phase  
Endometrium appears thin continuous and become isoechoic measuring 2-3mm in A-P thickness.

**TYPE III -** Endometrium in late proliferative phase  
Endometrium shows increased thickness and echogenicity but loss of continuous oedema of superficial cells is accompanied by fluid collection which is visible as hypoechoic areas.

**TYPE IV -** Endometrium in periovulatory phase.  
There is usually a hypoechoic area within the inner endometrium produces a ring like structure which most likely represents oedema of compactum layer and endometrium becomes more echogenic.

**TYPE V -** Endometrium in early secretory phase

In Secretory phase a progressive increase on the relative endometrial myometrial echogenicity from endometrial base towards its surface is observed.

**TYPE VI -** Late Secretory phase

There is further enhancement of relative echogenicity from base of endometrium towards its surface and reaching a complete hyperechogenic pattern.

**LIMITATIONS:**

- Prepubertal and virginal patients are not suitable candidates for TVS.
- Patients with acute pelvic pain may not tolerate the examination
- Restricted field of view

**REVIEW OF LITERATURE**

**EVALUATION OF DYSFUNCTIONAL UTERINE BLEEDING BY TVS HYSTEROSCOPY AND HISTOPATHOLOGY** by Acharya veena  
April 2003 vol 53, no 2 evaluated the accuracy and predictive values of

non-invasive transvaginal sonography and invasive procedures (hysteroscopy) in DUB patients. In detecting the histologic nature of endometrium (proliferative / secretory),TVS and hysteroscopy are almost equally specific and sensitive, but for detecting submucous myomas and endometrial polps , hysteroscopy has 100% sensitivity and specificity and a very high positive and negative predictive value. They concluded the study stating that in diagnosing DUB cases , the non invasive TVS should be the first choice .If intra cavity lesion is suspected or when the endometrial thickness is more than 14mm,hysteroscopy followed by curettage and histopathology will improve the clinical diagnosis.

**ROLE OF TRANSVAGINAL SONOGRAPHY IN ABNORMAL UERINE BLEEDING IN PERIMENOPAUSAL WOMEN** by Dr Shekhawat Usha did a study to evaluate the significance of TVS as a non invasive method in abnormal uterine bleeding and also to study its importance in measurement of endometrial thickness as a predictor for endometrial pathology , to correlate between the thickness by TVS and histopathology. According to this study majority of the patients were in the age group 40-45 years 60% were perimenopausal and 40% were postmenopausal. In the perimenopausal group 46.5% presented with polymenorrhagia 63.3% had endometrial thickness of 8mm. Maximum no. of patients (43.3%) in this group had endometrium in proliferative phase.In postmenopausal group 70% had endometrial thickness of 4mm. In patients with

endometrial thickness of 4mm none had carcinoma endometrium. This study concludes that TVS showed a sensitivity of 80% in detection of endometrial pathology as compared to 30% of endometrial biopsy and was more convenient as it is non-invasive method.

**OBS AND GYNAECOLOGY TODAY JANUARY 2004 VOL IX, NO**

**1** according to this study TVS has been found to be a good non-invasive method of screening it is as useful as hysteroscopy if the cavity is normal, but not as useful if pathology is present in the cavity. In contrast TV scanning with fluid in the endometrial cavity may improve reliability of TVS as a screening method.

**CASERTA D, PORRETTA M, MOSCARINI** did a study to compare the efficacy of TVS and HYSTEROSCOPY in diagnosing DUB cases. According to this study AUB is the most common symptom of endometrial pathology. In the past, D&C was the best way for both diagnosis and therapy. They used hysteroscopy in this study of endometrial pathology. The purpose of this study is to evaluate TVS testing compared to hysteroscopy. They have found that the endometrial thickness and pattern with the TVS probe of value as the first step in any endometrial diagnosis with or without bleeding.

**OBS AND GYNAECOLOGY CLINICS IN NORTH AMERICA**  
**SEPTEMBER 1995 VOL 22, NO 3** states that hysteroscopy represents

the ideal technique for examination of women over 45 years of age with abnormal bleeding. In association with endometrial biopsy, it can diagnose endometrial adenocarcinoma in its early stages and select those patients who have precursor lesions.

**ENDOMETRIAL BIOPSY VS TVS** a diagnostic approach to evaluation of abnormal uterine bleeding October –1 ,1999 – American academy of family physicians.If the endometrial thickness on TVS is >5 mm , endometrial sampling should be performed , although sonohysterography may sometimes delineate a submucous fibroid or an endometrial polyp.Hysteroscopy with biopsy provides the most comprehensive evaluation of the endometrium and is recommended for use in any woman with equivocal findings on biopsy or USG.

**THE ACCURACY OF TVS IN DIAGNOSIS OF OF ENDOMETRIAL ABNORMALITIES OBSTET GYNAECOLOGY** 1996 87(3) in this study 67 premenopausal patients ,TVS had a sensitivity of only 88% . For detecting endometrial pathologies, when the criterion was 5mm of thickness. However, the missed diagnosis included only benign lesions ie., polyps and myomas . Neither hyperplasia nor cancer was present in any of the patients who had an endometrial thickness of less than 5mm. It is therefore reasonable to treat such patients for presumed dysfunctional uterine bleeding and to evaluate further only if medical therapy fails.

**GOLDSTEIN SR, ZELSTER T, HORAN C. OBSTET GYNAECOLOGY 1997,VOL 177(1)** non directed outpatient endometrial biopsy may miss a significant percentage of endometrial lesions. For this reasons we recommened proceeding immediately to a more directed endometrial evaluation ,such as saline – infusion sonohysteroscopy or dilatation and curretage with hysteroscopy .

**SIMTH - BINDMAN R, KERLIKROWSKA K, FELDSTEIN V A, JAMA 1998 , 230 (17)** A recent meta analysis of uterine bleeding in post menopausal women concluded that the sensitivity of endovaginal ultra sound compares favourably with that of endometrial biopsy . In this population threshold of 5mm of endometrial thickness was associated with 96% sensitivity for cancer detection and 92% sensitivity for detection of endometrial diseases. This false negative rate of 8% compares favourably with the 5% to 15% false negative rate with endometrial biopsy.

**OBSTET AND GYNAECOLOGY OF NORTH AMERICA SEPTEMBER 1993 VOL22 NO- 3** abnormal uterine bleeding remains the main indication of diagnostic hysteroscopy .Polyps, submucous myomas, polypoidal hyperplasia are the most common causes of abnormal uterine bleeding and hysteroscopy is superior to hysteroigraphy in identifying them.

**THE EVALUATION OF ABNORMAL UTERINE BLEEDING HARREF HATASAKA** et al in their study regarding the selection of prevailing diagnostic produces for diagnosing abnormal uterine bleeding



a systemic approach may make the diagnosis simpler. They concluded that the selection of a diagnostic approach relies on knowledge of the accuracy practicality and availability, patients acceptability, complication rates, cost effectiveness and the improvement in clinical outcome based on those diagnostic aids. Transvaginal ultrasonography provides a relatively non-invasive first step with reasonable sensitivity for both focal and diffuse lesions causing AUB.

**TRANSVAGINAL SONOGRAPHY IN DYSFUNCTIONAL UTERINE BLEEDING AND ITS CORRELATION WITH HISTOPATHOLOGY – ANJALI SINGH, SAROJ SINGH, VEENA**

**MATHUL, KALPANA SINGH DEC 2001** . Total number of 100 cases, out of which 50 were of dysfunctional uterine bleeding and 50 of reproductive age group with normal menstrual cycle were taken for the study. All of them were subjected to transabdominal ultrasonography with full bladder technique with 3.5 MHz probe and the transvaginal sonography with empty bladder technique with 3.5 MHz intravaginal transducer and then finally to endometrial biopsy for histopathological correlation.

As these patients had menstrual irregularities with a great variability in duration of cycle. They studied duration of cycle for previous three months in every patient, then expected date of next menstrual cycle was calculated and patients were called 2-4 days prior to that date and transvaginal sonography and Endometrial biopsies were performed. Type

of Endometrium, its thickness its echogenecity and Endometrial myometrial interface were studied. Endometrial histopathology of DUB cases was then correlated with findings of vaginal ultra sound. It was found that in 92% of the cases finding of TVS correlated with histopathology. Transvaginal sonography a simple non invasives OPD procedure can be used as a good alternative to histopathology for dysfunctional uterine bleeding.

**HYSTEROSCOPIC POLYPECTOMY IN 240 PREMENOPAUSAL AND POST MENOPAUSAL WOMEN-** Sangchai preutthipan and yang yoth. This retrospective study was carried out to ascertain the therapeutic efficacy and safety of hysteroscopic polypectomy in 240 premenopausal and post menopausal women.Hysteroscopic polypectomy using various instruments including microscissors, grasping forceps or electrosurgery either with monopolar probe or a resectoscope.They concluded that hysteroscopic polypectomy to be effective, safe minimally invasive procedure with low rate and mild complication.Restoration of reproductive ability did not depend on the size of removed lesion. Resectoscopic surgery is more preferable to prevent recurrence of polyps.

**ABNORMAL UTERINE BLEEDING EXPANDING THE ROLL OF TRANSVAGINAL SONOGRAPHY J.KILL WILLIAMS –2002** AUB in non-pregnant women is a common problem. Clinical research and

experience suggest that use of transvaginal sonography. When compared with other modality the potential benefits are faster diagnosis less need for invasive procedure and lower overall health care cost.

**OUT PATIENT HYSTEROSCOPY AND ULTRASONOGRAPHY IN THE MANAGEMENT OF ENDOMETRIAL DISEASE - JUSTIN CLARK**

**2004** The purpose of the study is to detect the accuracy of the ultra sound and hysteroscopy in the management of endometrial disease presenting with abnormal uterine bleeding and they concluded the study by saying that further research is required to confirm the accuracy of the transvaginal sonography/ hysteroscopy in diagnosing abnormal uterine bleeding.

**COMPARATIVE STUDY OF DIAGNOSTIC HYSTEROSCOPY AND TRANSVAGINAL ULTRASONOGRAPHY IN PATIENTS WITH ABNORMAL UTERINE HEMORRHAGE DURING PERI AND POST MENOPAUSAL PERIOD - BARBERO ET AL 1997**

The aim of this study was to determine the diagnostic value of hysteroscopy and transvaginal ultrasonography in patients with abnormal uterine bleeding during peri and

post menopausal period. 302 patients with AUB underwent hysteroscopy and 86 patients also underwent transvaginal ultrasonography before hysteroscopy was performed. Results were compared with histopathological diagnosis. The results of this study show that sonography maybe used as a first diagnostic test in the investigation of women with abnormal uterine bleeding.

### **DIAGNOSTIC HYSTEROSCOPY IN ABNORMAL UTERINE BLEEDING FIVE YEARS EXPERIENCE - GIANNINOTS ET AL FEB 2003**

Hysteroscopy has acquired a central role in the clinical diagnosis of intrauterine pathologies. This study evaluated the feasibility, procedure modality, tolerability complications and diagnostic accuracy of hysteroscopy in the management of patient with abnormal uterine bleeding. This study was carried out in 512 women with AUB who attended hysteroscopy. After under going TVS patients were referred for further diagnostic studies. Ambulatory hysteroscopy was performed with CO<sub>2</sub> as distension medium and guided and biopsy completed the examination.

Ambulatory hysteroscopy was shown to be a simple safe and will tolerated and reliable procedure in the diagnosis of AUB across all age groups.

### **COMPARISON OF OFFICE HYSTEROSCOPY, TRANSVAGINAL ULTRASONOGRAPHY AND ENDOMETRIAL BIOPSY**

**IN EVALUATION OF ABNORMAL UTERINE BLEEDING - PAL - L - etal  
DEC 1997.** A comparison between office hysteroscopy, transvaginal ultrasonography and Endometrial biopsy was performed in terms of detection of intra uterine lesions. 54 women were evaluated for abnormal uterine bleeding. Assessment included performance of an Endometrial biopsy, a transvaginal ultra sound scan followed by office hysteroscopy. Results of hysteroscopy were taken as a gold standard. The study concludes by saying that both transvaginal ultrasound and Endometrial biopsy exhibited poor sensitivity for detection of focal intra uterine lesions. The most cost effective approach appears to be hysteroscopy in diagnosing AUB.

**ABNORMAL UTERINE BLEEDING DURING CLIMACTERIC,  
CORRELATION BETWEEN TRANSVAGINAL ULTRASONOGRAPHY  
,HYSTEROSCOPY AND HISTOLOGY – GRIO .R. ETAL APRIL 1999**

This study was performed to evaluate the accuracy of ultrasonographic findings compared to hysteroscopic and histological results in the diagnosis of anomalous uterine bleeding in menopause. This study specifies that if the Endometrial thickness is 4 mm further diagnostic test was performed using hysteroscopy with targeted biopsy to confirm the diagnosis.

**DIAGNOSTIC ACCURACY IN TRANSVAGINAL ECHOGRAPHY  
IN BENIGN ENDOMETRIAL DISEASES AND COMPARISON WITH  
HYSTEROSCOPIC BIOPSY - PUSIANE ET AL MARCH 1995.** Abnormal uterine bleeding is one of the main indications for hysteroscopy in perimenopausal women. Transvaginal ultrasound allows for an accurate study of the endometrium through the evaluation of thickness and homogeneity. This study aims at evaluating the accuracy of TVS/hysteroscopy in diagnostic approach for abnormal uterine bleeding in pre- and post-menopausal women. Based on endometrial thickness, premenopausal age groups were divided into 3 groups. If the endometrial thickness is greater than 4 mm, it requires hysteroscopic examination with directed biopsies and histological diagnosis, and if thickness is less than 4 mm, it specifies endometrial atrophy.

### **AIM OF THE STUDY**

- ❖ To evaluate DUB by transvaginal sonography and hysteroscopy, correlating it with histopathological findings as gold standard in reproductive and premenopausal women attending gynaecology OPD of PSGIMS&R during a period of 2004-2006.

- ❖ To compare the accuracy ,predictive values and likelihood ratios of TVS and hysteroscopy in DUB.

## **MATERIALS AND METHODS**

A prospective study was carried out in reproductive and premenopausal women attending gynaec opd who underwent TVS / Hysteroscopy / DNC at **PSG IMS & R** from 2004-2006.

### **SELECTION CRITERIA:**

All reproductive and premenopausal women with dysfunctional uterine bleeding.

### **INCLUSION CRITERIA:**

1. All reproductive and premenopausal age women
2. Any parity.

### **EXCLUSION CRITERIA:**

1. Postmenopausal age women
2. Unmarried women
3. Acute pelvic infection.

### **Methods :**

An organised proforma was used for collection of data.

### **PROFORMA**

1. NAME
2. AGE
3. SOCIO ECONOMIC STATUS
4. LITERACY
5. ADDRESS
6. OBSTETRIC SCORE
7. PRESENTING COMPLAINTS
8. ASSOCIATED FEATURES
9. MENSTRUAL HISTORY



- PRIOR TO ONSET OF SYMPTOM
  - AFTER ONSET OF SYMPTOMS
10. MARITAL STATUS
11. CONTRACEPTIVE USED
- OCP
  - IUCD
  - BARRIER METHOD
  - PERMANENT METHOD
12. MEDICAL AND SURGICAL HISTORY
13. INVESTIGATIONS
- USG FINDINGS
  - HYSTEROSCOPY FINDINGS
  - HISTOPATHOLOGY FINDINGS
14. FOLLOW UP

Abnormal uterine bleeding in non pregnant women is a common problem more than 20% visit gynaecologist for the same. The diagnosis of such patients begins with detailed history regarding the

**1) Interval**

**2) Duration**

### 3) Volume of menstrual follow.

**DUB** May be either

ovulatory \ Anovulatory

Anovulation is the most commonest cause of **DUB** which is due to progesterone deficient state .Although less common than anovulatory bleeding ovulatory bleeding may also occur, it presents with regular cyclic bleeding.

An understanding of normal menstrual pattern is essential for the diagnosis of abnormal uterine bleeding.

Variable	Average/Normalrange	Abnormal
1. Cycle length (days)	28/21-35	<25 or >35
2. Bleeding duration (days)	4/1-8	>8
3. Blood loss (ml)	35/20-80	>80

#### **Various terminologies used to describe abnormal uterine bleeding**

1. Amenorrhea	Absence of bleeding for >6 months.
2. Menorrhagia	Excessive bleeding at regular intervals (>8 days>80ml).
3. Metrorrhagia	Irregular, frequent bleeding.

4. Oligomenorrhea	Bleeding at interval greater than every 35 days.
5. Intermenstrual bleeding	Bleeding that occur between normal cycles.
6. Polymenorrhea	Regular bleeding at <21 days interval.
7. Break through bleeding	Intermenstrual bleeding in HRT users.

**TECHNIQUE:**

HYSTEROSCOPY

**EQUIPMENT AND TECHNIQUE:**

The equipment depends on the reason for the procedure. core competencies required for hysteroscopy are

1. Patient positioning and cervical exposure.
2. Cervical dilatation
3. Uterine distension
4. Imaging
5. intra uterine manipulation

**PATIENT POSITIONING AND EXPOSURE:**

Hysteroscopy is performed in a modified dorsal lithotomy position. The patient is supine and the legs are held in stirrups. In situations where patient is conscious, comfort must be considered in conjunction with the need to gain good exposure of the perineum. Stirrups that hold and support the knees, calves and ankles provide adequate support and time to perform the procedure.

The SIM's speculum is used to expose the cervix.

### **PREANESTHETIC MEDICATION:**

- Analgesics 30 minutes prior to the procedure.
- Sedation if patient is anxious.
- Tnj T.T.
- Inj. Lidocaine test dose

### **ANAESTHESIA:**

The anaesthetic requirement for hysteroscopy vary greatly depending on the patients level of anxiety, status of the cervical canal, the procedure, and the outside diameter of the hysteroscope or sheath.

For most diagnostic procedures effective cervical anesthesia is obtained with an intra cervical block. A paracervical block may also be

injected into the uterosacral ligament at the 4 and 8'0 clock position if necessary.

In few selected case we prefer GA/SA.

### **CERVICAL DILATION:**

The cervix should be dilated as atraumatic as possible using Hegar's dialator.

### **UTERINE DISTENSION:**

Distension of the endometrial Cavity is necessary to create a viewing space. A pressure of 45mm of Hg or higher is required for adequate distension of the uterine cavity. To minimize extravasation this pressure should not exceed the mean arterial pressure.

Normal saline is useful and a safe medium for procedures that do not require electricity. Even if there is absorption of a significant volume of solution, saline does not cause electrolyte imbalance. Therefore saline is a good fluid for minor procedure in the office.

A pressure cuff may be placed around the infusion bag to elevate the pressure in the system. Caution must be excused however because

this technique cause extravasations if intra uterine pressure is above the mean arterial pressure.

## **ENDOSCOPES :**



Hysteroscopes are available in two basic types flexible and rigid  
Rigid hysteroscopes are more durable and provide superior image.

## LIGHT SOURCES AND CABLES



- Adequate illumination of the endometrial cavity.
- light source 110-220 volt wall outlet.

- Most equipment require 150 watts power for direct viewing and preferably 200 watts or more for video and operative procedure.

## **TRANSVAGINAL SONOGRAPHY**

### **Patient preparation:**

The transvaginal examination is usually completed within 10 minutes. Most women accept transvaginal scanning preferring it over the standard transabdominal approach. Which requires a full urinary bladder.

If the sonographer or physician is male the presence of female assistant at the time of the procedure may be beneficial.

Before the examination begins the patient is asked to empty her bladder, scanning was performed with patient supine and with her thighs abducted and knees flexed. Elevation of the buttocks by a pillow, Wedge or a lithotomy table may be necessary to visualize anterior structures.

### **PROBE PREPARATION AND INSERTION:**

The probe should be covered with a condom containing a small amount of gel once the transducer has been covered, additional gel should be placed on the outside of the sheathed tip. The probe is inserted by the sonographer or by the physician. K.Y.Jelly applied on the vaginal introitus using finger and probe pushed inside. Probe is gently pushed



posteriorly towards the rectum and against the pubococcygeus muscle while the patient is encouraged to relax pubococcygeus.

While insertion the normal posterior angulation of the vagina with the perineum should be remembered. After the probe is inserted into the vaginal vault, contact is made with the wall of the vagina. If contact between the transducer and the vaginal Fornix is inadequate or lost during scanning an artifact is created that prevent visualization of pelvic status. Avoiding abrupt movements against the cervix will minimize patient discomfort.

The probe should be immersed in a disinfecting solution such as cidex or the recommended agents for a specified period of soaking time usually between 10-20 minutes.

### **Image planes and Display:**

Standard anatomic planes are termed sagittal, Transverse and coronal, but the terms preferred for TVS are long & short axis views. The long axis view of the uterus represent the uterus displayed in its longest dimension. The short axis plane of section is defined as the view perpendicular to the long-axis projection.

Theoretically there are four ways to display the TVS image, the apex of the ultrasound beam can be oriented up, down, to the right or to the left.

The essential requirement for TVS are that the images be fully labeled & their orientation to be understood.

### **Techniques:**

The Three basic maneuvers possible with TVS include

1. Advancement (or) withdrawal of the transducer along the axis of vagina
2. Angling the transducer by pointing the tip from side – side (or) anterior to posterior .
3. Rotating the transducer along its axis.

### **THE FOLLOWING SYSTEMATIC APPROACH IS NECESSARY**

#### **Image the uterus including the fundal portion**

The cervix & LUS are visualized initially once the transducer is inserted, then the probe is advanced cephalad until the uterus fundus comes to view, then to long axis view of uterus for endometrium. When the uterus has been identified, Magnification of an area of interest provide additional detail.

#### **Ovaries; adnexa & lateral areas of the pelvis**

Angulating more laterally, ovaries should come into focus. The ovaries & adnexa should be evaluated in both long – axis & short axis views

## **Cul –de sac for the presence of free fluid**

Steep posterior probe angulation is necessary

### **THE ENDOMETRIUM:**

The endometrium is depicted by TVS with great detail.

It appears as an echogenic interface in central uterus. Sonographic measurements of normal endometrial thickness correlate well with actual endometrial thickness.

<b>Phase In cycle</b>	<b>Endometrial thickness in mm</b>
1. Proliferative	4-7mm
2. Secretory	8-14mm
3. Atrophic	< 5mm
4. Thickened /Hyperplasia	> 14mm

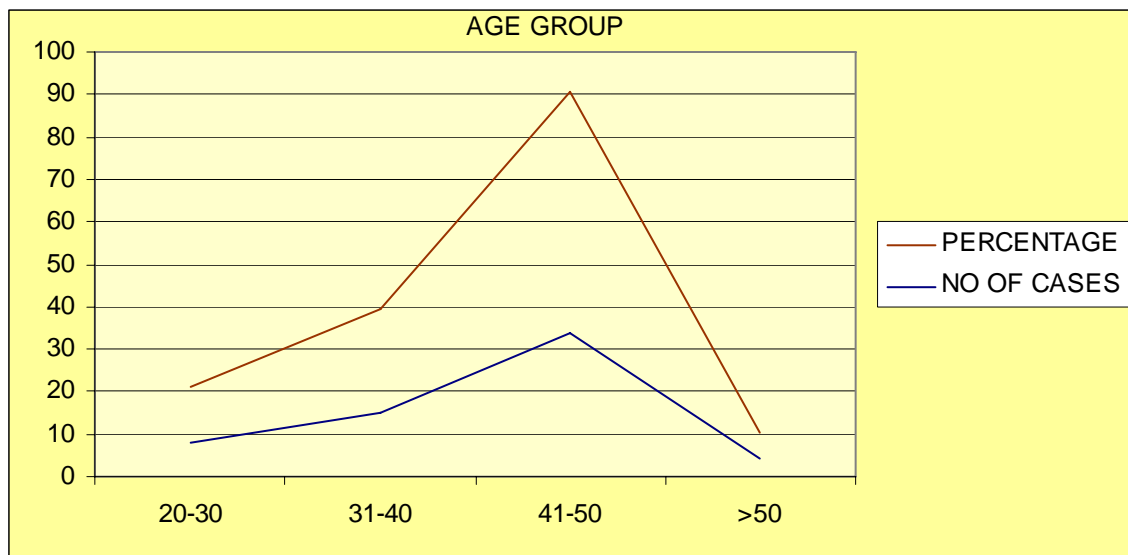
- In proliferative phase – orderly organization of the glandular elements with in the endometrium.
- Ovulation --- more echogenic with a hypoechoic halo arises from the inner layer of myometrium, surrounds the endometrium.
- Secretory – more echogenic with greatest thickness (upto 14mm) fluid content will be seen with in the endometrium.

- Endometrial thickening --- It is an abnormal condition seen in variety of complications like pregnancy, hyperplasia, polyps, endometrial carcinoma, some times even in secretory phase with these findings, we assess the different pathologies of endometrium using TVS in this study.

## **RESULTS**

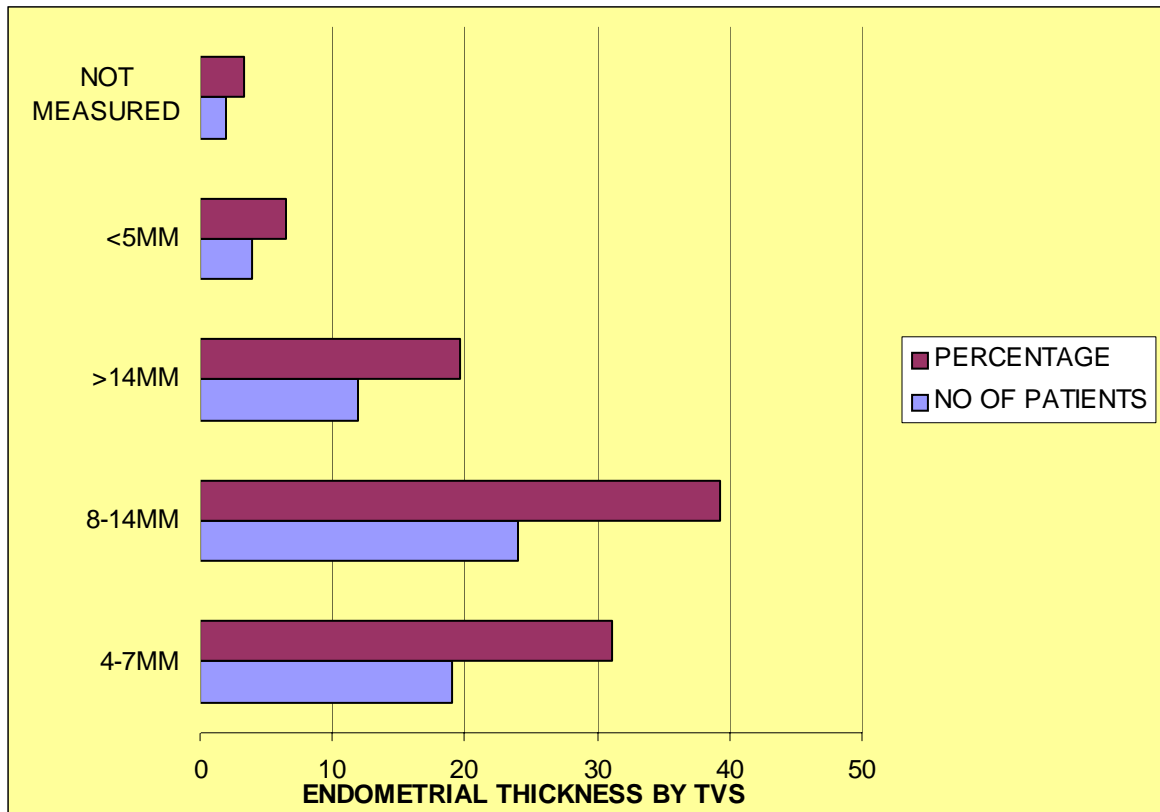
## AGE GROUP

AGE	NO OF CASES	PERCENTAGE
20-30	8	13.11
31-40	15	24.59
41-50	34	56.7
>50	4	6.55



## ENDOMETRIAL THICKNESS BY TVS

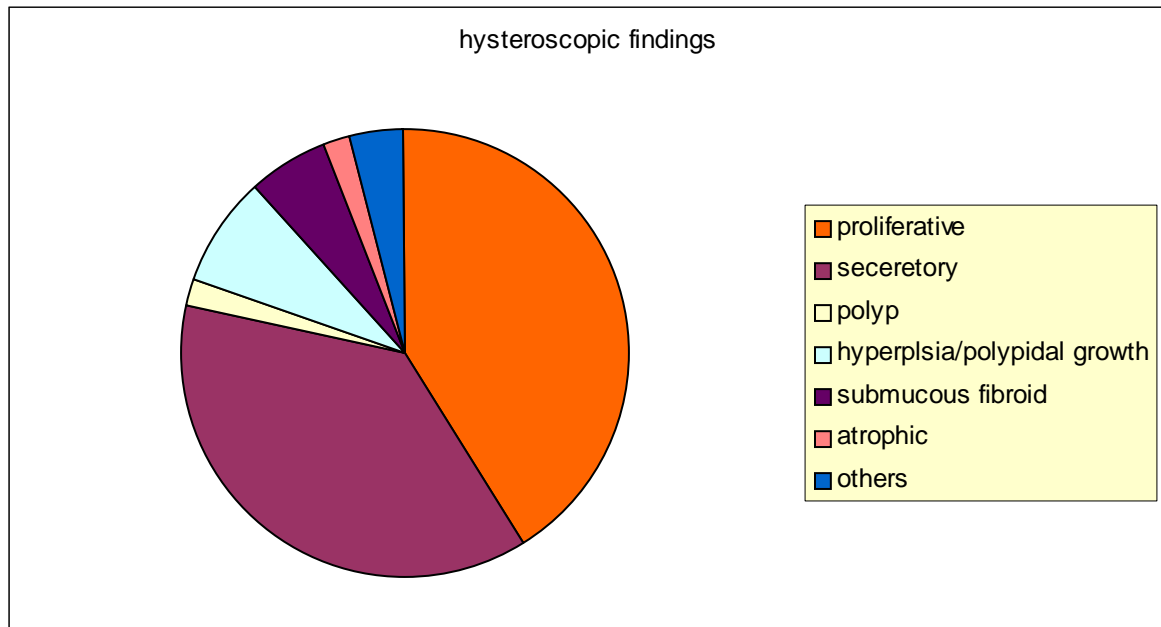
ET in mm	No. of patients	Percentage
4 - 7mm	19	31.14%
8 – 14mm	24	39.34 %
> 14mm	12	19.67%
< 5mm	4	6.5%
Not measure	2	3.27%



### HYSTEROSCOPIC FINDINGS

Endometrial by	No. of	Percentage
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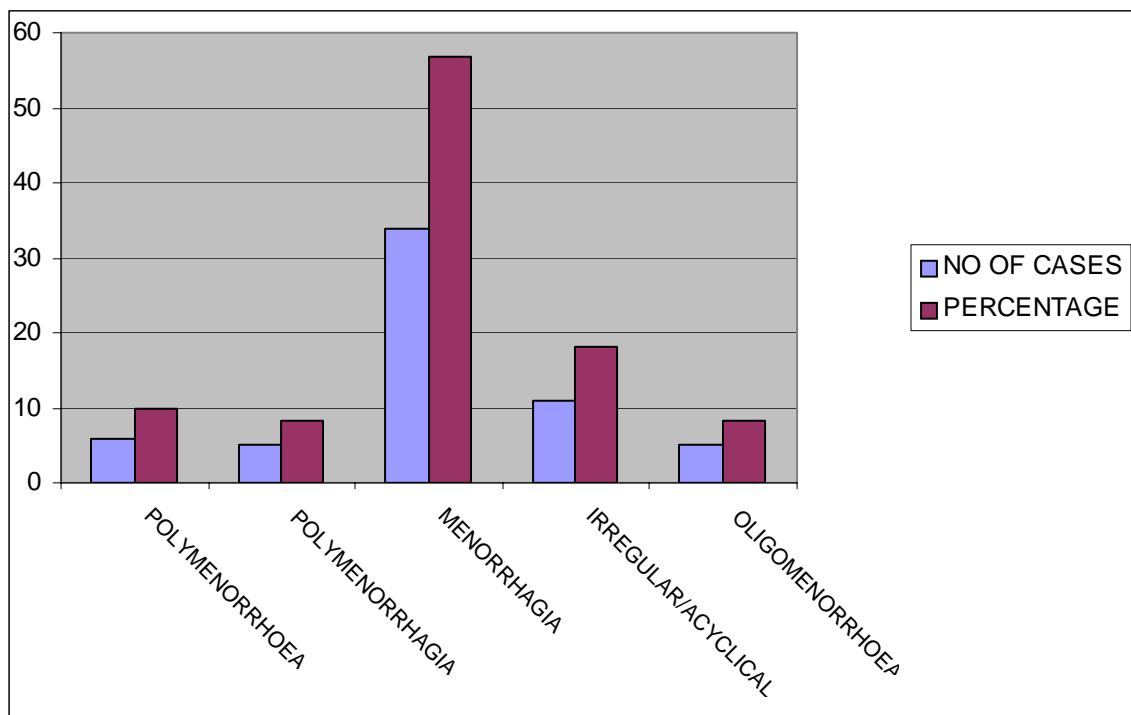
<b>Hystroscopy</b>	<b>patients</b>	
1. Proliferative	21	34.4%
2. Secretory	19	31.14%
3. Polyp	11	18%
4. Hyperplasia/ Polypoidal growth	4	6.5%
5. Submucous fibroid	3	4.91%
6. Atrophic	1	1.6%
7. Others	2	3.27%



### CLINICAL SYMPTOMS

<b>Symptoms</b>	<b>No of cases</b>	<b>Percentage</b>
Polymenorrhoea	6	9.83%

Polymenorrhagia	5	3.196%
Menorrhagia	34	55.7%
Irregular	11	18.03%
Oligomenorrhoea	5	8.196%

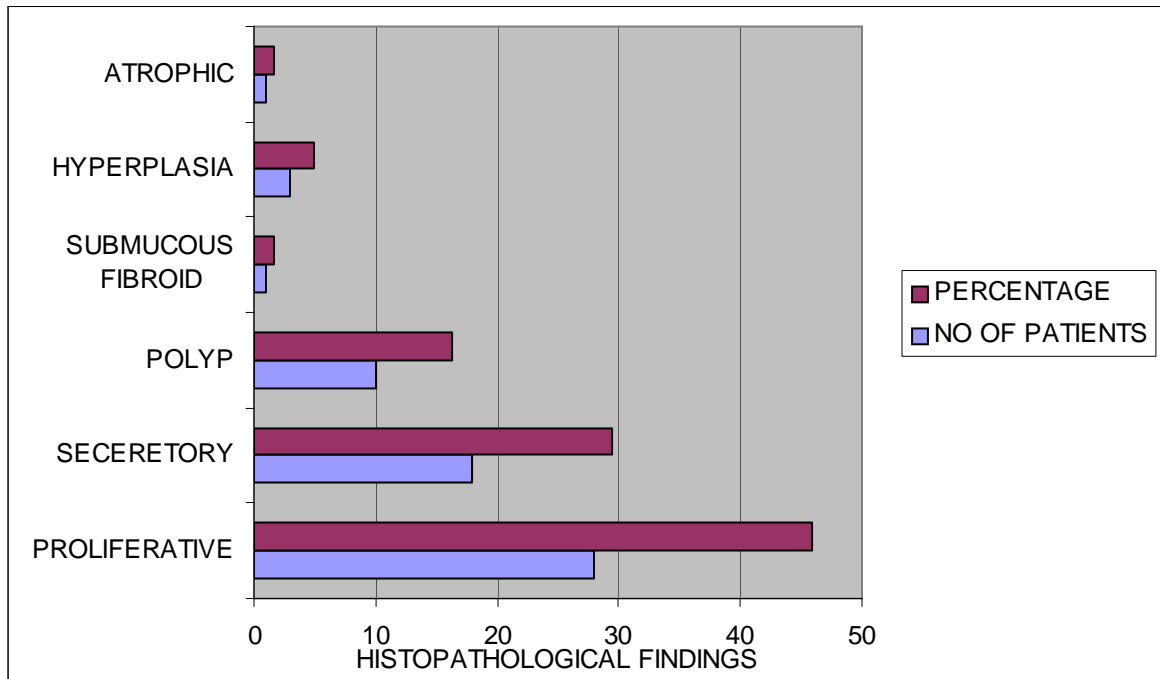


### **HISTOPATHOLOGICAL FINDINGS**

<b>HPE of endometrium</b>	<b>No of patients</b>	<b>Percentage</b>
1. Proliferative	28	45.9%



2. Secretary	18	29.5%
3. Polyp	10	16.31%
4. Submucous fibroid	1	1.6%
5. Hyperplaisa	3	4.91%
6. Atrophic	1	1.6%



**CORRELATION B/W HYSTEROSCOPIC & SONOGRAPHIC FINDINGS\***

Hysteroscopic findings	TVS Finding		
	4-7mm	8 – 14 mm	>14 mm

1. Proliferative	18	2	-
2. Secretory	0	17	1
3. Hyperplasia	-	-	4
4. Polyp	-	5	6
5. Submucosal fibroid	-	1	1
6. Atrophic	2	-	-
7. Others	2	-	-

\*  $r^2 < 0.001$  - significant

**CORRELATION B/W HPE & TVS FINDINGS \***

<b>HPE findings</b>	<b>Endometrial thickness in mm by TVS</b>		
	4-7mm	8 – 14 mm	>14 mm

1. Proliferative	19	5	2
2. Secretory	1	15	3
3. Polyp	-	4	7
4. Atrophic	1	-	-
5. Hyperplasia	-	-	2
6. Submucosal fibroid	-	1	-
7. Others	1	-	-

\*  $r^2 < 0.001$  significant

**CORRELATION BETWEEN TVS & HYSTEROSCOPY\***

No of patients	ET in mm	TVS findings				HYS findings
		Proliferative	Secretory	Polyp	Others	
22	4-7	20	-	-	1-IUCD 1-ATR	18-PRO 2-ATR 2-OTHER
25	8-14	2	20	1	1-TE 1-SMF	17-SEC 2-PRO 6-POLYP 1-SMF
12	>14	-	-	4	7-TE 1-HYP	1-SEC 6-POLYP 4-HYP 1-SMF
2	Not measured	-	-	-	1-SMF 1-EUC	

\*  $r^2 < 0.001$  significant

ATR –atrophic endometrium

TE – thickened endometrium

SMF- submucous fibroid

HYP – hyperplasia

EUC –empty uterine cavity

PRO – proliferative

SEC – secretory

**CORRELATION B/W TVS & HPE AT DIFFERENT ET**

<b>Endometrial thickness in mm</b>	<b>No of patients</b>	<b>TVS findings</b>	<b>HPE</b>
4 – 7 mm	22	Proliferative 20 Secretory – 0 Atrophic -1 Others – 1	Proliferative 19 Secretory – 1 Atrophic -1 Others – 1
8 – 14 mm	25	Proliferative – 3 Secretory – 20 Thickened endometrium – 1 Polyp – 1 Submucous fibroid – 1	Proliferative – 5 Secretory – 15 Polyp – 4 Submucous fibroid – 1
> 14 mm	12	Thickened - 7 Polyp – 4 Hyperplasia - 1	Proliferative – 2 Secretory – 3 Polyp – 7 Hyperplasia - 2

**TVS/ HPE**

	<b>SW</b>	<b>SP</b>	<b>PPV</b>	<b>PNV</b>	<b>LR+/LR-</b>
Proliferative	75%	96.96%	95.45%	82.05	96
Secretory	77.77%	87.87%	77.77%	87.87%	25.37
Hyperplaisa	100%	88.13%	22.22%	100%	14.85
Polyp	30%	94.11%	50%	87.27%	6.85
Fibroid	100%	98.33%	50%	100%	59

**HYS Vs HPE**

	<b>SW</b>	<b>SP</b>	<b>PPV</b>	<b>PNV</b>	<b>LR+/LR-</b>
Proliferative	75%	100%	100%	82.5%	198
Secretory	94.44%	95.34%	89.47%	97.61 %	348.5
Hyperplaisa	100%	96.61%	50%	100%	114
Polyp	90%	96.7%	81.8%	98%	220.5
Fibroid	100%	96.66%	33.33%	100%	29

LR+/LR- > 50 is desirable

**TVS VS HYS**

	<b>SW</b>	<b>SP</b>	<b>PPV</b>	<b>PNV</b>	<b>LR+/LR-</b>
Proliferative	100%	97.5%	95.45%	100%	819
Secretory	84.21%	95.23%	88.88%	93.02%	106.67
Hyperplaisa	100%	91.2%	44.44%	100%	41.6
Polyp	45.45%	98 %`	83.33%	89.09%	40.83
Fibroid	66.66%	100%	100%	98.3	116

## **DISCUSSION**

Dysfunctional uterine bleeding is one of the commonest problem accounting for 10-15 %of the cases in everyday gynaecology

OPD. Regardless of the diagnosis, DUB is the diagnostic term for any abnormal uterine bleeding where the physical examination ruled out all other endometrial pathology. An optimal management of endometrial disease requires an accurate and timely diagnosis. This study aims to compare the accuracy and predictive values of TVS, Hysteroscopy and HPE in diagnosing DUB in an outpatient setting.

In this study, 71 patients who underwent all three investigations TVS, Hysteroscopy and HPE were studied. Out of which 10 were excluded for postmenopausal bleeding. In this study, DUB was commonly present in 41-50 years of age group accounting for 55.7%. J. Kell. Williams, et al found that DUB to be more common during 5<sup>th</sup> decade in his study which was similar to our study. He also states that it is related to both dysfunction of aging ovaries and to uterine abnormalities.

In this study, we found that about 56.7% of the DUB patients present with menorrhagia. In J. Obstet Gynecology India vol 51; the author states that the commonest irregularity observed was polymenorrhagia (40%); menorrhagia (24%); acyclical bleeding (20%); polymenorrhagia (20%); oligomenorrhoea (4%). According to that study maximum cases of DUB was between 31-40 years of age.

Veena Archarya (2003) et al in their study categorized endometrial thickness based on TVS. In most of the patients the endometrial thickness were within 10-12mm (20%) which coincides with this study 8-14mm (39.34%) based on endometrial thickness (8-14mm). Most of the



patients were found to be in secretory phase(20) except one who have been diagnosed as having endometrial polyp and one with submucosal fibroid and other one with thickened endometrium.

Among those who have endometrial thickness greater than 14mm seven were diagnosed as thickened endometrium and four as polyps by TVS in this study. Hysteroscopy was performed premenstrually for all patients except in those cases with grossly irregular cycles. Grio .R (1999)and Persiani(1995) imposed a cutt-off thickness of endometrium (4mm) above which hyseteroscopy with targeted biopsy is mandatory for the diagnosis.

J.S. Afonson et al based on his recent study showed that there is a similar sensitivity between hysteroscopy with out patient biopsy when performed properly which correlates with our study.

Hysteroscopy diagnosed most of the patients to be in proliferative phase(34.4%) and also it diagnosed 7.8% to be polyps.The hisopathology findings is being considered as the gold standard to compare the findings based on TVS and hysteroscopy . The histopathology findings shows that 45.9% of the patients had proliferative endometrium, 29.5 % had secretory phase, 16.31% had polyps,4.9% had hyperplasia and 1.6% had submucous ibroid and atrophic endometrium.Though most of the curretage was performed premenstrually ,biopsy reports showed majority of them to have proliferative endometrium rather than seceretory,and

these patients were found to be treated with hormones and resumed regular cycles on follow up, thus based on this study most of the DUB cases were found to be in anovulatory type similar to recent definition.

On correlating the findings of TVS with hysteroscopy of endometrium in DUB cases, there was a statistical significance of  $r^2 < 0.001$ .

TVS correlated with hysteroscopy in diagnosing

1. Proliferative phase
2. secretory phase
3. submucous fibroid

On contrary in diagnosing polyps, hysteroscopy proved to be superior than TVS i.e., in case of endometrial thickness between 8-14mm, TVS missed out two out of five polyps which was diagnosed by hysteroscopy. Similarly in endometrial thickness  $>14$ mm, it missed out two out of six polyps.

Archarya (2003) et al in her study states that TVS is less sensitive (8.33% for polyps and 0% for fibroids) compared to hysteroscopy (100% for both the conditions) in detecting polyps and submucous fibroids. Harry et al (2005) in his study proved TVS has high false negative rates in diagnosing intrauterine pathology and is suboptimal in diagnosing submucous fibroids. In correlating TVS with histopathology there is a statistical significance of  $r^2 < 0.001$ . In 4-7 mm of endometrial thickness

there was no gross difference between TVS and histopathology findings; but in endometrial thickness of 8-14 mm TVS correlated only in 3 out of 4 polyps diagnosed by HPE perfect correlation was established in submucous fibroids by TVS and histopathology.

In endometrial thickness more than 14 mm it again missed 3 out of 7 polyps. In conditions where endometrial thickness within 4 to 7 mm there was no gross change between hysteroscopy and TVS findings. In thickness measuring 14mm, hysteroscopy and histopathology found more number of endometrial polyps compared to TVS. Archarya (2003) et al in her study found that endometrial thickness less than 14 mm TVS, hysteroscopy and histopathology were almost same whereas in endometrial thickness more than 14 mm hysteroscopy found more polyps, submucous fibroids whereas histopathology showed proliferative endometrium and endometrial hyperplasia.

In general the sensitivity of more than 70% and specificity of more than 80%, the test is said to be good whereas the sensitivity of more than 90% and specificity of more than 90%, the test is found to be excellent. In this study, the sensitivity of diagnosing polyps by TVS is only 30% compared with histopathology and 45.45% compared with hysteroscopy. Harry et al (2005) says that polyps represent the most commonest cause of endometrial thickening and its differentiation from hyperplasia and other causes by TVS alone is problematic. He also

quotes that sonohysterography and hysteroscopy promises the best sensitivities in detecting uterine polyps.

As discussed earlier, even in this study hysteroscopy has a sensitivity of 90% in detecting polyps which was mostly diagnosed as thickened endometrium by TVS. The sensitivity of TVS with histopathology is comparatively lesser than hysteroscopy in this study. This is because the TVS may not be done on the same day of biopsy and hence the menstrual phase varies but in case of hysteroscopy, biopsy is done under its guidance and on the same day.

The specificity of all three modalities correlated well and most of them found to be excellent. The positive predictive value of TVS in diagnosing hyperplasia is 22.22% with HPE and 44.44% with hysteroscopy. Similarly in diagnosing polyp and fibroid polyp it has a PPV of only 50% when compared with histopathology.

The PPV of hysteroscopy in diagnosing fibroid polyp is only 33.33% when compared with histopathology. This may be probably because we use only a diagnostic hysteroscopy in this study and so some fibroid polyp has not been removed and sent for biopsy. Thus HPE missed the findings. However since diagnostic accuracy of a test using sensitivity, specificity, PPV and PNV are dependant on prevalence, it is important to look at the odds of the disease using a specified test (TVS or HYS or HPE) to the odds of the disease in the population studied, independent of the prevalence.

The likelihood ratio (+) which is a ratio of sensitivity to the false positive error rate (FPR) and LR(-) which is a ratio of false negative error rate (FNR) to the specificity, it gives the clinician a true measure of what the specified test is set to achieve. A LR<sup>+</sup>/LR<sup>-</sup> ratio of more than 50 is desirable. In our study comparing TVS with HPE a good LR<sup>+</sup>/LR<sup>-</sup> is obtained in fibroid state in spite of a low PPV(50%) indicative of a good measure independent of low prevalence of that state (no of submucous fibroid cases is 1). Similarly, comparing hysteroscopy with HPE, in spite of low PPV for hyperplasia and Submucous fibroid, a good LR<sup>+</sup>/LR<sup>-</sup> recommends the use of the test in study population.

## **CONCLUSION**

Of 71 patients underwent all three modalities, ten were excluded for postmenopausal bleeding. Among the 61 patients studied 56.7% belong to 41-50 years of age group. 55.7% of those patients presents with menorrhagia HPE is considered to be the gold standard for evaluating a case with DUB and hence the accuracy and predictive values of TVS and hysteroscopy is compared with it.

In this study there is a statistical significance in correlation between TVS & hysteroscopy with HPE. In case of detecting the menstrual phase (ie) proliferative (or) secretory phase TVS and hysteroscopy almost has equal accuracy especially in endometrial thickness between 4-7 mm. Even the minimal drop in accuracy of TVS with hysteroscopy may be due to the reason where TVS is not performed on the same day of biopsy in all cases unlike hysteroscopy.

Only in ET > 8mm TVS fail to diagnose certain endometrial pathology like polyps, submucosal fibroids and hyperplasia in few patients. Even for submucosal fibroids the likelihood ratio is in favour of TVS. Whereas hysteroscopy has a high sensitivity of 90%, specificity of 96.07% and PPV of 81.8% and NPV of 98% in detecting polyps and in case of hyperplasia also likelihood ratio recommends hysteroscopy in spite of low PPV.

Even then TVS has its own strength as it is a non-invasive procedure the chance of infection, pain and other complications are not recorded till now. It requires very less skill and is cost-effective and it is always accepted by many patients.

Hysteroscopy though having high accuracy in diagnosing endometrial disease, it has certain disadvantages like infection, pain, discomfort and is expensive.

Thus to conclude TVS is useful as a first choice in lesser ET thickness < 8mm for evaluating DUB. But when ET is more than 8mm or when an intracavitary lesion is suspected, hysteroscopy followed by curettage and biopsy improves the accuracy of diagnosis particularly, in focal pathology where even curettage alone may miss the diagnosis.

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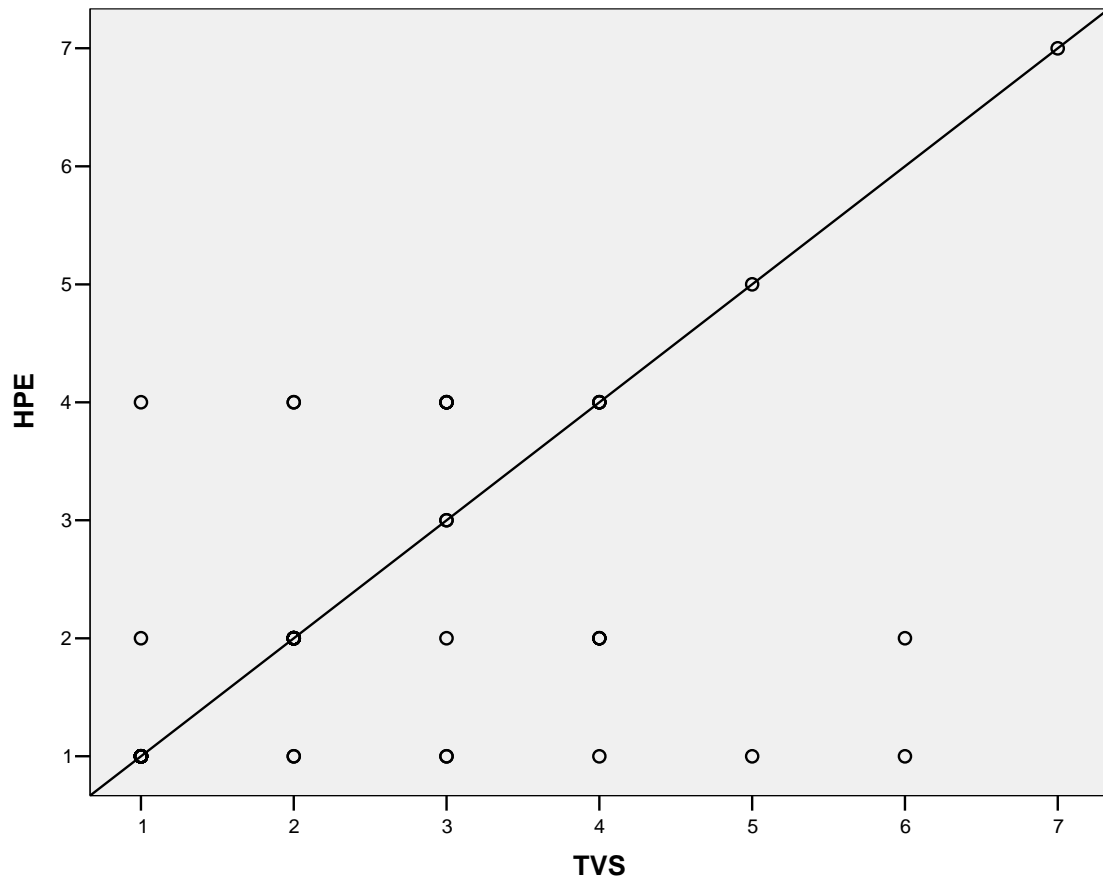
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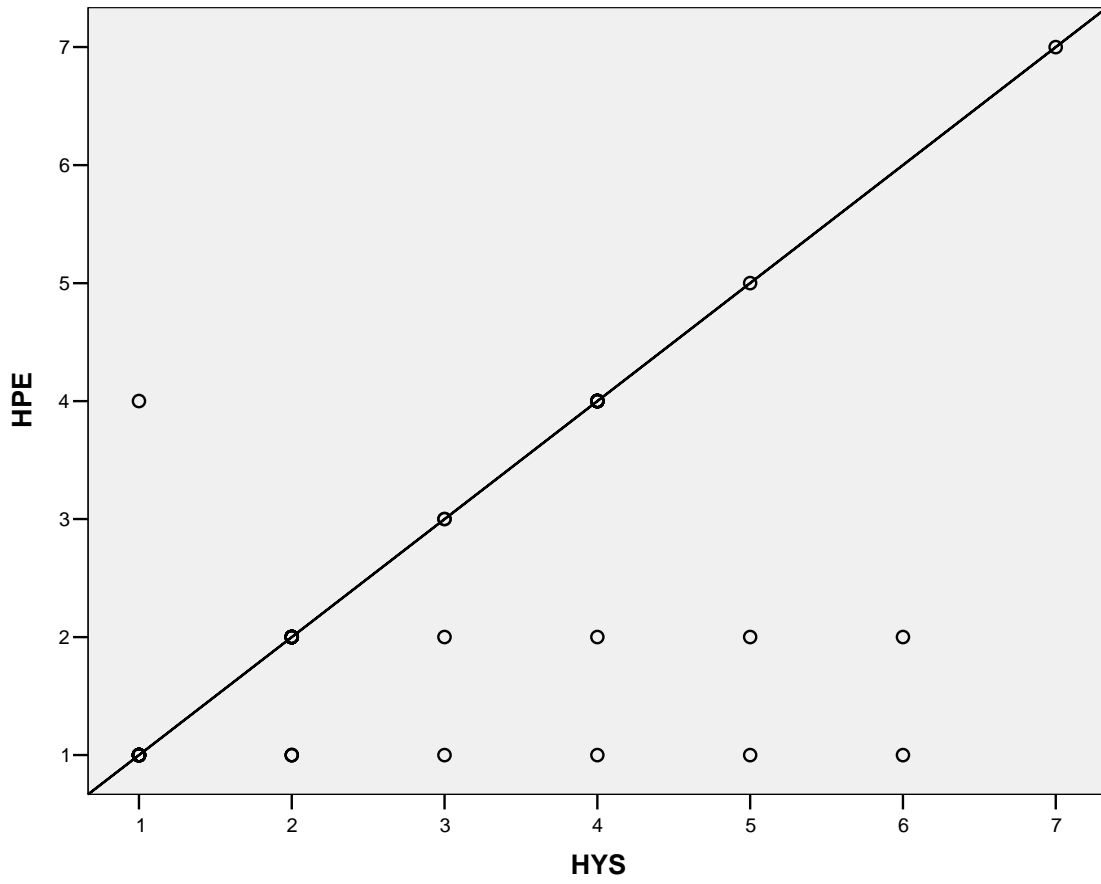
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# CORRELATION BETWEEN HPE & TVS



$r^2 < 0.01$  statistically significant

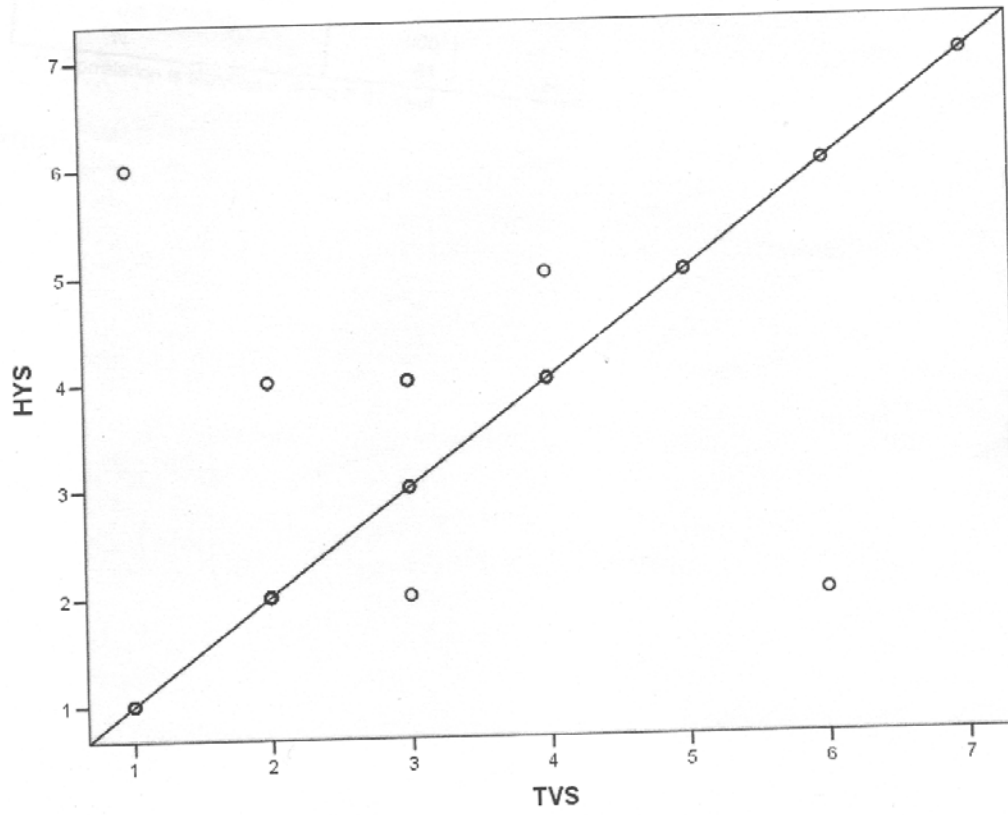
### CORRELATION BETWEEN HPE & HYS



$r^2 < 0.01$  statistically significant

# CORRELATION BETWEEN HYS & TVS

Graph



$r^2 < 0.01$  statistically significant

SL. NO.	TVS	HYSTERSCOPY	HPE	AGE	ET	SYMPTOMS
1	2	2	2	47	9	M
2	2	2	2	48	10	PM
3	1	1	1	26	6	IR
4	2	2	2	48	12	M
5	2	2	2	36	11	IR
6	3	4	4	43	15	O
7	1	1	1	44	4	M
8	2	2	2	50	9	PM
9	1	1	1	38	7	PM
10	2	2	2	48	11	M
11	1	1	1	51	8	IR
12	2	2	2	30	9	M
13	2	2	2	29	8	M
14	4	4	4	46	20	M
15	4	4	4	41	15	M
16	3	4	4	47	16	M
17	2	2	2	37	9	M
18	1	1	1	28	7	P
19	1	1	1	50	7	M
20	1	1	1	30	6	M
21	1	1	1	31	4	P
22	1	1	1	37	6	IR
23	2	2	2	37	9	M
24	2	2	2	32	12	M
25	1	1	1	45	6	IR
26	1	1	1	40	7	O
27	1	1	1	46	7	O
28	3	4	4	48	12	IR
29	4	4	4	42	13	M
30	3	4	4	47	15	P
31	7	7	7	55	4	M
32	5	5	5	36	8	M
33	1	1	1	50	6	M
34	2	2	2	51	13	IR
35	1	1	1	39	7	M
36	1	1	1	46	7	PM

37	1	1	1	44	8	M
38	3	3	3	54	18	M
39	2	2	2	37	9	M
40	2	2	1	43	13	M
41	1	1	1	46	5	M
42	1	1	1	44	5	M
43	1	1	1	35	6	M
44	3	3	3	44	18	IR
45	2	4	4	49	9	M
46	1	6	2	35	6	O
47	6	2	2	28	NM	M
48	1	1	1	40	7	M
49	3	2	1	47	16	IR
50	2	4	4	49	9	M
51	2	2	2	50	12	PM
52	5	5	1	42	NM	M
53	4	4	1	27	9	P
54	4	5	2	31	17	M
55	4	4	2	39	17	IR
56	6	6	1	26	5	M
57	3	3	1	48	>14	M
58	1	1	4	42	5	M
59	2	2	2	49	10	M
60	2	2	1	45	9	M
61	3	3	2	45	15	M

**TVS**

1. Proliferative
2. Secretory
3. Thickened endometrium/  
Hyperplasia
4. Polyp
5. Fibroid polyp
6. Others
7. Atropic

**HYSTEROSCOPY/ HPE**

1. Proliferative
  2. Secretory
  3. Sub mucous fibroid
  4. Polyp
  5. Fibroid polyp
  6. Others
  7. Atropic
- 
1. P - Polymenorrhea
  2. PM – PolyMenorrhagia
  3. M – Menorrhagia
  4. IR – Irregular
  5. O – Oligomenorrhea

<b>TVS</b>	–	<b>Trans vaginal Sonography</b>
<b>HPE</b>	–	<b>Histo Pathological Examination</b>
<b>HYS</b>	–	<b>Hysteroscopy</b>
<b>PPV</b>	–	<b>Positive Predictive Value</b>
<b>NPV</b>	–	<b>Negative Predictive Value</b>
<b>LR</b>	–	<b>Likelihood Ratio</b>
<b>IUCD</b>	–	<b>Intra Uterine Contraceptive Device</b>
<b>NM</b>	–	<b>Not Measured</b>
<b>ET</b>	–	<b>Endometrial Thickness</b>