

**A STUDY ON CORRELATION
BETWEEN HYSTEROSCOPY AND
TRANSVAGINAL ULTRASONOGRAPHY
IN EVALUATION OF ABNORMAL
UTERINE BLEEDING**

**THIS DISSERTATION IS SUBMITTED FOR
MD DEGREE EXAMINATION
BRANCH II
OBSTETRICS AND GYNAECOLOGY
STANLEY MEDICAL COLLEGE
CHENNAI – 1.**



Submitted to the Tamil Nadu
Dr. MGR MEDICAL UNIVERSITY CHENNAI

1.1.1.1 MARCH – 2010

1.2 ACKNOWLEDGEMENT

I gratefully acknowledge and sincerely thank **Dr.A.PRIYA, M.S., D.O.** Dean Govt. Stanley Medical College and Hospital and **Dr. S.CHITRA, M.D., PhD.,** Dean Govt. Stanley Medical College, Chennai for granting me permission to utilize the facilities of the institution for my study.

I am extremely grateful to our Superintendent, **Prof Dr. C.VENI, M.D., D.G.O., D.N.B,** Govt. R.S.R.M. Lying in Hospital, Chennai for the guidance and encouragement given in fulfilling my work.

I am also extremely grateful to Prof. Dr. **Dr. S.CHITRA, M.D., PhD.,** H.O.D. Dept. of Pathology, Govt. Stanley Medical College & Hospital, Chennai for giving me permission to do the study.

I express my sincere thanks to **Prof Dr. A.KALAICHELVI, M.D.D.G.O., D.N.B., Dr. N.HEPHZIBAH KIRUBAMANI, MD.D.G.O., Ph.D.,** and **Dr. T.RUCKMANI, M.D.D.G.O.,** Professors of Obstetrics and Gynaecology Govt. R.S.R.M. Lying in Hospital for their guidance in carrying out this study.

I am also extremely grateful to **Dr. J. ARUMAIKANNU, M.D., D.G.O.** Assist Surgeon Govt. R.S.R.M. Lying in Hospital, Chennai for her encouragement, invaluable support and guidance throughout my study.

I am also extremely grateful to all the Professors, and Assistants and my colleagues for their help in research work.

I am extremely thankful to all the patients who have readily consented and co operated in the study.

1.3 CERTIFICATE

This is to certify that the dissertation entitled “**CORRELATION BETWEEN HYSTEROSCOPY AND TRANSVAGINAL ULTRASONOGRAPHY IN EVALUATION OF ABNROMAL UTERINE BLEEDING**” is the bonafide original work of **Dr. M. RAMYA**, under the guidance of **Dr. C.VENI, M.D., D.G.O., DNB**, Professor of Department of Obstetrics and Gynaecology, Stanley Medical College, Chennai in partial fulfillment of the requirements for MD (Obstetrics and Gynaecology) branch II examination of The Tamilnadu Dr. M.G.R. Medical University to be held in March 2010. The period of post graduate study and training was from May 2007 to February 2010.

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1.4 CONTENTS

1.4.1 Sl.No	Title	Page No.
1.	1.5 INTRODUCTION	1
2.	1.6 REVIEW OF LITERATURE	3
3.	1.7 AIM OF THE STUDY	32
4.	1.8 MATERIALS & METHODS	33
5.	1.9 RESULTS & ANALYSIS	61
6.	1.10 DISCUSSION	67
7.	1.11 SUMMARY	70
8.	1.12 CONCLUSION	72
9.	1.13 PROFORMA	
10.	1.14 BIBLIOGRAPHY	
11.	1.15 MASTER CHART	

INTRODUCTION

Abnormal uterine bleeding (AUB) is defined as the changes in frequency of menstruation, duration of flow or amount of blood loss. It can occur in women of adolescent, reproductive, perimenopausal and postmenopausal age groups. In the reproductive women, regular menstruation is the norm and any departure is likely to be due to pregnancy, birth control methods, or hormone imbalance . During perimenopause, bleeding patterns are usually irregular. After menopause, the significance of bleeding depends to some degree on whether a woman is taking hormone replacement therapy (HRT), but postmenopausal bleeding is always a concern.

INCIDENCE:

It is estimated that 9 to 30% of reproductive women suffer from AUB, whereas in perimenopausal age incidence is higher and in postmenopausal women, it is seen in about 10%. In the reproductive age group, majority of the AUB are dysfunctional, whereas in perimenopausal and post-menopausal women, benign and malignant lesions of genital tract form the major cause. Dysfunctional uterine bleeding (DUB) & uterine fibroids account for about 75% of all hysterectomies performed worldwide . It was found that during the period from September 2008 to September 2009, AUB has accounted for 20% of all outpatient visits at the Obstetrics and Gynaecologic department at Government RSRM hospital, Royapuram. It is imperative that a cost-effective tool to diagnose etiology of AUB is worked out.

REVIEW OF LITERATURE

Introduction

Various literatures have been reviewed to find out the best method for diagnosing the cause of AUB, the commonest gynaecological problem in women¹.

Causes of AUB

The significant causes of AUB are endometrial abnormalities which run across the entire age spectrum. Various investigatory methods are available to find out the causes of AUB in these age groups. The terms used to describe patterns of AUB are based on periodicity and quantity of flow.

Terminologies of AUB⁸

Term	Definition
Menorrhagia	Prolonged or excessive bleeding at regular intervals
Metrorrhagia	Irregular, prolonged bleeding of varying amounts but not excessive
Menometrorrhagia	Prolonged or excessive bleeding at irregular intervals
Polymenorrhoea	Regular bleeding at intervals of less than 21 days
Oligomenorrhoea	Infrequent / Irregular bleeding, variable in amount, scanty in duration greater than 35 days
Amenorrhoea	No uterine bleeding for at least 90 days.

AUB in adolescent age⁶

- Anovulation (90%): 80% of cycles are anovulatory in first year after menarche.

Cycles become ovulatory in an average of 20 months after menarche.

- Pregnancy related bleeding like spontaneous abortions, ectopic pregnancy.
- Hematological up to 20% presenting with menorrhagia have a bleeding disorder e.g., Von Willebrands disease, Idiopathic Thrombocytopenic Purpura.
- Medical illnesses like hyperthyroidism (initial stages) hypothyroidism, Diabetes mellitus, Tuberculosis etc.
- Pelvic inflammatory disease.

AUB in reproductive Age¹⁰

- Exogenous hormone use, pregnancy related bleeding, polyp, fibroids adenomyosis, pelvic inflammatory disease, genital tuberculosis, dysfunctional uterine bleeding, bleeding disorders, endocrine disorders like thyroid dysfunction.

Perimenopausal AUB

Etiology: Anovulation, Anatomic (Fibroids, adenomyosis, polyps),

Endometrial hyperplasia, endometrial cancer & functioning ovarian tumors

Post –menopausal AUB (30-50% are due to malignancy of genital tracts)⁸

Etiology: Endometrial carcinoma (5-10%), endometrial hyperplasia, fibroids,

HRT, feminizing ovarian tumors, Hypertension, bleeding disorders.

Dysfunctional Uterine Bleeding (DUB)

DUB is defined as abnormal uterine bleeding not caused by pelvic pathology, medications, systemic disease or pregnancy. It is the most common cause of AUB during

reproductive age, but remains a diagnosis of exclusion⁹.

An understanding of normal menstruation is essential in investigating the complaint of AUB. The interval between the menstrual cycle, duration of flow and volume of flow remain relatively constant during woman's reproductive years. In the first part of the cycle, estrogen halts menstrual flow and promotes endometrial proliferation. After ovulation, progesterone stops endometrial growth, and then promotes differentiation. If pregnancy doesn't occur the corpus luteum regresses, progesterone production falls, the endometrium sheds its lining and menstrual bleeding follows.

The causes of DUB are related to one of three hormonal imbalance conditions, estrogen break through bleeding, estrogen withdrawal bleeding and progesterone breakthrough bleeding.

Peri-menopausal & post menopausal AUB:-

Erratic bleeding will be distressing; whatever may be its cause. Nearly 70% of peri and post menopausal women seek gynaecological care for the problem. Many women undergo hysterectomy to eliminate abnormal bleeding but better understanding has led to less invasive, more individualized approaches⁹.

Perimenopause

During perimenopause, intervals between menstrual cycles may become longer and the amount of blood flow decreases and the duration of flow shorter. The main reason for this is fewer ovulations. Any deviation from the above pattern is abnormal and should be investigated.

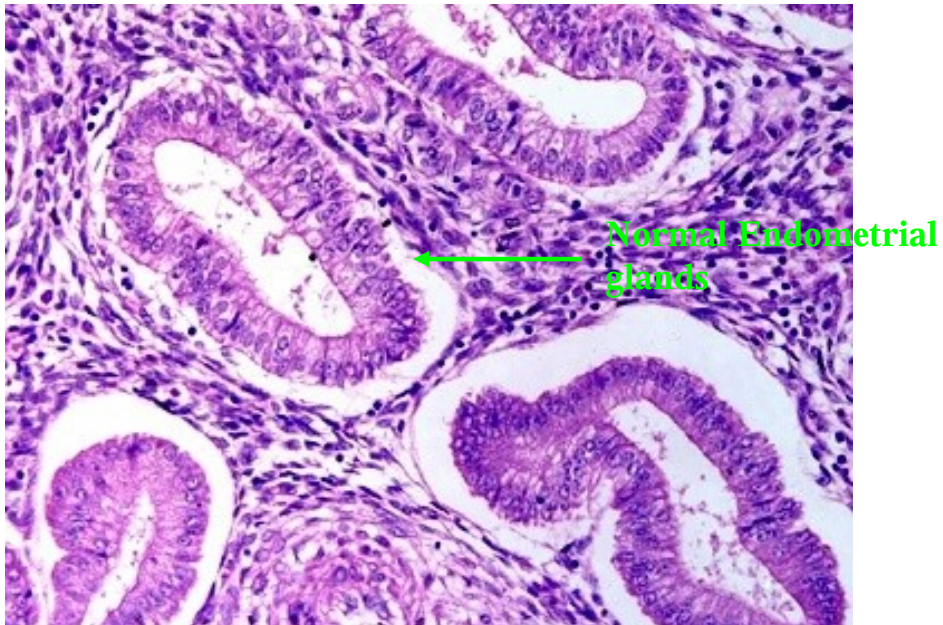
Bleeding in menopausal women:-

It is possible for a menopausal woman to have erratic ovulation after years

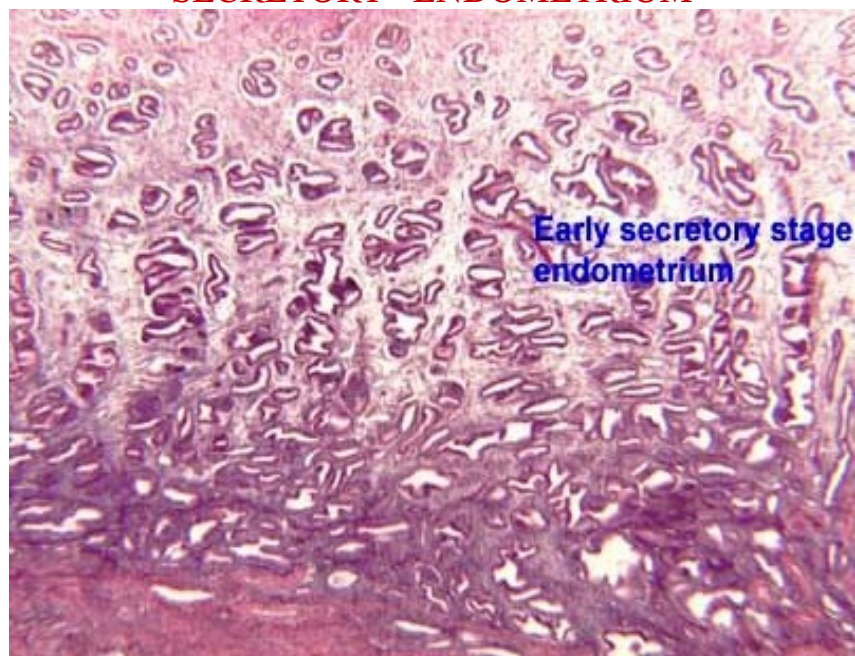
without menstrual periods and women receiving HRT often have bleeding. Bleeding in any menopausal woman is considered abnormal and should be evaluated as the risk for endometrial cancer is 5-10%.

Endometrial abnormalities seen in AUB:-

Normal Endometrium



SECRETORY ENDOMETRIUM

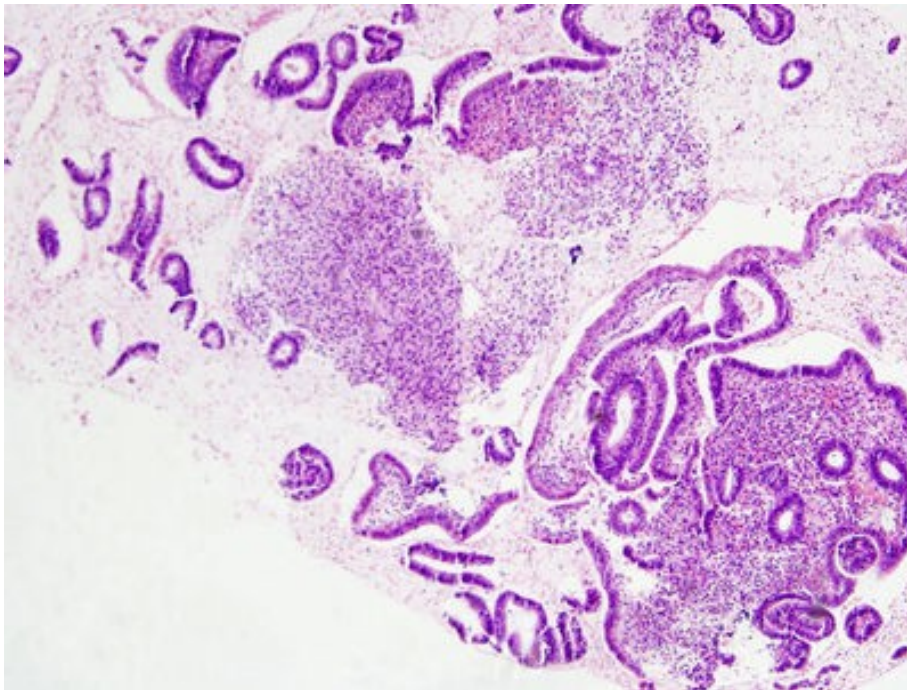


SECRETORY ENDOMETRIUM

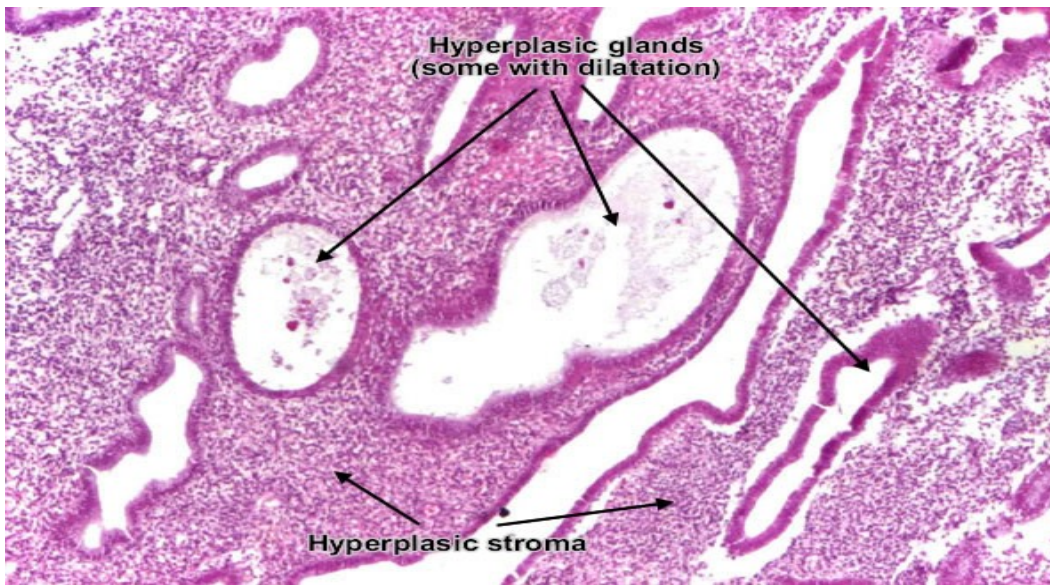
Endometrium - Secretory
(Luteal) Phase



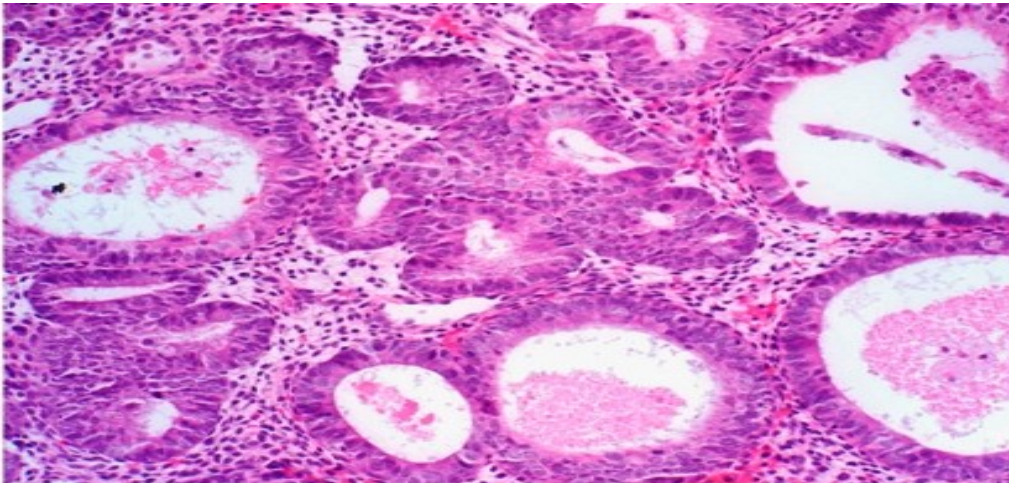
PROLIFERATIVE ENDOMETRIUM



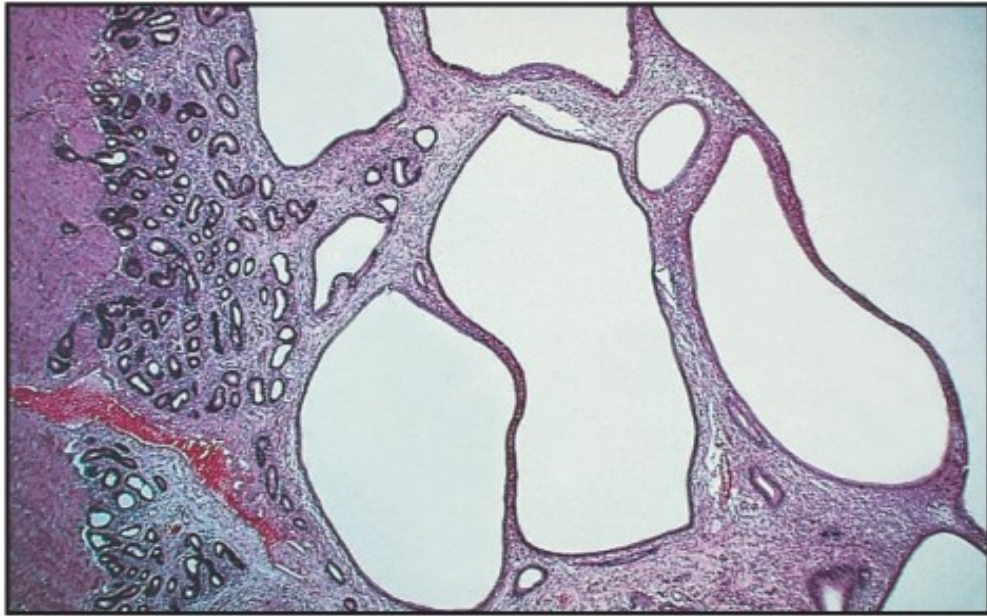
SIMPLE TYPICAL HYPERPLASIA



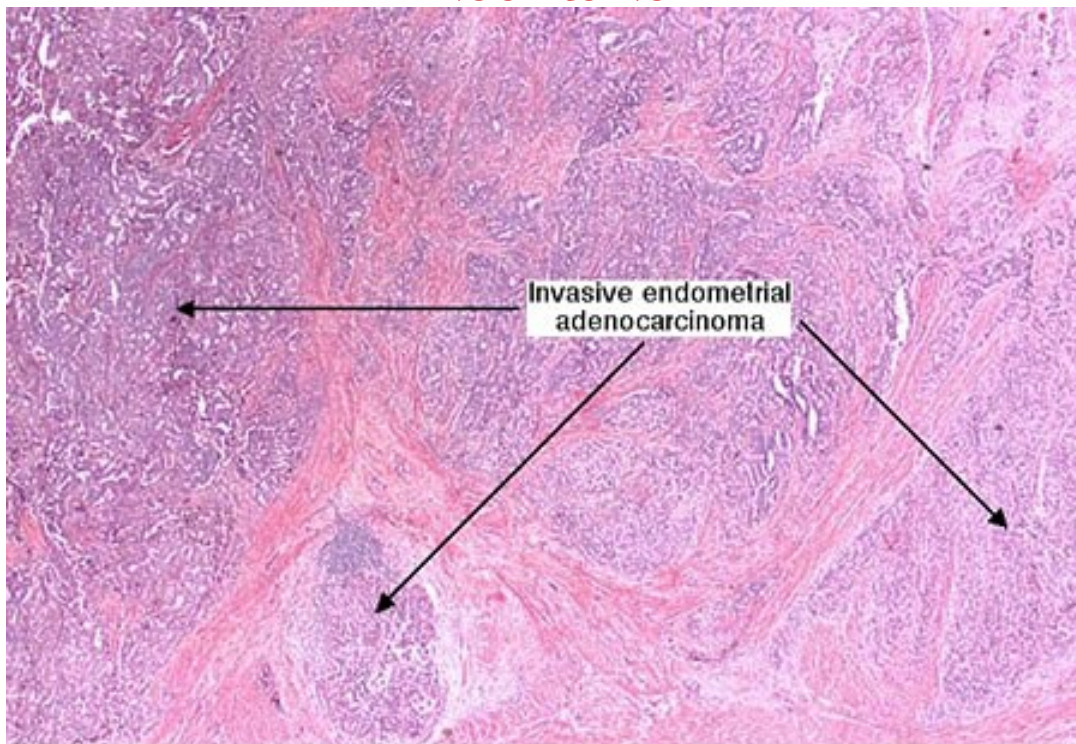
COMPLEX ATYPICAL HYPERPLASIA



CYSTIC GLANDULAR HYPERPLASIA



ADENOCARCINOMA



Uterine leiomyoma

This occurs in as many as one-half of all women older than 35 years of age and is the most common benign tumor of the genital tract. Although they are asymptomatic in

many women, it is estimated to be clinically significant in at least 25%.

Endometrial polyp:-

It is usually associated with endometrial hyperplasia. They are seen in 10% of post-menopausal bleeding. It is present as intermenstrual bleeding or menometrorrhagia. Diagnosis is based on either visualization with hysteroscopy or sonohysterography or microscopic assessment of tissue obtained by biopsy.

Endometrial hyperplasia

It represents an exaggerated, proliferative response of the endometrial glands and stroma due to prolonged, unopposed estrogen stimulation. In most cases, benign endometrial hyperplasia is resolved with D&C or progestin therapy. This accounts for 5-10% of AUB in perimenopausal and postmenopausal women¹⁹.

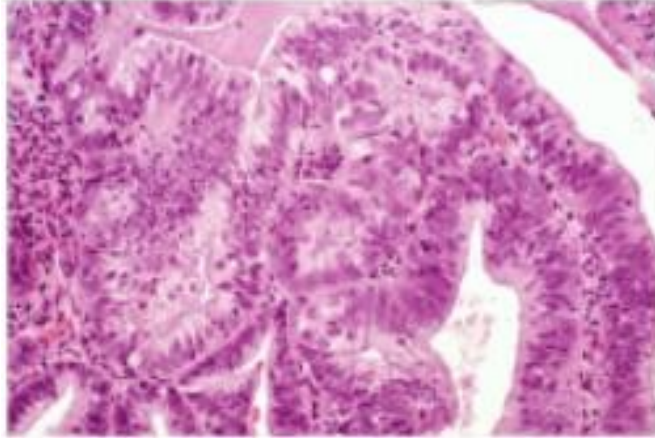
Kurman et al classification

Classification type	Progression to cancer
Simple(cystic without atypia)	1%
Complex (adenomatous without atypia)	3%
Atypical(cystic with atypia)	8%
Atypical complex(adenomatous with atypia)	29%

Endometrial carcinoma:-

This accounts for about 10-15% of women with perimenopausal and postmenopausal uterine bleeding. The strong association of this carcinoma with unopposed estrogen stimulation of the endometrium is very well documented.

ENDOMETRIAL CARCINOMA



Methods of endometrial assessment in AUB

Endometrial cytology

- Pap smear (only 30-50% of patients with endometrial cancer have abnormal pap test)
- Aspiration cytology

Endometrial Biopsy

- Novak curette
- Pipelle or vabra aspirator

Dilatation & curettage

Imaging technique

1. Trans abdominal ultrasonography
2. Endovaginal ultrasonography
3. Hysterosalpingography
4. Hydrosonography
5. Hysteroscopy
6. Other procedures like color flow Doppler of endometrium and MRI

Endometrial Biopsy:-

This is an outpatient procedure. Devices like Pipelle or Vabra aspirator can be used. They yield adequate samples in about 90% of the cases.

Though sample obtained may be adequate, accurate pathology is diagnosed only in 67%⁽¹³⁾.

Dilatation & Curettage

Even though dilatation and curettage has been employed to sample and study endometrium in women with dysfunctional uterine bleeding, it is proved that only 50-60% of the endometrium can be studied¹⁰.

Hysterosalpingography (HSG)

It has been traditionally used to diagnose uterine abnormalities but the disadvantages of using these methods include less than optimal sensitivity, radiation exposure, inability to differentiate submucous fibroid from polyp and inability to visualize myometrial and adnexal abnormalities¹².

Hysteroscopy

History & development

The hysteroscopy that is being used today has evolved over the past 175 years. In 1805 Bozzini constructed a device called a 'light conductor' to inspect various passages and body cavities. The first hysteroscopy was described in 1869 by PANTALEONI²⁴. He used reflected candle light from a concave mirror to illuminate the uterine cavity. The hysteroscopy used by Pantaleoni was similar to an instrument developed by Desormeaux in 1865 for examination of urinary bladder. Now hysteroscopy has developed into an important minimal invasive procedure to diagnose and treat intracavitary abnormalities.

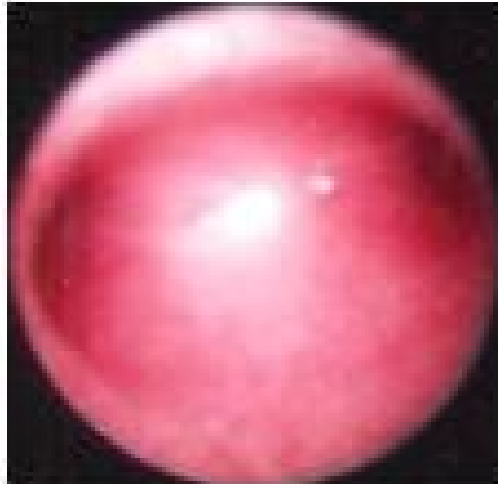
It comprises a rigid 4mm telescope with Hopkins rod lens optical system having wide viewing angle and fibro optic illumination cable. The sheath is 5mm diameter in the centre of which telescope is fitted.

The uterine cavity is distended with ringer lactate.

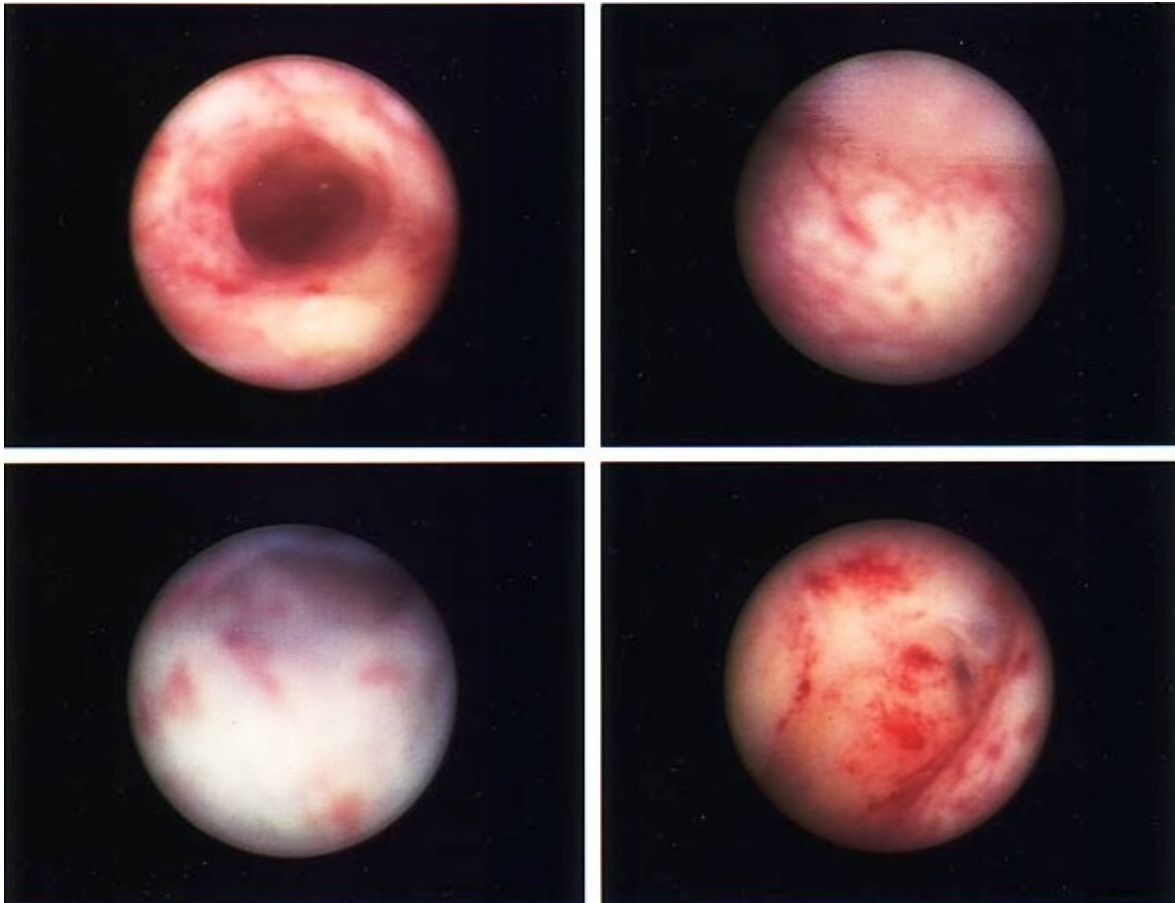
TYPES:

- *MICRO HYSTEROSCOPE*
- *CONTACT HYSTEROSCOPE*

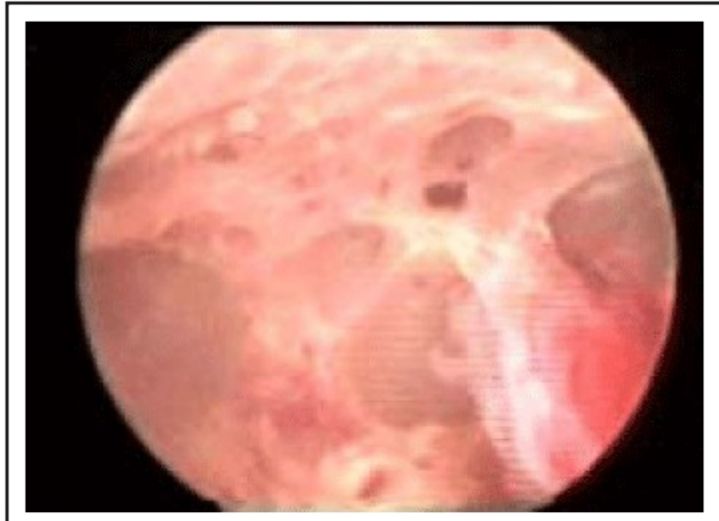
HYSTEROSCOPIC VIEW OF NORMAL ENDOMETRIUM



VARIOUS HYSTEROSCOPIC VIEWS OF UTERINE CAVITY



SIMPLE CYSTIC HYPERPLASIA



ENDOMETRIUM-POLYP



UTERINE SEPTUM

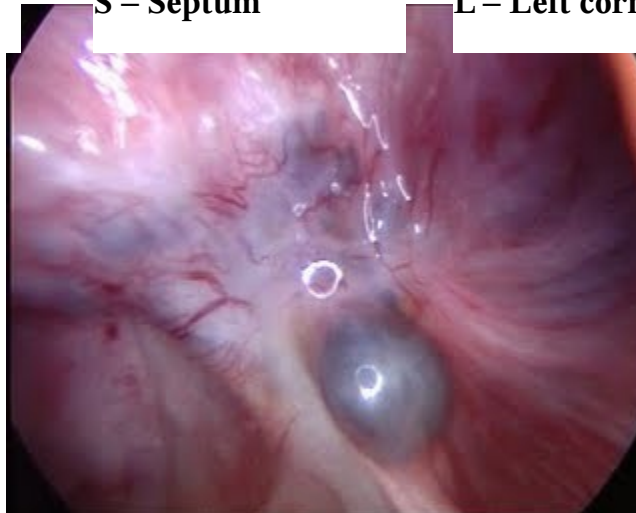


R – Right cornua

ENDOMETRIOTIC-NODULE

S – Septum

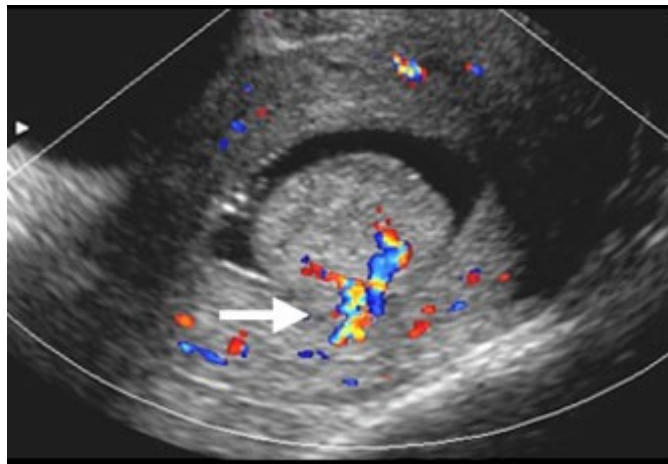
L – Left cornua



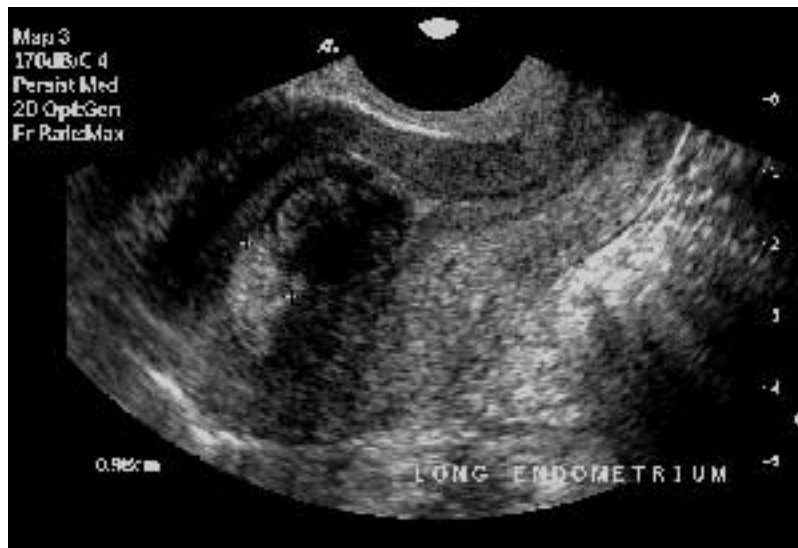
ENDOMETRIUM - HYPERPLASIA



TRANSVAGINAL ULTRASOUND – SUBMUCOUS FIBROID



TRANSVAGINAL ULTRASOUND – SHOWING POLYP



As stated by VALLE, hysteroscopy is indicated in any situation in which intrauterine visualization will enhance diagnostic accuracy and define therapy.

INDICATIONS FOR DIAGNOSTIC HYSTEROSCOPY²⁴

1) Unexplained abnormal uterine bleeding

- Reproductive
- Premenopausal
- Post menopausal

2) Selected infertility cases

- Abnormal hysteroGRAPHY or transvaginal ultrasonography
- Unexplained infertility.

3) Recurrent Spontaneous abortions.

INDICATIONS FOR THERAPEUTIC HYSTEROSCOPY

- Adhesiolysis
- Division of uterine septum
- Resection of Myomas
- Endometrial destruction through Nd: YAG Laser vaporization or radio frequency resection.

- Removal of foreign bodies.
- To position occluding devices in the fallopian tube for sterilization.

Only diagnostic hysteroscopy is dealt in this study.

CONTRAINDICATION OF HYSTEROSCOPY

- i. Pregnancy
- ii. Active or recent endometrial infections
- iii. Menstruation is a relative contra indication
- iv. Patient with cardiac and pulmonary disease

TIMINGS OF HYSTEROSCOPY

Studies should be preferably done in postmenstrual phase of menstrual cycle.

COMPLICATIONS OF HYSTEROSCOPY

Adverse effects resulting from diagnostic hysteroscopy are few compared to those following its therapeutic use. Faulty technique and selection of inappropriate patients are most frequent causes of untoward sequelae.

1. TRAUMA

Cervical laceration can result from rough manipulation by holding the cervix with tenacula. Forceful dilatation provokes unnecessary bleeding. Uterine perforation and thermo intestinal accidents can occur.

2) INTRAVASATION

Endometrial tuberculosis, sub mucous tumors, hypo plastic uterus and proximal tubal obstruction-are predisposing factors to venous intravasation. The risk of pulmonary embolism is very minimal.

3) INFECTION

Hysteroscopic procedure can exacerbate latent salpingitis. Post-operative salpingitis, peritonitis and febrile reactions can occur.

4) MORTALITY

Due to faulty technique of CO₂ insufflation. It is a very rare complication.

ENDOMETRIAL STUDY BY HYSTEROSCOPE AT RSRM HOSPITAL



When the hysteroscope is introduced into the cervical canal under vision, the cervical canal is seen as a circular or oval structure. The anterior-posterior diameter is smaller and has a smooth mucous membrane. The whitish appearance of the mucous membrane differentiates it from the lining of uterine cavity. By steady and slow progress in the cervical canal it is possible to assess the cervical mucus. The length, morphology and pathological features can be studied. The isthmus, details about the glandular and papillary structure of the mucosa can also be studied.

PROLIFERATIVE ENDOMETRIUM

- The surface is smooth and the color is white or yellow
- Height of endometrium is 2-5mm
- Pores of endometrial glands are seen and are situated regularly
- Superficial vascularisation forms are relatively poor and are seen as interrupted and punctuate lines
- Tubal ostia are normal

SECRETORY ENDOMETRIUM

- The surface is smooth or slightly rough. The color varies from yellow to pink.
- Height of the endometrium is 4-5mm
- Superficial vessels have typical geometrical pattern mimicking a net.
- Tubal ostia are normal

NATURAL ATROPHY

- Surface is smooth and appears as white or yellow
- Height of the endometrium is less than 1mm
- Visible glandular openings are absent
- There is complete absence of superficial vessels though deeper vessels of stroma can be seen
- The tubal ostia are either completely obliterated or seen as fibrous folds

INDUCED ATROPHY

- The surface is rough and the color is ochre
- Height is 1 to 2 mm
- Visible glandular pore are absent
- Superficial vessels are inadequate but deeper stromal vessels are seen
- Tubal ostia show characteristic atrophy

COMPLEX HYPERPLASIA

- This presents with a rough surface and the color is variable from white to yellow or even pink
- The height of the endometrium is uneven and usually very thick
- Rich superficial vascularisation with no specific pattern is seen Endoscopic examination easily provokes hemorrhage
- Though some glandular orifice can be seen, they are no longer well delineated and the regular disposition is lost
- Tubal ostia are normal

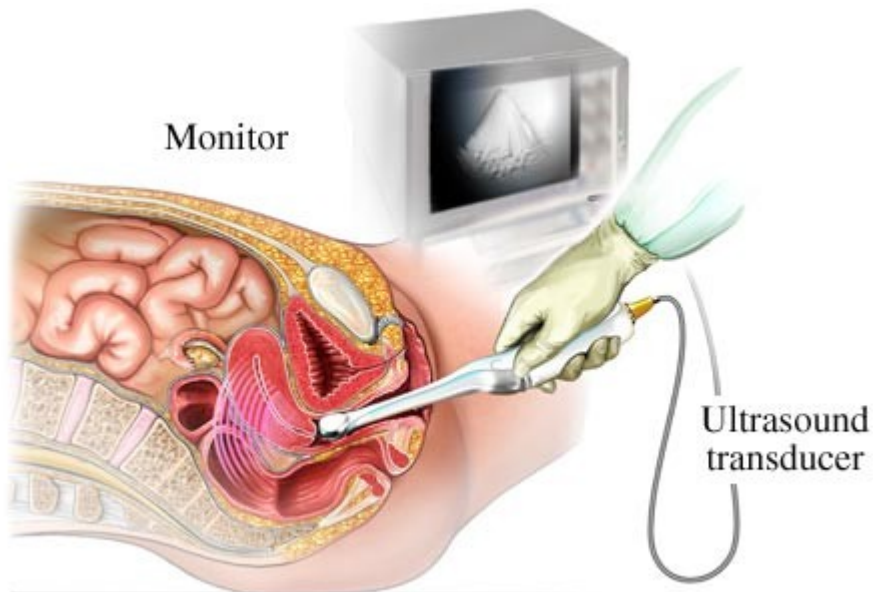
SIMPLE HYPERPLASIA

- As with complex hyperplasia , the surface is rough and the colour varies from white to yellow or even pink
- The height of endometrium is uneven and thick. Rich superficial vascularisation with network appearance are seen
- Trapped in the meshes of the net are several transparent cysts which often attain a diameter of several millimeter. Some are filled with brown liquid suggesting intra cystic hemorrhage

PSEUDO DECIDUALISATION

- The surface is rough
- Height of endometrium is variable and has pseudopolypoidal appearance
- Rich congestive vascularisation is noted as in secretory phase
- Visible glandular pores are absent
- Tubal ostia are absent

ENDOGENITAL SONOGRAPHY



~ Due to the increased proximity of the endovaginal probe to the uterus and hence to the endometrium, endovaginal approach gives an excellent opportunity to study the endometrium very closely. A very clear and magnified view provided by the high frequency transducer permits precise evaluation of endocrine response of the endometrium and helps to diagnose endometrial pathology.

Normally the uterine cavity is empty and hence it is represented by the two layers of the endometrium in apposition and the sonographic appearance is that of a clear echogenic line.

MENSTRUAL ENDOMETRIUM

The endometrial cavity is filled with small echo free spaces suggesting the presence of blood clots. The endometrial lining will be thin and less echoic.

PROLIFERATIVE ENDOMETRIUM

The growth of the endometrial glands and stromal edema is identified in the form of gradually increasing thickness of the endometrium. During the mid-proliferative phase the hypo-echoic area surrounded by echogenic line widens due to increasing stromal edema. In the impending pre-ovulatory period the stromal edema is maximal. This results in significant widening of echo free zone and intense echogenicity of the endometrial lining. The endometrial thickness increases gradually from 2-3 mm in early proliferative phase to upto 8-10 mm in late proliferative phase.

SECRETORY ENDOMETRIUM

During the luteal phase, the secretions of glands are discharged into the lumen of the endometrial cavity. This is recognized at transvaginal scan in the form of an echo-free space being lined by thick and relatively echogenic endometrium. During mid-secretory phase there is regression of endometrial glandular elements and prominence of stromal cells. This leads to increased thickness of the endometrium which becomes more echogenic. During the late secretory phase there is prominence of stromal cells which give a strong echogenic fluffy appearance to the endometrium and also adds to the thickness of the endometrium. The endometrial thickness can increase to 10-14 mm during the secretory phase.

HYPERPLASTIC ENDOMETRIUM

Hyperplastic endometrium has characteristic picture by sonography. The intensely echogenic and thick endometrium surrounded by echo free periphery is quite diagnostic. The endometrium thickens and become pseudopolypoid in configuration. In these patients, thickening of the endometrium beyond what is expected for women of comparable age is detected. In perimenopausal women endometrial thickness greater than 14 mm should be considered for further evaluation , whereas in postmenopausal women endometrial thickness more than 10 mm should be considered abnormal.

AIM OF THE STUDY

- To compare the efficacy of hysteroscopy and transvaginal ultrasound in diagnosing endometrial pathology in AUB .
- To correlate the hysteroscopy and sonography findings with histopathological specimen of endometrium obtained by Dilatation and Curettage.

MATERIALS AND METHODS

This is a prospective study conducted at Government RSRM Hospital. 150 patients were taken up randomly from those who are attending the gynaecological outpatient department in the age group 25-50 years with following complaints

Menorrhagia, polymenorrhoea, amenorrhoea, metrorrhagia and oligomenorrhoea

INCLUSION CRITERIA

- Only parous women of age groups 25-50 years
- Patients without medical illness and patients with diabetes and hypertension under control
- Fair, general condition
- In postmenstrual phase of menstrual cycle

EXCLUSION CRITERIA

- Hemoglobin level <8 g/dl
- Pelvic infection
- Profuse bleeding per vaginum
- Uncontrolled diabetes/hypertension/ cardiopulmonary illness.

Thorough history taking (as per proforma) was done, general examination, systemic examination, P/A, P/S and bimanual pelvic examination were done. Baseline investigations like hemoglobin, Urine-albumin, Sugar, Deposits, electro cardiography.

- Informed consent for the procedure & anaesthetic assessment for hysteroscopy and D& C obtained.
- Patients are advised to have light dinner before 10 PM on night prior to hysteroscopy
- Preparation done as for other surgical procedures
- The next day an endovaginal USG is performed on all patients prior to hysteroscopy

ENDO VAGINAL USG

Done with 5 mega hertz curvilinear probe. After emptying the bladder the patient lies down in the dorsal position, the probe covered by condom was inserted into the introitus. After gentle separation of labia majora by examiners fingers and gentle downward pressure on posterior commissure of labia minora saggital and coronal with transverse sections of uterus were viewed and findings noted.

FINDINGS

- 1) Thickness of endometrium
- 2) Stromal edema – represented by clear echo free space surrounding the periphery of echogenic endometrial lining

- 3) Other uterine or adnexal pathology which could not be detected clinically. After endovaginal USG patient is wheeled to theatre where hysteroscopy and Dilatation and Curettage were performed

HYSTEROSCOPY

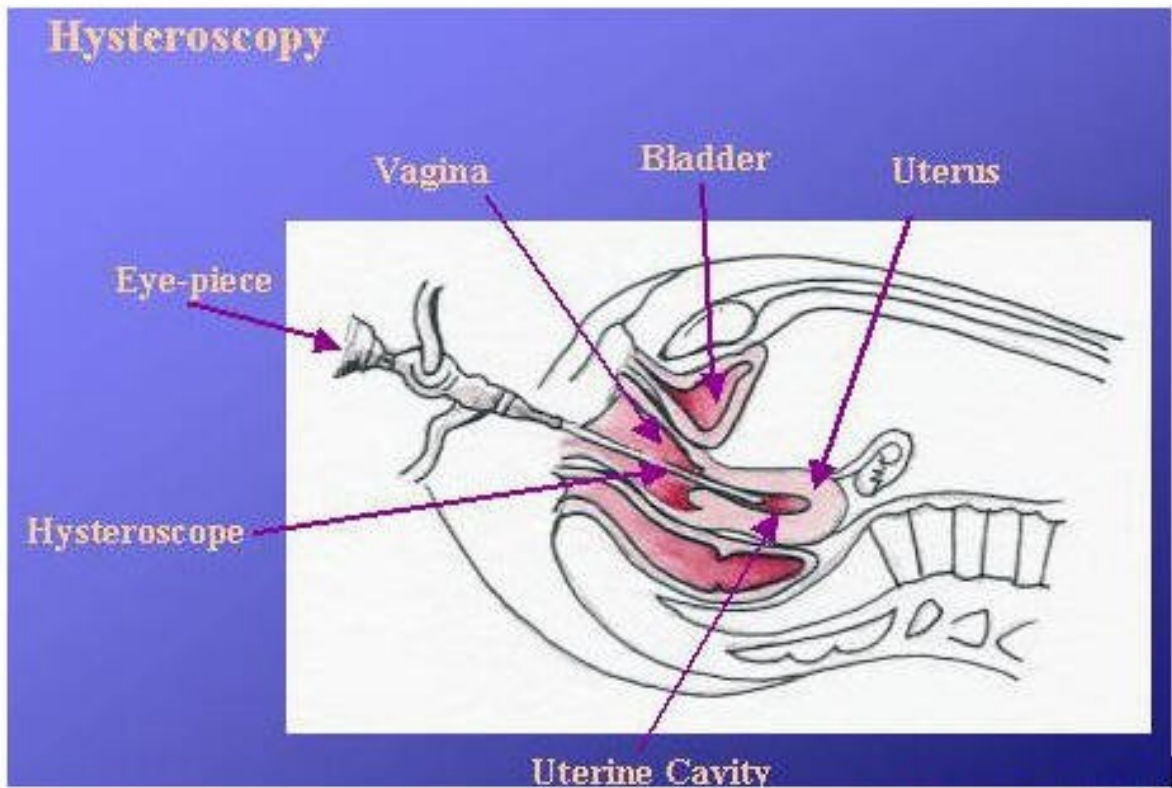


Figure Showing a Hysteroscope Introduced into the Endometrial Cavity

The patient is examined and reassessed by anaesthetist in the theatre. After a routine examination which includes vital parameters such as Temperature, Pulse, blood pressure, cardio vascular and Respiratory system examination, patient is put in lithotomy position. The part to be examined is cleaned with antiseptic solution and draped.

In this study hysteroscopy is performed under intravenous ketamine anesthesia.

ANAESTHESIA

ROUTE

- Intravenous

DRUGS USED

1. Ketamine hydrochloride (2mg/kg)
2. Diazepam 10mg
3. Atropine 0.6mg

DURATION

15-20 minutes

INSTRUMENTS

- Telescope –eye piece and object lens
- Light generator



Diagnostic sheath required to deliver distending media inside uterine cavity.

Ringer lactate is used as distending media. Speculum, Valsellum, Sponge holding forceps

Under anaesthesia after catheterizing the bladder a bimanual pelvic examination was done. After introducing Sim's speculum the anterior lip of the cervix was caught with Valsellum. After measuring length of the uterine cavity the internal os is dilated upto 7 Hegars dilator which was sufficient in most of the patients. Hysteroscope introduced into cervical canal under vision. The inflatable cuff surrounding the medium was inflated to 100 mm of Hg & maintained between 80-100 mm Hg. The drip set attached to the distending medium was attached to the inflow channel of the hysteroscope. The uterine cavity is examined and the following findings are noted:-

- Endometrial surface, color
- Vascularity
- Glandular pores
- Tubal ostia

Any blood clots present in the cavity will be rinsed off by the fluid used as distending medium. The time taken for the procedure and amount of fluid used are noted carefully at the end of the procedure.

Abnormalities like

- Endometrial hyperplasia
- Sub mucous fibroid
- Endometrial atrophy
- Neoplasia
- Synechiae
- AV malformations
- Polyp
- Hemangioma are visualized.

Advantages

- Direct visualization of pathology
- Accurate localization of lesion
- To take biopsy from lesion (good volume of tissue obtained)

Dilatation and Curettage

Under anaesthesia endometrial curettage was done and curettings were sent for histopathological examination.

After the procedure was over the patients were shifted to post operative ward and kept under observation for 24 hours.

TABLES AND CHARTS

Table 1

DISTRIBUTION OF AUB IN RELATION TO AGE

Age	No. of patients	Percentage %
25-29	15	10
30-34	45	30
35-39	37	24.6
40-44	27	18
45-50	26	17.4
Total	150	100

Majority of patients with AUB were 35 years & above (>60%)

Figure 1

DISTRIBUTION OF AUB IN RELATION TO AGE

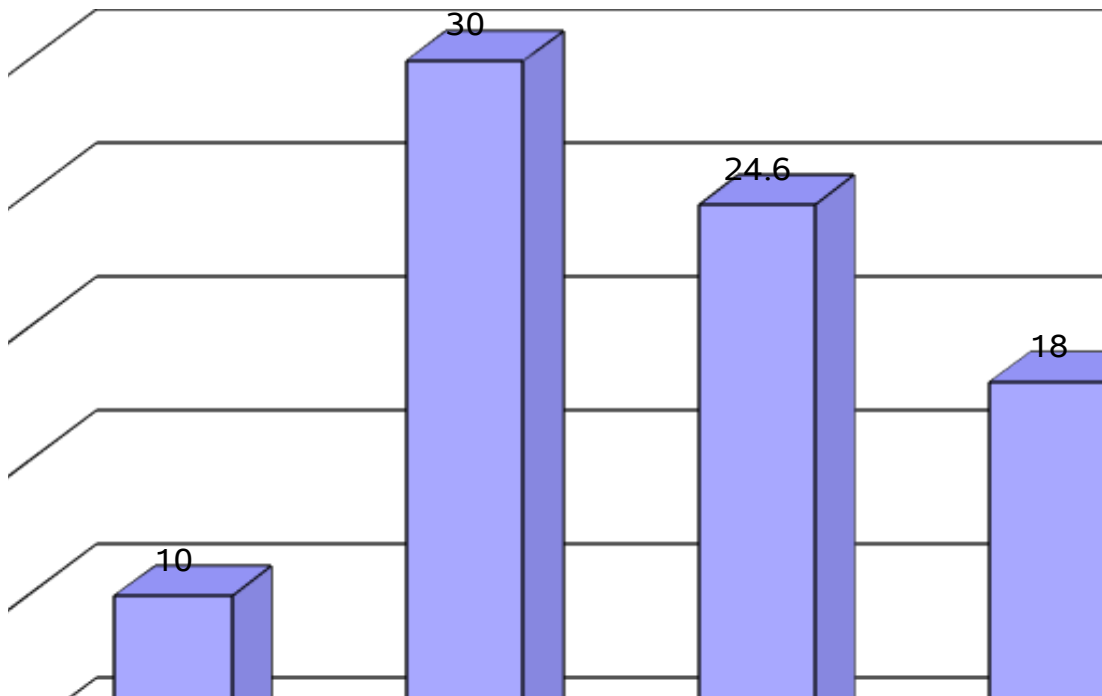


Table 2

DISTRIBUTION OF AUB IN RELATION TO PARITY

	No. of patients	Percentage %
Nullipara	6	4
Para1	9	6
Para2	42	28
Para3	66	44
Para4 & above	27	18
Total	150	100

Most of the women were found to be multiparous, para 2 & above (90%)

Figure 2

DISTRIBUTION OF AUB IN RELATION TO PARITY

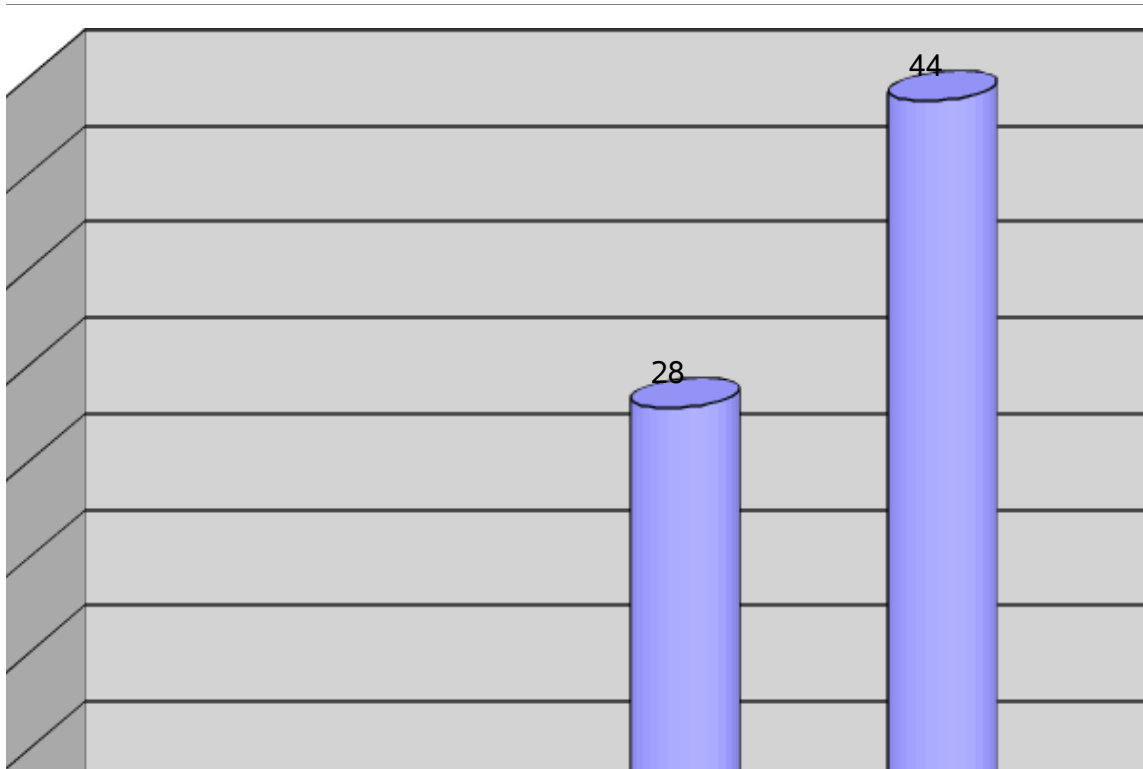


Table 3

DISTRIBUTION OF AUB IN RELATION TO SOCIO-ECONOMIC CLASS(SE CLASS)

	No. of patients	Percentage%
SE class iii	6	4
SE class iv	18	12
SE class v	126	84
Total	150	100

84% of the patients belong to class V socio-economic status.

Figure 3

DISTRIBUTION OF AUB IN RELATION TO SOCIO-ECONOMIC CLASS(SE CLASS)



Table 4

TYPE OF BLEEDING

	No. of patients	Percentage
Menorrhagia	96	64
Metrorrhagia	16	10.67
Menometrorrhagia	18	12
Polymenorrhoea	20	13.33
TOTAL	150	100

Menorrhagia was the commonest complaint found in 64% of study group.

Figure 4

TYPE OF BLEEDING

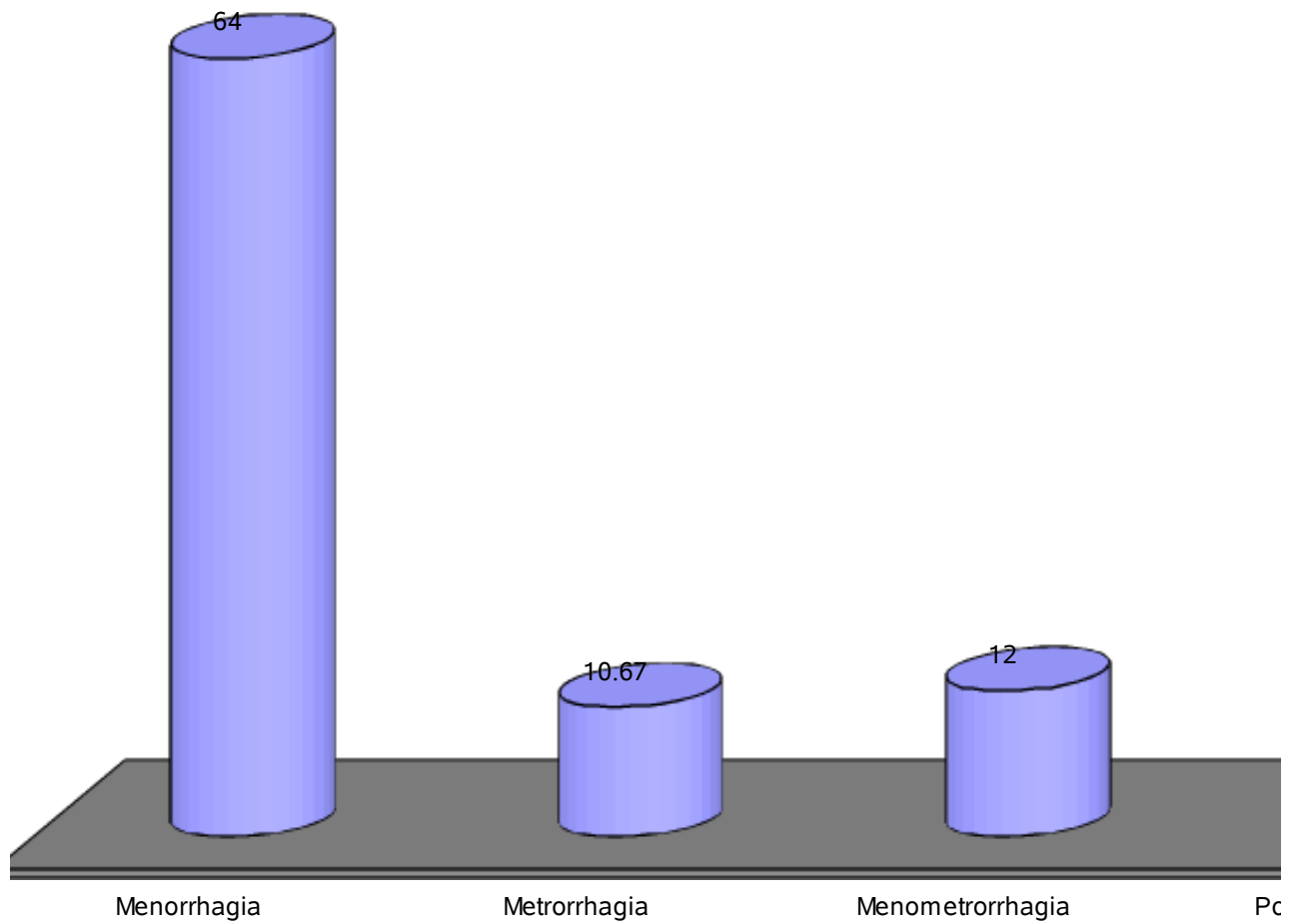


Table 5

DURATION OF COMPLAINT

Duration	No. of patients	Percentage
<3 months	27	18
3-5 months	27	18
6-9 months	54	36
1-2 years	30	20
>2 years	12	8
	150	100

Majority of the patients sought medical treatment only after more than 6 months.8% had complaints for more than 2 years.

Figure 5

DURATION OF COMPLAINT

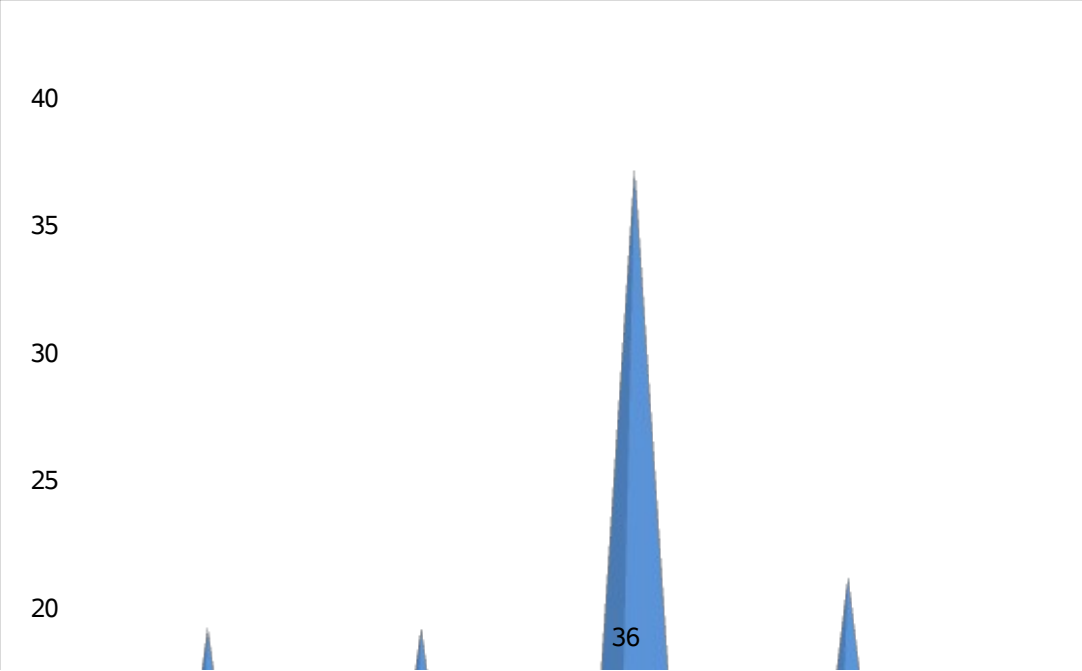


Table 6

ASSOCIATED MEDICAL CONDITIONS

Anaemia and Diabetes was seen in 18 % of the study group, Hypertension was seen in 20% of study group.

Figure 6

ASSOCIATED MEDICAL CONDITIONS

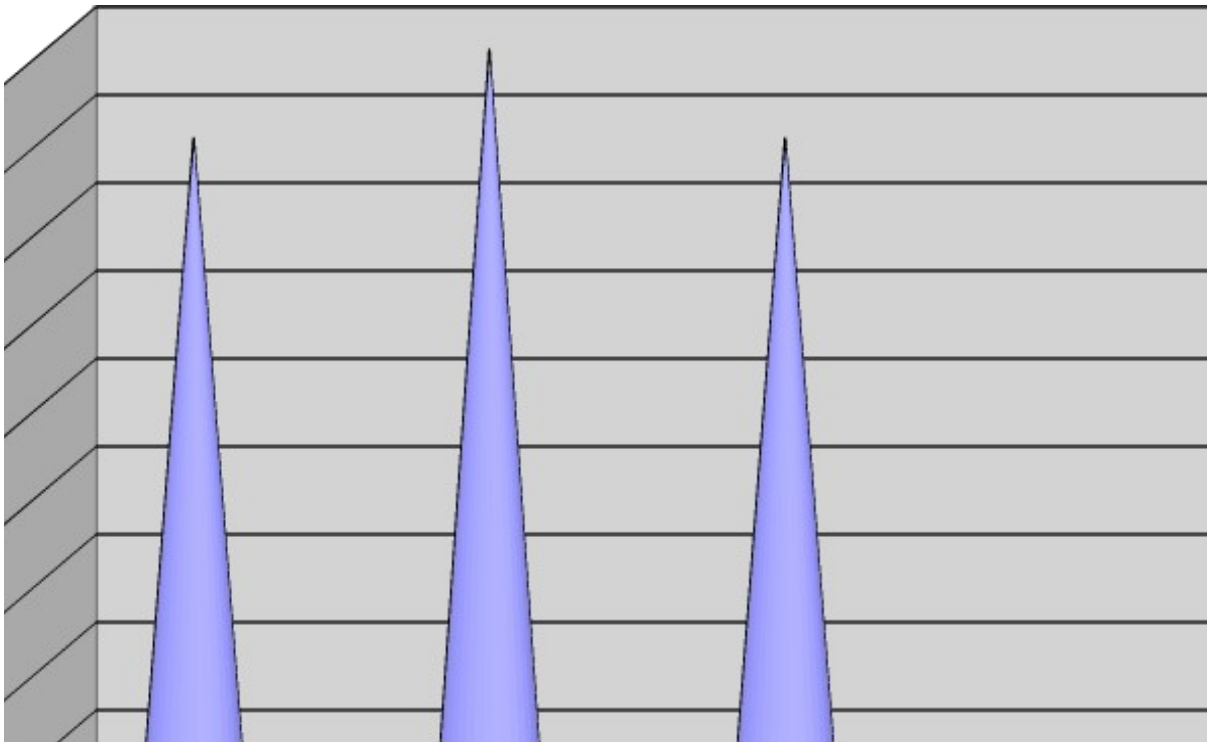


Table 7

FINDINGS IN HISTOPATHOLOGIC EXAMINATION

Age	Proliferative	Secretory	Simple	Complex
25-29	10 (6.6%)	5 (3.3%)	-	-
30-34	12 (8%)	32 (21.3%)	1 (0.7%)	-
35-39	15 (10%)	20 (13.3%)	2 (1.3%)	-
40-44	3 (2%)	2 (1.4%)	22 (14.7%)	-
45-50	-	1 (0.7%)	24 (16%)	1 (0.7%)
Total	40 (26.6%)	60 (40%)	49 (32.7%)	1

- Among 26.6% of proliferative endometrium reported by Histo Pathologic Examination, 24.6% was present within 39 years of age. Only 2% of patients in age group 40-50 years had proliferative endomerium.
- Among 40% of secretory Endometrium reported by histopathologic examination 37.9% was present within 39 years of age, only 2.1% in age group 40-50 years had secretory endometrium.
- 30.7% patients above 40 years had hyperplastic endometrium
- Only one patient had complex hyperplasia without atypia.

Figure 7

FINDINGS IN HISTOPATHOLOGIC EXAMINATION

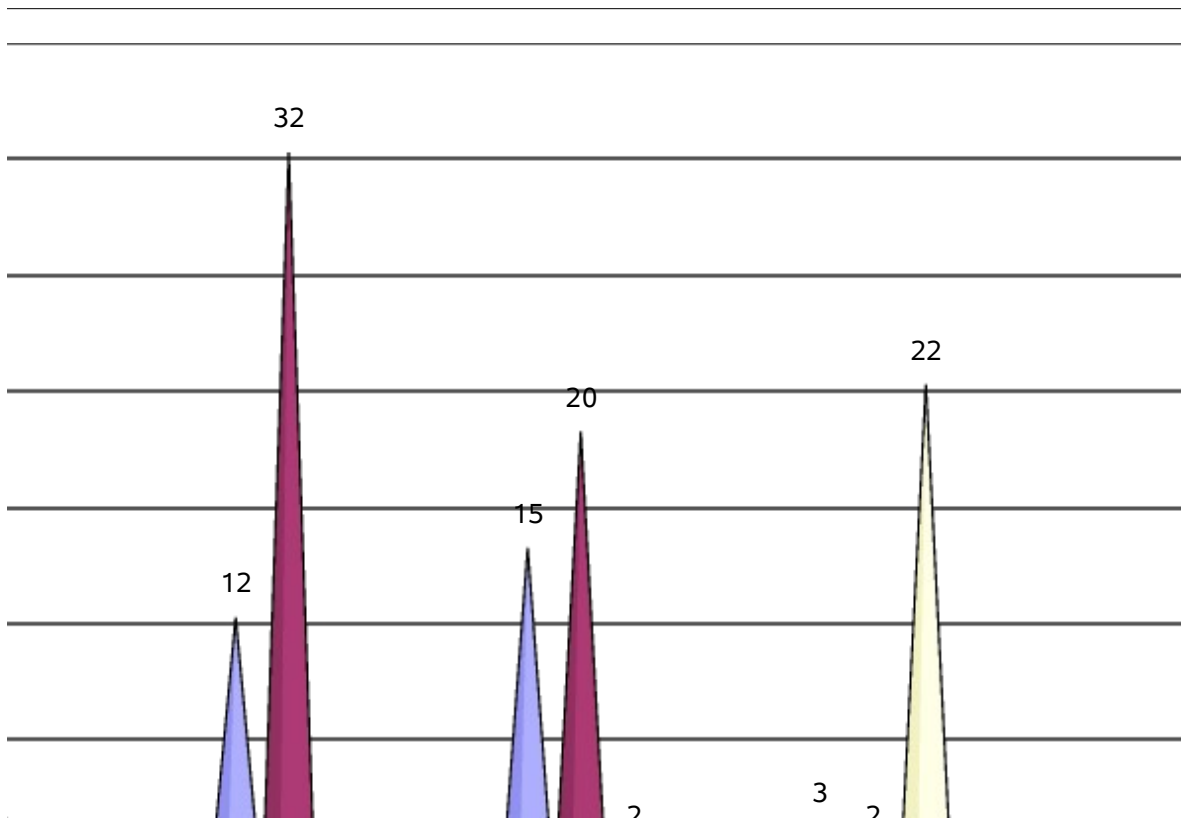


Table -8

FINDINGS IN TRANSVAGINAL SONOGRAPHY

Endometrial thickness	Type of endometrium	Number of patients	Percentage
5-10 mm	Proliferative	50	33.3
11-14mm	Secretory	60	40
>14mm	Hyperplastic	40	26.7
Total		150	100

Transvaginal ultrasound identified hyperplasia in 26.7% cases.

Figure -8

FINDINGS IN TRANSVAGINAL SONOGRAPHY

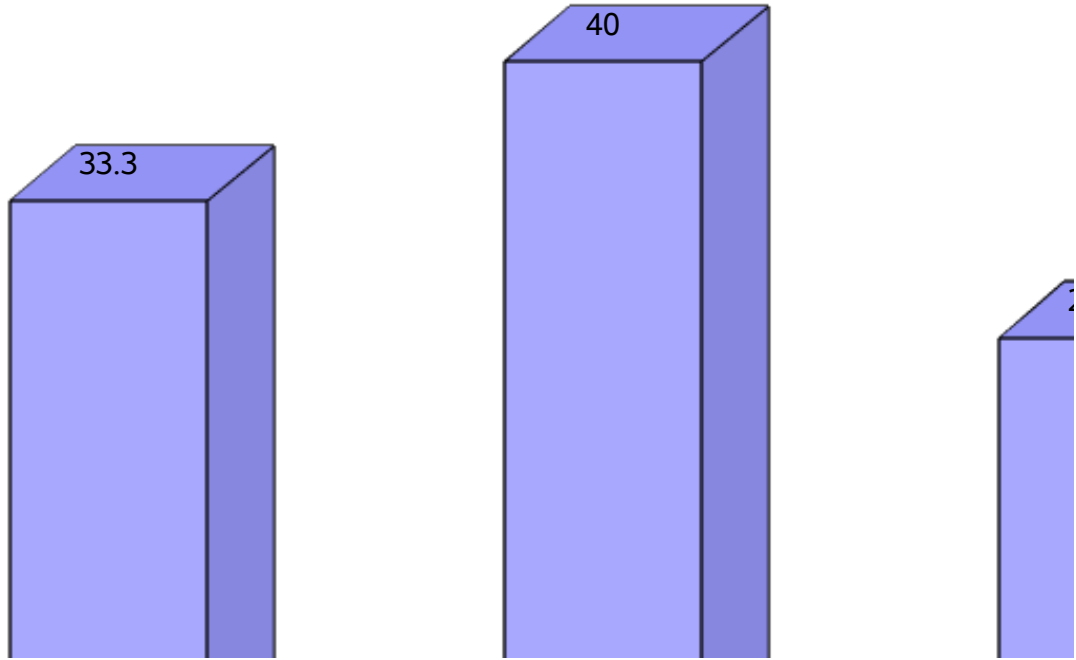


Table -9

FINDINGS IN HYSTEROSCOPY

Colour of Endometrium	Pattern of Endometrium	Type of Endometrium	No. of patients	Percentage
White or Yellow	Smooth surface, Poor superficial vascularisation seen as interrupted and punctate lines	Proliferative	42	28
Yellow to Pink	Smooth or slightly rough surface. Geometric pattern of superficial vessels (Net Pattern)	Secretory	60	40
White to Yellow or even pink	Rough surface, Rich superficial vascularisation with network appearance	Simple	47	31.40
Pink	Rich superficial vascularisation with no specific pattern hemorrhage is easily provokable	Complex	1	0.6
TOTAL			150	100

Hysteroscopy identified hyperplasia in 32% cases.

Figure -9

FINDINGS IN HYSTEROSCOPY

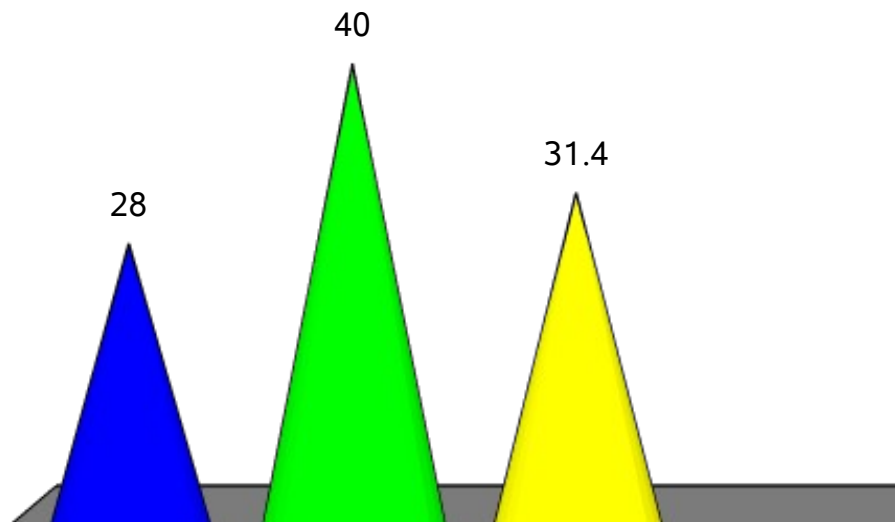


Table -10

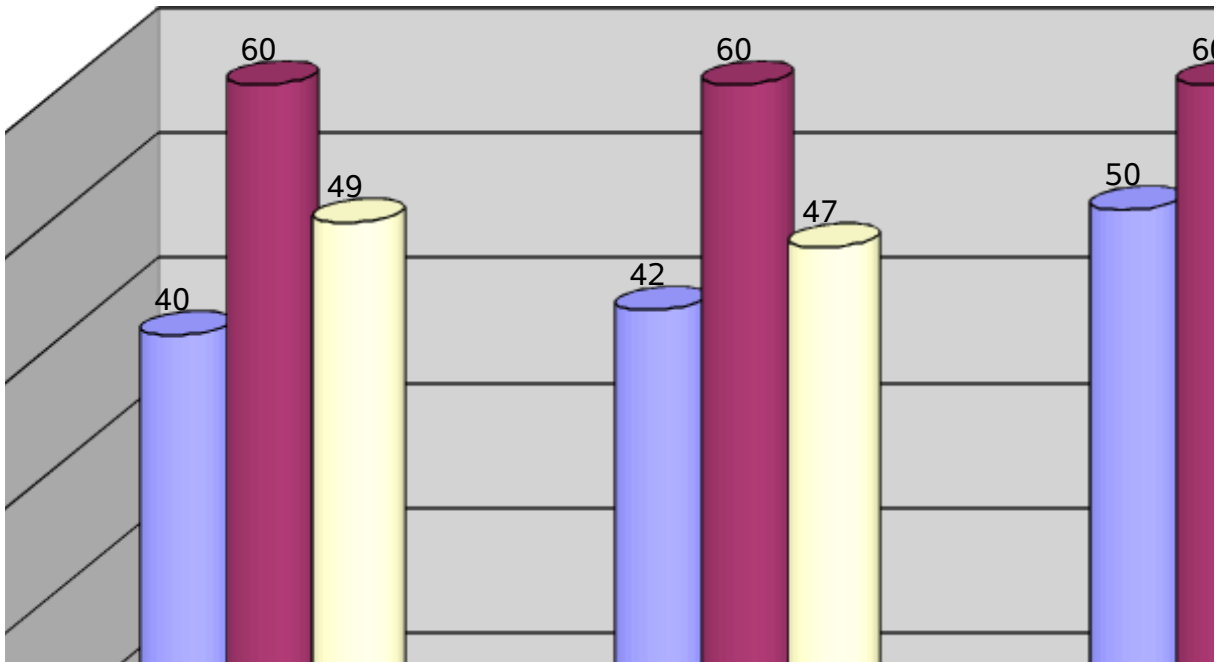
**COMPARISION OF TRANSVAGINAL ULTRASOUND AND HYSTEROSCOPY
FINDINGS WITH HISTOPATHOLOGIC REPORT**

Type of Endometrium	Finding in Histopathology	Findings in Hysteroscopy	Findings in Transvaginal ultrasound
Proliferative	40	42	50
Secretory	60	60	60
Simple	49	47	40
Complex	1	1	-
Total	150	150	150

Hysteroscopy with biopsy has more correlation with histopathologic report.

Figure -10

COMPARISION OF TRANSVAGINAL ULTRASOUND AND HYSTEROSCOPY
FINDINGS WITH HISTOPATHOLOGIC REPORT



RESULTS & ANALYSIS

TOTAL NUMBER OF CASES = 150

The secretory and proliferative endometrium are taken as normal. The hyperplastic endometrium is considered as abnormal. Both transvaginal ultrasound and hysteroscopically diagnosed patterns are correlated with histopathology of endometrium.

INCIDENCE OF ENDOMETRIAL PATHOLOGY BY HISTOPATHOLOGIC EXAMINATION

Type of Endometrium	Number of Cases	Percentages
Normal Endometrium (Both Proliferative and Secretory)	100	66.7%
Hyperplastic endometrium	Simple - 49	32.7%
	Complex - 1	0.6%
Total	150	100%

Here simple hyperplasia includes simple cystic hyperplasia and cystic glandular hyperplasia. Complex hyperplasia includes complex hyperplasia without atypia. In the present studies, there was no atypical hyperplasia or malignancies.

SENSITIVITY AND SPECIFICITY OF HYSTEROSCOPY IN DIAGNOSIS OF ABNORMAL ENDOMETRIUM

Number of hyperplastic endometrium diagnosed by hysteroscope = 48

Out of these 48 cases, 40 were confirmed to be hyperplastic by histopathologic examination

Hence No. of true positives =40

No.of false positives =8

Number of normal endometrium diagnosed by hysteroscope=102

Out of these 102 cases, 94 were proved to have normal endometrium by histopathology examination

Hence No. of true negatives=94

No. of false negatives=8

Sensitivity = $a/a+c \times 100 = 40/48 \times 100 = 83.3\%$

Specificity = $d/d+b \times 100 = 94/102 \times 100 = 92.1\%$

Positive predictive value = $a/a+b \times 100 = 40/48 \times 100 = 83.3\%$

Negative predictive value = $d/c+d \times 100 = 94/102 \times 100 = 92.1\%$

SENSITIVITY & SPECIFICITY OF TRANSVAGINAL SONOGRAPHY IN DIAGNOSIS OF ABNORMAL ENDOMETRIUM

No. of hyperplastic endometrium

diagnosed by transvaginal sonography = 40

Out of these 40 cases 28 were confirmed to be hyperplastic by histopathology.

Hence, no. of true positives = 28

No. of false positives = 12

No. of normal endometrium

diagnosed by transvaginal sonography = 110

Out of these 110 cases 90 were proved to have normal endometrium by histopathology.

Hence, No. of true negatives = 90

No. of false negatives = 20

Sensitivity = $a / a+c * 100 = 28/48 \times 100 = 58.3\%$

Specificity = $d/d+b * 100 = 90/120 \times 100 = 88.2\%$

Positive predictive value = $a/a+b * 100 = 28/40 \times 100 = 70\%$

Negative predictive value = $d/c+d * 100 = 90/110 \times 100 = 81.9\%$

FINAL RESULTS OF THE STUDY

	Hysteroscopy	TVS
Sensitivity	83.3%	58.3%
Specificity	92.1%	88.2%
Positive predictive value	83.3%	70%
Negative predictive value	92.1%	81.9%

Significance (Chi-square test)

In this study, 50 patients had hyperplasia out of 150 patients. Using transvagnial ultrasound only 40 cases were diagnosed, hysteroscopy on the other hand diagnosed 48 cases.

	Number of Hyperplasia detected	Number of Hyperplasia not detected	P-value
Hysteroscopy	48	2	0.014*
Transvaginal ultrasound	40	10	

* Significant at 5% level

The above chi-square test shows that Hysteroscopy is more significant than Transvaginal ultrasound in diagnosing endometrial pathology in AUB.

DISCUSSION

This study was conducted at Government RSRM Lying in hospital, Royapuram , Chennai from September 2008 to September 2009. This study compares the efficacy of Hysteroscopy & Transvaginal Ultrasound in diagnosis of endometrial pathology in AUB.

A study conducted by European society of Human reproduction & embryology 2002 concludes that hysteroscopy with endometrial biopsy is the “**Gold standard**” investigation for AUB²⁰.

A Cochrane database systems review 2007⁸, compares Hysteroscopy and Dilatation and Curettage (D&C) showed D&C is obsolete because it is a blind method with a complication rate of 4 to 6.% and low sensitivity for local and pendunculated intracavitary leisions. It requires hospital stay and general anaesthesia. With hysteroscopic visualization, organic leisions are not missed and directed biopsy can be performed (Pellicano 2003).

Study	Hysteroscopy				Transvaginal Ultrasound			
	Sensi	Speci	PPV	NPV	Sensi	Speci	PPV	NPV
Caserta D et al (2009)	98%	96%	99%	98%	77%	94%	84%	91.6%
Gviazda Im et al (2006, June)	79%	93%	80%	93%	54%	90%	74%	83%
Sajdak. S et al (2005)	86%	89%	88%	93%	60%	93%	68%	84%
Terrask et al (2001)	86.6%	92.3%	89%	94%	67.3%	87.5%	72%	90%
In this study	83.3%	92.1%	83.3%	92.1%	58.3%	88.2%	70%	81.9%

Sensi – Sensitivity
Speci – Specificity

PPV – Positive Predictive Value
NPV – Negative Predictive Value

Another study in August 2000 at University teaching hospital based- Outpatient clinic evaluated diagnostic hysteroscopy efficacy in identifying endometrial pathology concludes that hysteroscopy with biopsy has the highest sensitivity and positive predictive value in diagnosing endometrial hyperplasia.⁵²

A study conducted at Institute of Gynecologic Oncology – poznanio in 1993 evaluated the usefulness of Transvaginal ultrasound and Hysteroscopy in diagnosing endometrial hyperplasia. Ultrasound diagnosed 44% cases & hysteroscopy diagnosed 84% cases⁴⁰.

Another study conducted at University of Winconsin, Madison showed hysteroscope with biopsy allows visualization of endometrial cavity and is regarded as gold standard for endometrial assessment¹.

A Study conducted at Royal free hospital –London-United kingdom in 1996 compared the use of carbon dioxide and normal saline for uterine distention in hysteroscopy. The study concluded that the use of normal saline for uterine distention had no adverse effects .It provides a shorter operating time, less nausea, shoulder tip pain, lower abdominal pain⁴⁷.

SUMMARY

This study conducted at Government RSRM Lying in Hospital Royapuram, Chennai compares the efficacy of Hysteroscopy and Transvaginal Ultrasound in the diagnosis of endometrial pathology in patients with Abnormal uterine bleeding.

150 patients with abnormal uterine bleeding were selected from gynaecology out patient department. They were subjected to Endovaginal ultrasound and hysteroscopy after preliminary investigations. The results were correlated with histopathology report.

Endovaginal ultrasound could diagnose 80% of abnormalities whereas hysteroscopy was able to diagnose 96% of abnormalities. In hysteroscopy the sensitivity & specificity in diagnosing hyperplastic endometrium were 83.3% and 92.1% respectively. The sensitivity of transvaginal ultrasound in diagnosing the same was 58.3% and the specificity about 88.2%.

The results were correlated with the histopathologic examination of endometrial tissue obtained by dilatation & curettage. This procedure requires anaesthesia & hospitalization for three days. Hysteroscopy can also be done as an office procedure. Under direct visualization endometrial biopsy can be obtained. When hysteroscopy with a small diameter (<4mm) is used it doesn't require dilatation. Hence the time required for hysteroscopy is relatively less.

Routine hysteroscopy in all cases of abnormal uterine bleeding during endometrial biopsy will help in identifying any other hitherto unknown intra-uterine pathology which might be the cause of uterine bleeding.

It will also assist both the gynecologist & pathologist to obtain a good volume of endometrium from any suspicious areas. With increase in regular use of endometrial sampling under vision, the need for repeat biopsies for lack of sufficient material will no longer be encountered.

CONCLUSION

In this study hysteroscopy correlated more with Histopathologic findings and also identified associated pathology like polyps and submucous fibroids.

It is both accurate and feasible when compared to Transvaginal Ultrasound in identifying intracavitary abnormalities and has additional advantage of taking visually directed biopsy.

Hence Hysteroscopy forms an efficient investigative tool in diagnosing the endometrial pathology in cases of abnormal uterine bleeding.

PROFORMA

Name :

Age :

In patient Number :

Socio-Economic status :

Literacy :

Occupation :

Place :

Married since :

Parity :

Time since Last child birth :

Sterilization :

Last Menstrual Period :

Presenting Complaints of :

 Pattern of bleeding :

 Number of diapers/day :

 Last menstrual Period :

 Any History of (H/o) passing clots :

Past menstrual History :

Prior treatment with hormones :

Prior Dilatation and Curettage :

Other presenting complaints :

H/o white discharge per vaginum :

Scanty or profuse :

Blood stained :

Itching/ foul smelling :

H/o post coital bleeding :

H/o pain abdomen in relation to menses:

H/o burning micturition :

H/o drug intake :

H/o endocrine disorders :

Menstrual History

H/o Regularity of menstrual period :

How many pads/day?

Cycle length

Duration of flow

Marital and obstetric history

Married since :

Parity, Live, Abortion (spontaneous/ induced):

Contraception History

Temporary methods –

Oral contraceptive pills :

Barrier methods :

Intra Uterine Contraceptive Device:

Natural methods:

Permanent methods :

Puerperal Sterilization:

Medical termination of pregnancy with trans abdominal tubectomy:

Medical termination of pregnancy with Laparoscopy sterilization :

Interval Laparoscopy sterilization

No contraception:

Past medical/ surgical History :

Hypertension, Diabetes mellitus, Tuberculosis, Asthma, bleeding disorders, any surgery

General examination

- Weight
- Built/Nourishment
- Anaemia
- Pedal edema
- Thyroid ,spine, breast

Vital signs pulse rate

 blood pressure

 temperature

 respiratory rate

Cardio vascular system

Respiratory system

Per abdomen

Per speculum

Per vaginum

INVESTIGATIONS

Urine Routine

Complete Hemogram with platelet count

Blood sugar

Blood urea

Chest x-ray (Patient greater than 35 years for anesthesia)

Electrocardiography (Patient greater than 35 years)

Informed consent for hysteroscopy

Trans vaginal sonography findings

Hysteroscopy findings

Histopathologic examination findings

BIBLIOGRAPHY

1. Abnormal uterine bleeding: Kathleen A. orier, Sarina Schragger University of Winconsin, Madison. <http://www.aafp.org/afp/991001/ap/137-html> availed on 23rd November 2009.
2. Adstran K, Femtral J: The diagnostic possibilities of a modified hysteroscopic technique. *Acta Obstet Gynecol scand* 49:327, 1970
3. Albers JR, Hull Sk, Wesley RM. Department of Family and Community Medicine, Southern Illinois university school of medicine, Springfield, Illinois.
4. Barbero M, Enria R, Pagliano M, Canni M et al: Comparative study of diagnostic hysteroscopy and transvaginal ultrasonography in patient with abnormal uterine hemorrhage during the peri- and post-menopausal period. *Minerva Ginecol*. 1997 Nov; 49(11):491-7.
5. Behrman SJ: Historical aspects of hysteroscopy *Fertil Steril* 24 : 243, 1973.
6. Behrman SJ: Hysteroscopy : An overview, *clin. Obstet Gynecol* 19 : 307, 1976
7. Campo V, Campo S: Hysteroscopy requirements and complications *Minerva Gynecol* 2007 Aug; 59(4):451-7.
8. Caserta D, Porretta M, Moscarini M et al. Transvaginal Ultrasonography vs hysteroscopy *Minerva Ginecol*. 1997 Jun; 49(6) :

251-3

9. Cochrane database of systematic Reviews 2007, issue 3. Art No:CD 006604, DOI: 10.1002/14651858 CD 006604 uterine distention media for outpatient hysteroscopy.
10. Cohen M.A:Anaemia and menstrual loss.J Reprod .med,1994,39.755-759
11. Comparing Transvaginal ultrasound, sonohysterography hysterosalpingography & operative hysteroscopy in predicting endometrial hyperplasia by M Nabil El Tabbakh & Peter slamka. Study taken from internet <http://www.obgyn.net/hysteroscopy/hysteroscopy.asp?page=/hysteroscopy/articles/tv-sh-hyst-eltabbakh> availed on November 15, 2009
12. Davidson KG, Dubinsky TG : Ultrasonographic evaluation of endometrium in postmenopausal vaginal bleeding
13. Deckardt R ,Lueken RP,Gallinat A ,Nugent et al:Comparision of transvaginal ultrasound ,hysteroscopy,and dilatation and curettage in the diagnosis of abnormal uterine bleeding and intra uterine pathology in perimenopausal and postmenopausal women. J Am Assoc Gynecol Laparosc.2002 Aug;9(3):277-82
14. Edstrom K,Fernstrom I:The diagnostic possibilities of a modified hysteroscopic technique,Acta Obstet Gynecol scand 49:327,1970

15. Emanuel MH, Verdel MJ, Wamsteker K, Lammes FB et al. A prospective comparison of transvaginal ultrasonography and diagnostic hysteroscopy in the evaluation of patients with abnormal uterine bleeding: clinical implications Am J Obstet Gynecol.1995 Aug;173(2):675: Am J Obstet Gynecol.1995 oct;173(4):1351-2 Am J Obstet Gynecol.1995oct;173(4):1353-4
16. Ewoka Okara et al : The use of ultrasound in the management of gynecological conditions : Progress in obstetrics and gynecology, Churchill Livingstone,Spain,2003,15,273-297
17. George.A.Vilos :Guidelines for the management of abnormal uterine bleeding.SOGC Clinical practice guidelines,2001,No.106
18. Gunjan Sabberwal et al:Role of Transvaginal sonography,Diagnostic Hysteroscopy and Dilatation and Curettage in cases of menorrhagia in the perimenopausal age group.J. of obst and Gyn of index,2002;52-48-51
19. Hysteroscopic view in atypical endometrial Hyperplasias :A correlation with pathologic findings on hysterectomy specimens. Garuti G, Mirra M, Luerti M.
20. Investigation of infertile couple / Hysteroscopy with Endometrial biopsy is the gold standard investigation for AUB. Human Reproduction. Vol. 17, No. 8, 1947-1949, August 2002 taken from internet
<http://www.humrep.oxfordjournals.org/cgi/content/abstract/17/18/1947>
[on November 15, 2009.](#)

21. Johnson JE :Hysteroscopy and Diagnostic Curettage. Acta Radiol
320:1973
22. Jonathan.s. Berek : Novak's gynecology,Lippincott, Williams and
Wilkins, Philadelphia, 2002.
23. Kathleen.A.sarina schrager:Abnormal uterine bleeding,university of
Wisconsin,Dept.of family medicine,problem oriented diagnosis,1999.
24. Krامل E,Bourne T,Istre o, Hurlen-Solbakken H et al : Transvaginal
ultrasonography sonohysterography and operative hysteroscopy for the evaluation
of abnormal uterine bleeding; Acta Obstet Gynecol Scand.2001Jul;80(7):616-22.
25. Krolkowski A ,Gupta R, Mathew M:Role of transvaginal
ultrasonography and diagnostic hysteroscopy in the evaluation of
patients with abnormal uterine bleeding Int J Gynaecol Obstet.2000
Dec;71(3):251-3
26. Kudela M,pilka R :The importance of sonography and hysteroscopy at suspected
findings on endometrium
27. Lee RS:Hysteroscopy J . AM Obstet Assoc 77 :118,1977
28. Lopes TM ,Arraiano MB:Diagnostic hysteroscopy Acta Med Port .1997
Oct;10(10):669-75
29. Luo QD:Evaluation of hysteroscopy in diagnosis of abnormal uterine bleeding
Zhonghia Fu Chan Ka Za Zhi ,1986 may :21(3):152-4
30. Madan SM,Al-Jufairi ZA:Abnormal uterine bleeding.Diagnostic value

of hysteroscopy. Saudi Med J.2001 Feb;22(2):153-6

31. Makris N, Skartados N, Kalmantis K et al : Evaluation of Abnormal uterine bleeding by transvaginal 3-D hysterosonography & diagnostic hysteroscopy. Eur J Gynaecol Oncol . 2007;28(1) :39-42
32. Mortakis AE, Mavrelou K. TVS and Hysteroscopy in diagnosis of endometrial abnormalities. J AM Assoc Gynecol Laparosoc. 1997 Aug; 4 (4): 449-52.
33. Mukhopadhyays, Bhattacharyya SK:Comparitive evaluation of perimenopausal bleeding by transvaginal ultrasound, hysteroscopy and endometrial biopsy J Indian Med Assoc.2007 Nov; 105(11) : 624, 626, 628.
34. Newwirth RS : Operative Hysteroscopy, In Albano J : Cittidini E(Eds):1981
35. Norment WB:The hysteroscopy.Am J Obstet Gynecol 71:426,1956
36. Obstet Gynecol Clin North Am. 1995 Sep 22(3):457-71 Office Hysteroscopy Siegler AM
37. Pal L, Lapenese L, Toth TL, Isaacson KB. et al. Comparision of office hysteroscopy, transvaginal ultrasonography and endometrial biopsy in evaluvation of abnormal uterine bleeding. JSLS. 1997 Apr - Jun ; 1 (2) : 125-30
38. Patel S.R.Dysfunctional uterine bleeding.place of hysterectomy and its management.J.postgrad.med, 1986, 32 :150-3
39. Perino A,Hamou J et al:Hysteroscopy in perimenopausal and

postmenopausal women with abnormal uterine bleeding *Reprod Med.*1987;32(80):577-82

40. Randolph J et al : Comparison of real time transonography, hysterosalpingography, and Laparoscopy / Hysteroscopy in the Evaluation of uterine abnormalities and tubal patency,*Fertil Steril* 1986,46:828-832. *The IGSE News*;Dec 2001,8(2)
41. Sajdak S, Michalska M, Kedzia H, Spaczynskini et al: usefulness of TVS and hysteroscopy in diagnosing endometrial hyperplasia. *Ginekol pol.* 1993 Sep : 64 (9): 431-7.
42. Sciarra JJ,Valle RF:Hysteroscopy:A Clinical experience with 320 patients.*Am J Obstet Gynecol* 127:340,1977.
43. Siengler AM:A comparison of gas and liquid for hysteroscopy.*J Reprod.Med* 15;73,1975
44. Speroff K.L.,Glan R.H,Kase N.G et al : Abnormal uterine bleeding. *Clinical Gynaecologic Endocrinology and Infertility*, Baltimore William and Wiekins co 1978.
45. Steiner RA,fink D:Abnormal menstrual bleeding. *J minim invasive gynaecol.* 2006 Jun. Aug; 13(4); 325-30.
46. Sugimoto O : Hysteroscopy normal endometrial findings.*Obstet Gynecol Ther Jpn* 23:585,1971
47. Tessher et al :Transabdominal versus endovaginal pelvic sonography prospective study ,*Radiology*,1989,170;553-556.
48. The role of outpatient diagnostic hysteroscopy in identifying anatomic pathology & histopathology in the endometrial cavity.*The Journal of*

Minimally Invasive Gynecology Vol7, Issue3, pages 381-385(August 2000).

49. Treatment of menorrhagia: study taken from internet
<http://www.aafp.org/afp/20070615/1813.html> taken on November 23rd 2009.
50. Valeute s;Diagnostic significance of hysteroscopy in gynecologic pathology.Acta-Medico 681,1979
51. Van Dongen H :Diagnostic hysteroscopy in abnormal uterine bleeding
Bjog.2007 J UN:114(6):664-75
52. Van Trotsenburg M,Wieser F,Nagele F:Diagnostic hysteroscopy for the investigation of abnormal uterine bleeding in premenopausal patients. Contrib Gynecol Obstet .2000;20:21-6.
53. Vercellini P, Cortesi I, Oldani S, Moschetta M et al The role of Transvaginal sonography and outpatient diagnostic hysteroscopy in evaluation of patients with menorrhagia. Hum reprod.1997 Aug;12(8) : 1768-71.

