Volume-6, Issue-1, January - 2017 • ISSN No 2277 - 8160 IF : 3.62 | IC Value 80.26

Original Research Paper Gynaecology

# COMPARATIVE EFFICACY OF DIAGNOSTIC HYSTEROSCOPY VERSUS DIRECTED BIOPSY IN PERIMENOPAUSAL ABNORMAL UTERINE BLEEDING

**DR.M.MEENA** MD, DGO, DNB (OB & G)., SENIOR ASSISTANT PROFESSOR, INSTITUTE OF OBSTETRICS AND GYNAECOLOGY, KASTURBA GANDHI HOSPITAL, MADRAS MEDICAL COLLEGE, CHENNAI, TAMILNADU.

**DR.D.NARMADHA** MD, DNB (OB & G), SENIOR ASSISTANT PROFESSOR, INSTITUTE OF OBSTETRICS AND GYNAECOLOGY, KASTURBA GANDHI HOSPITAL, MADRAS MEDICAL COLLEGE, CHENNAI, TAMILNADU.

**ABSTRACT**

***AIM:*** *To evaluate the endometrium, type the endometrium, identification of intrauterine pathology in perimenopausal women with hysteroscopy. Comparison of visual findings with HPE report. To asses the correlation between hysteroscopy and hysteroscopy directed biopsy.*

***SUBJECT AND METHODS:*** *This study was conducted in 200 perimenopausal women with abnormal uterine bleeding at Kasturba Gandhi hospital. Among which hysteroscope alone and hysteroscope directed biopsy taken and comparative study was done.*

***RESULTS:*** *The mean age group 45-50 years, duration more than 6 months.On comparing the hysteroscopy findings with that of hysterectomy, its diagnostic accuracy for normal uterus is 87.5% & for hyperplasia it is 86.36%,since 6cases turned out to have normal histology with hysterectomy. For endometrial polyp it has 83.33% accuracy for myoma & atrophic endometrium it has 100% accuracy.*

***CONCLUSION:*** *Our study concluded that hysteroscopy with directed biopsy is a powerful diagnostic tool with a high degree of diagnostic accuracy than hysteroscopy alone.*

**KEYWORDS** : Hyseroscope, Endometrial sampling, Abnormal uterine bleeding.

**INTRODUCTION:** A significant proportion of the surgical workload of a gynecological department involves the exclusion of sinister endometrial pathology in perimenopausal women presenting with abnormal uterine bleeding. The major concerns include endometrial hyperplasia and carcinoma and other abnormalities such as chronic endometritis and endometrial polyps. However, in majority of the cases no organic pathology would be found.

Abnormal uterine bleeding is excessive or irregular bleeding in the presence of intracavitary or uterine pathology, which may be associated with structural or systemic abnormalities.

It is one of the most common clinic problems in gynecology. Uterine bleeding is abnormal if the bleeding pattern is

1) Abnormal in duration
2) Abnormal in amount

Abnormal uterine bleeding can be caused by a myriad of problems including

1) Prgenancy
2) Tumours of the uterus(benign and malignant)
3) Infection
4) Hormonal abnormalities
5) Intra uterine foreign body (eg:IUD)
6) Coagulopathy

Dysfunctional uterine bleeding is the term used to describe abnormal bleeding because of hormonal abnormalities in the absence of pregnancy, tumour, infection or coagulopathy.

DUB can be
1) Ovulatory
2) Anovulatory

**1) Ovulatory bleeding**

Heavy or prolonged menstrual losses at normal intervals can be the result of corpus luteum defects which presents in the following ways.

a) Irregular ripening of the endometrim
b) Irregular shedding of the endometrium (Halban's disease)

**2) Anovulatory bleeding**

Continous ovarian estrogen production associated with anovulation occurs most commonly in teenage and perimenopausal women.

a) Puberty

Due to immature hypothalamo pitutary ovarian axis leads to anovulation and causes abnormal uterine bleeding .

b)Perimenopausal

Like teenage women, perimenopausal women develop dysfunctional uterine bleeding because of continuous exposure to estrogen without exposure to progesterone. In perimenopasal women the ovary becomes depleted of healthy follicles and oocytes. Due to the low number of follicles present in the ovary, FSH levels become elevated. This stimulates estrogen production from the few remaining ovarian follicles. The hormonal milieu is therefore characterized by continuous estrogen unopposed by progesterone. Perimenopausal women frequently have endometrial hyperplasia or endometrial cancer as the cause of uterine bleeding. Therefore all perimenopausal women with abnormal uterine bleeding need to have an endometrial biopsy to ensure that endometrial cancer is not present. Perimenopausal women with AUB should not be treated with hormones until the results of endometrial biopsy are available.

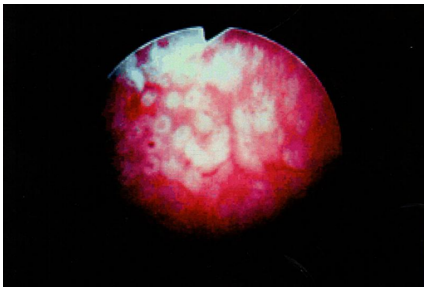
Diagnosis is made by
a) A thorough history
b) Meticulous general examination and pelvic examination
c) Laboratory investigation
    1) Hormonal
    2) Hematological
d) Endometrial sampling
e) Imaging techniques
f) Endoscopy

The various diagnostic modalities employed are
a) Dilatation and curettage
b) Cytologic evaluation

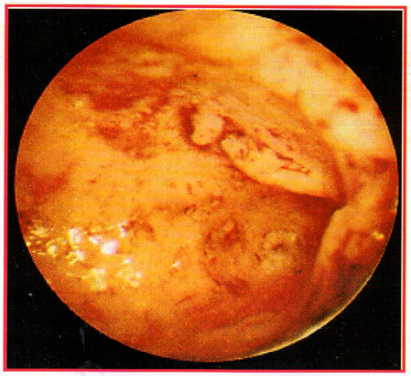
1) Cervicovaginal and pap smear
2) Gravelees endometrial lavage
3) Endometrial brush

c) Traditional 4 quadrant biopsy – NOVAK curette
d) Endometrial sampling
1) Vabra aspirator
2) Pipelle aspirator
e) Endoscopic technique
1) Hysteroscope
f) Imaging technique
1) TVS
2) Sonohysterography
3) Hysterography

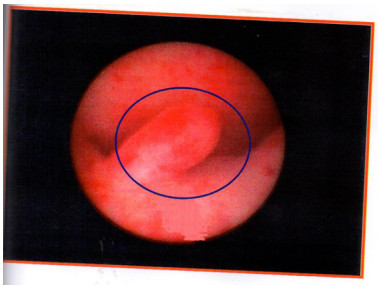
**'Good' hysteroscopic findings of the mid-secretory phase endometrium**



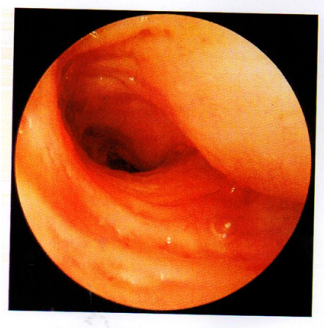
**Abnormal Uterine Bleeding**



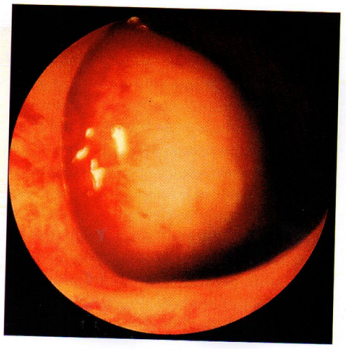
**POLYP**



**Submucous myoma, covered by homogenous endometrium**



**Pedunculated myoma covered by Atrophic endometrium**



## SUBJECTS AND METHODS

This study was conducted in 200 perimenopausal women with abnormal uterine bleeding admitted at Government Kasturba Gandhi Hospital during the period August 2015 to August 2016.

These 200 patients were selected based on the inclusion and exclusion criteria as described below

## INCLUSION CRITERIA

1) Women in the age group of 40-55 yrs who are regularly menstruating
2) Parous women (para 2 and above)
3) No history of associated medical and surgical complication
4) No obvious palpable pelvic pathology
5) No history of hormone or drug intake in the recent past

## EXCLUSION CRITERIA

1) Nulliapra
2) Severe and profuse bleeding requiring emergency intervention
3) Vaginal or cervical pathology
4) Any medical and surgical complication
5) Pelvic inflammatory disease, pregnancy and pregnancy associated problems like abortion
6) Patients on hormonal or other drug therapy

After a thorough history, general, local examination and bimanual pelvic examination, baseline investigation were performed.

1) Urine albumin and sugar
2) Hb in gms%
3) Blood sugar
4) ECG

**ANAESTHESIA:** Intravenous analgesia
Patient positioning and exposure
Modified dorsal lithotomy with patient supine, legs held in stirrups.

## INSTRUMENTS:

1) Speculum
2) Single tooth tenaculum
3) Sponge holding forceps
4) A micro hysteroscope with light source
5) Hysteroscope biopsy forceps
6) Crystalloid distending medium
7) Drip set & insufflations cuff

## TECHNIQUE

Under IV analgesia, the patient is placed in dorsal lithotomy position and the vulva, vagina and cervix are then cleaned with an antiseptic solution, and a bimanual examination is performed. A speculum is introduced and anterior lip of cervix is grasped with a single tooth tenaculum. The hysteroscope attached to its light source and distending medium is then introduced atraumatically into the cervical canal under vision the obturator is used whenever necessary. During the entire procedure, the distension media was allowed to flow in a continuous fashion, cervical mucosa & canal were examined, the scope is introduced into the uterus. The

following are examined in a systematic manner.
1) Fundus
2) All walls of the uterus
3) Endometrial pattern
4) Both tubal ostia with crescentic fold
5) Colour of the endometrial surface
6) Any growth or abnormalities in the uterine cavity

Biopsy was then taken with the biopsy forceps from the appropriate site under visualization.

When there was difficulty in introducing the scope, minimal dilatation was performed but not more than 7MD.

The procedure was abandoned if the scope could not be introduced even with 7MD dilatation or there is bleeding.

**RESULTS**

**TABLE 1 AGE DISTRIBUTION**

| S.NO | AGE IN YEARS | NO | PERCENTAGE |
|---|---|---|---|
| 1 | 40-45 | 88 | 44% |
| 2 | 45-50 | 100 | 50% |
| 3 | 50-55 | 12 | 6% |

Majority of the population are in the age group of 45-50 years.

**TABLE 2 SOCIO ECONOMIC STATUS**

| S.NO | S.E STATUS | NO | PERCENTAGE |
|---|---|---|---|
| 1 | 1V | 58 | 29% |
| 2 | V | 142 | 71% |

71% of the study population belong to socio economic class v.

**TABLE 3 DURATION OF THE COMPLAINT**

| S.NO | DURATION OF COMPLAINT | NO | PERCENTAGE |
|---|---|---|---|
| 1 | < 3 months | 10 | 5% |
| 2 | 3-6 months | 40 | 20% |
| 3 | 6 months 1 year | 80 | 40% |
| 4 | 1 year | 70 | 35% |

Most of the study population had their complaint for than 6 months.

**TABLE 4 CURRENT MENSTRUAL PATTERN**

| S.NO | MENSTRUAL PATTERN | NO | PERCENTAGE |
|---|---|---|---|
| 1 | Menorrhagia | 88 | 44% |
| 2 | Polymenorrhagia | 48 | 24% |
| 3 | Metrorrhagia | 40 | 20% |
| 4 | Menometrorrhagia | 24 | 12% |

Most common complaint was menorrhagia which was in 44% of study population.

**TABLE 5 HYSTEROSCOPY FINDINGS**

| S.NO | HYSTEROSCOPE FINDINGS | NO | PERCENTAGE |
|---|---|---|---|
| 1 | Secretory and proliferative endometrium | 108 | 54% |
| 2 | Abnormal | 92 | 46% |
| a) | Hyperplasia | 60 | 65.2% |
| b) | Submucous fibroid | 8 | 8.6% |
| c) | Polyp | 12 | 13% |
| d) | Atrophic endometrium | 12 | 13% |

All the 200 study population underwent hysteroscopy.
54% of the patients had secretory & proliferative pattern.46% had abnormal findings. Endometrial hyperplasia was the most common abnormality detected in 65.2% of the patients. Submucous fibroid was found in 8.6%. Endometrial polyp in 13%. Atrophic endometrium in 13%.

**TABLE 6 FINDINGS OF HYSTEROSCOPY DIRECTED BIOPSY**

| S.NO | BIOPSY | NO | PERCENTAGE |
|---|---|---|---|
| 1 | Secretory & proliferative endometrium | 116 | 58% |
| 2 | Abnormal | 84 | 42% |
| a) | Hyperplasia | 54 | 64.28% |
| b) | Submucous fibroid | 8 | 9.5% |
| c) | Polyp | 10 | 11.9% |
| d) | Atrophic endometrium | 12 | 14.28% |

Hysteroscopy directed biopsy was taken in all the 200 patients and results are 58% patients had secretory and proliferative endometrium. 42% had abnormal findings. Endometrial hyperplasia was found in 64.28%. Submucous fibroid in 9.5%. Endometrial polyp in 11.9%. Atrophic endometrium in 14.28%.

**TABLE 7 FINDINGS AT HYSTERECTOMY**

| S.NO | BIOPSY | NO | PERCENTAGE |
|---|---|---|---|
| 1 | Secretory & proliferative endometrium | 64 | 45.72% |
| 2 | Abnormal | 76 | 54.28% |
| a) | Endometrial hyperplasia | 44 | 57.89% |
| b) | Submucous fibroid | 8 | 10.5% |
| c) | Polyp | 12 | 15.78% |
| d) | Atrophic endometrium | 12 | 15.78% |

140 out of 200 patients underwent hysterectomy. Out of them 64 had secretory & proliferative endometrium. 44 had hyperplastic endometrium. Submucous fibroid in 8 patients. Endometrial polyp I 12. Atrophic endoendometrium in 12.

**TABLE 8 DURATION OF THE MENSTRUAL COMPLAINT AND HYSTEROSCOPIC FINDINGS**

| S.NO | DURATION OF COMPLAINT | HYSTEROSCOPY | | | | |
|---|---|---|---|---|---|---|
| | | Sec & prolif. Em | Hyperplasia | Fibroid | Polyp | Atrophic |
| 1 | < 3 months | 8 | | 2 | | |
| 2 | 3-6 months | 34 | 4 | | 2 | |
| 3 | 6 months - 1 year | 38 | 26 | 4 | 6 | 6 |
| 4 | 1 year | 28 | 30 | 2 | 4 | 6 |

With increasing duration of the complaint the abnormal hysteroscopy findings increase.

**TABLE 9 CURRENT MENSTRUAL PATTERN & FINDINGS AT HYSTEROSCOPY**

| S.NO | MENSTRUAL COMPLAINT | HYSTEROCOPY | | | | |
|---|---|---|---|---|---|---|
| | | Sec & prolif. Em | Hyperplasia | Fibroid | Polyp | Atrophic |
| 1 | Menorrhagia | 58 | 22 | 4 | | 4 |
| 2 | Polymenorrhoea | 22 | 18 | | 2 | 6 |
| 3 | Metrorrhagia | 20 | 10 | 4 | 6 | |
| 4 | Menometrorrhagia | 8 | 10 | 2 | 4 | 2 |

Menorrhagia is the most common menstrual pattern. With endometrial polyp metrorrhagia predominates.

**TABLE 10 DURATION OF COMPLAINT AND HYSTERECTOMY FINDINGS**

| S.NO | DURATION OF THE COMPLAINT | HYSTERECTOMY | | | | |
|---|---|---|---|---|---|---|
| | | Sec & Prolif Em | Hyperplasia | Fibroid | Polyp | Atrophic |
| 1 | <3 months | 6 | 2 | 2 | | |
| 2 | 3 – 6 months | 16 | 6 | | 2 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | 6 months – 1 year | 28 | 8 | 4 | 6 | 6 |
| 4 | 1 year | 14 | 28 | 2 | 4 | 6 |

Abnormal findings at hysterectomy are seen in those with duration of the complaint more than 1 year.

**TABLE 11 COMPARISION OF FINDINGS AT HYSTEROSCOPY AND HISTOPATHOLOGIC EXAMINATION**

| S.NO | HYSTEROSCOPY | NO OF CASES | HYSTEROSCOPY GUIDED BIOPSY | | | | | DIAGNOSTIC ACCURACY |
|---|---|---|---|---|---|---|---|---|
| | | | Sec & Prolif Em | Hyperplasia | Fibroid | Polyp | Atrophic | |
| 1 | Secretory & Proliferative Endometrim | 108 | 100 | 8 | | | | 92.59% |
| 2 | Abnormal | | | | | | | |
| a) | Hyperplasia | 60 | 16 | 44 | | | | 73.33% |
| b) | Fibroid | 8 | | | 8 | | | 100% |
| c) | Polyp | 12 | | 2 | | 10 | | 83.33% |
| d) | Atrophy | 12 | | | | | 12 | 100% |

Out of the 108 patients who had normal hysteroscopic findings 100 had normal pattern.8 had endometrial hyperplasia. Thus the accuracy of hysteroscopy for normal uterus is 92.59%. Out of the 60 patients who had endometrial hyperplasia 16 had normal histology. Thus the diagnostic accuracy is 73.33%. The accuracy in diagnosing fibroid and atrophic endometrium is 100%. The accuracy in diagnosing polyp is 83.33%.

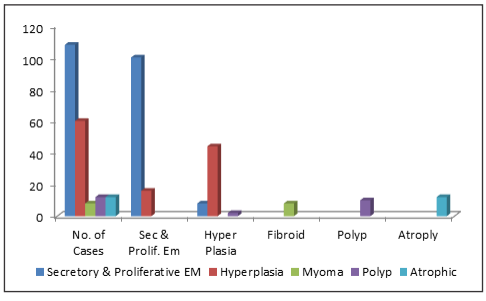



**TABLE 12 COMPARISION OF FINDINGS AT HYSTEROSCOPY AND HYSTERECTOMY**

| S.NO | HYSTERECTOMY | NO OF CASES | HYSTEROSCOPY | | | | | DIAGNOSTIC ACCURACY |
|---|---|---|---|---|---|---|---|---|
| | | | Sec & Prolif Em | Hyperplasia | Fibroid | Polyp | Atrophy | |
| 1 | Secretory & Proliferative Endometrium | 64 | 56 | 8 | | | | 87.5% |
| 2 | Abnormal | 76 | | | | | | |
| a) | Hyperplasia | 44 | 6 | 38 | | | | 86.36% |
| b) | Fibroid | 8 | | | 8 | | | 100% |
| c) | Polyp | 12 | | 2 | | 10 | | 83.33% |
| d) | Atrophy | 12 | | | | | 12 | 100% |

On comparing the hysteroscopy findings with that of hysterectomy. Its diagnostic accuracy for normal uterus is 87.5% & for hyperplasia it is 86.36%, since 6 cases turned out to have normal histology with hysterectomy. For endometrial polyp it has 83.33% accuracy, for myoma & atrophic endometrium It has 100% accuracy.

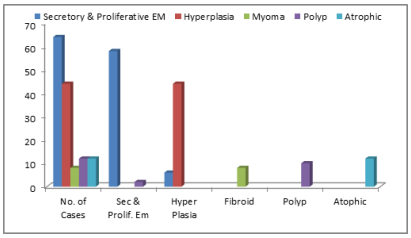



**TABLE 13 COMPARISION OF FINDINGS AT HPE OF BIOPSY AND HYSTERECTOMY**

| S.NO | HYSTERECTOMY | NO OF CASES | HPE OF BIOPSY | | | | | DIAGNOSTIC ACCURACY |
|---|---|---|---|---|---|---|---|---|
| | | | Sec & prolif Em | Hyperplasia | Fibroid | Polyp | Atrophy | |
| 1 | Secretory & Proliferative endometrium | 64 | 58 | 6 | | | | 90.62% |
| 2 | Abnormal | 76 | | | | | | |
| a) | Hyperplasia | 44 | | 44 | | | | 100% |
| b) | Fibroid | 8 | | | 8 | | | 100% |
| c) | Polyp | 12 | 2 | | | 10 | | 83.33% |
| d) | Atrophy | 12 | | | | | 12 | 100% |

This table compares the biopsy findings with the findings of HPE of hysterectomy. This shows that except for normal uterus, the diagnostic accuracy of hysteroscopy directed biopsy is excellent for all the abnormal findings at hysterectomy, when compared with hysteroscopy alone.

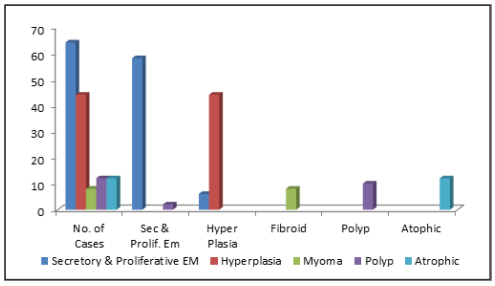



**TABLE 14 SENSITIVITY, SPECIFICITY, NPV & PPV OF HYSTEROSCOPY**

| HYSTEROSCOPY | HYSTERECTOMY | |
|---|---|---|
| | ABNORMAL | NORMAL |
| ABNORMAL | 68 (a) | 8 (b) |
| NORMAL | 8 (c) | 58 ( d) |

**Sensitivity = 89.47%** **PPV = 89.47%**
**Specificity = 87.87%** **NPV = 87.87%**

**TABLE 15 SENSITIVITY, SPECIFICITY, NPV & PPV OF BIOPSY**

| BIOPSY | HYSTERECTOMY | |
|---|---|---|
| | ABNORMAL | NORMAL |
| ABNORMAL | 74 (a) | 2 (b) |
| NORMAL | 6 © | 58 (d) |

Sensitivity = 92.5% PPV = 97.36%
Specificity = 96.66% NPV = 90.62%

**DISCUSSIONS**

In the study undertaken , most patients were in the age group 40-45 years. Almost 71% of the patients were of socio economic class V.

Table 3 shows that most of the patients had the prevailing menstrual complaint for more than 6 months duration.

Table 4 describes the current menstrual pattern of the patient of which menorrhagia is the most common complaint.

Similar studies in the year 2000 by J Kell Williams et all studied the diagnostic accuracy of hysteroscopy with endometrial biopsy in 433 patient with perimenopausal AUB, wherein the most common indication was menorrhagia.

Another study in the year 1985 by Goldrath & Sherman et all reported on 423 patients were seen for menorrhagia is the

commonest complaint.

Table 5 shows the hysteroscopy findings of the 200 patients in the study population. Here out of the 200 patients , 54% patients had normal endometrial histology and 46% had abnormal findings, out of which endometrial hyperplasia was the most common abnormality. Submucous fibroid was found in 8.6%. Endometrial polyp was found in 13% and atrophic endometrium in 13%.

This is consistant with a similar study in 1994 by Gillespie and Nichols on 160 patient out patient examination . Here among the hysteroscopically examined 160 patients 66% had normal endometrial histology.

A study of J Kell Williams et all in the year 2000 on 433 perimenopausal women with AUB shows that around 50% of the patients over 45 years with AUB have normal endometrium. But in Gillespie and Nichols stidy the most common abnormal hysteroscopic findings was submucous fibroid rather than endometrial hyperplasia.

Table 6 shows the findings of hysteroscopy directed biopsy in the study group. Out of the 200 patients 58% normal histology, 42% had abnormal HPE report, endometrial hyperplasia was the most common abnormality.

Table 7 shows that out of the 200 patients who underwent hysteroscopy and directed biopsy. 140 patients underwent hysterectomy. Among the 140 patients the indication for hysterectomy in 74 of the patients were for abnormal hysteroscopic findings like hyperplasia who were not amenable for follow up, submucous fibroid and endometrial polyp. 44 patients had abnormal bleeding for more than 6 months duration, not responding to medical management. Remaining 22 patients insisted on hysterectomy persistently for dysmenorrheal and associated impairment of quality of life.

Out of the 140 patients 64 had normal endometrial histology , 76 had abnormal findings of which 44 had endometrial hyperplasia , 8 had submucous fibroid , 10 had polyp and the remaining 12 had atrophic endometrium.

Table 8 & 10 both the table correlates the duration of the menstrual complaint and the findings at hysteroscopy and hysterectomy . This shows that with increasing duration of the complaint (> 1 year) abnormal hysteroscopic findings and hysterectomy were increased in number.

Table 9 shows the relationship between the pattern of menstrual bleeding and the findings at hysteroscopy which shows that the most common complaint was menorrrhagia. Metrorrhagia and menometrorrhagia were the predominant bleeding pattern in case of submucous fibroid and endometrial polyp.

Table 11 shows compares the findings at hysteroscopy with that of hysteroscopy directed biopsy. This table shows that hysteroscopy has missed 8 cases of endometrial hyperplasia out of the 108 cases . Also it misdiagnosed 16 cases of normal endometrium as hyperplasia thus reducing its diagnostic accuracy for hyperplasia.

Loverroa et all studied the reliability of hysteroscopy in the diagnosis of endometrial hyperplasia in 105 patients with AUB and reported a high incidence of false positive diagnosis of endometrial hyperplasia. This infers that biopsy will be conclusive in such situations.

The diagnostic accuracy for myoma and atrophic endometrium are 100% and for polyp it is 83.33% since one case of endometrial hyperplasia was misdiagnosed as polyp.

Table 12 shows the comparison of hysteroscopy findings with those of hysterectomy in the 140 patients, and the diagnostic accuracy of hysteroscopy.

Table 13 correlates between the findings of hysteroscopy directed biopsy and hysterectomy, and its diagnostic accuracy.

**TABLE 14 These results were consistent with the sensitivity reports of hysteroscopy by various authors.**

| S.NO | AUTHOR | YEAR | SENSITIVITY |
|---|---|---|---|
| 1 | BAGGINS | 1979 | 87.5% |
| 2 | BARBOT | 1980 | 84.6% |
| 3 | PARLEKAR & PARASINES | 1992 | 92% |

**TABLE 15**

These results are consistent with a similar study comparing the results of hysteroscopy directed biopsy with hysterectomy by Bettochi & Pellegrino in 443 patients which showed that office hysteroscopy with biopsy has 93% sensitivity , 98% specificity , 98% PPV & 96% NPV.

From the above statistical data based on paired T – test and Chi-square test it is evident that the diagnostic accuracy of hysteroscopy directed biopsy is significant when compared to hysteroscopy in the evaluation of the patients under study.

## CONCLUSION

Office hysteroscopy has evolved over years as a diagnostic method for evaluating patients with perimenopausal AUB. It has superceded in it is diagnostic accuracy over all other methods like TVS. Endometrial sampling and D & C when combined with directed biopsy it has excelled in detecting all the intrauterine pathologies.

From the above study concluded that hysteroscopy with directed biopsy is a powerful diagnostic tool with high degree of diagnostic accuracy than hysteroscopy alone.

The recent guidelines from RCOG has reported that for women over 40 with menstrual disorders, hysteroscopy complemented with endometrial biopsy is the investigation of choice.

## REFERENCES


1. Adstran K.Femtral J, The diagnostic possibilities of modern hysteroscopic technique. Acta obst gynaec scand, 49: 327
2. Behrman SJ: Hysteroscopy an overview, Clin obst gynecol 19:307 (1976) Behrman SJ ; Historical aspects of hysteroscopy Fertil steril 24:243 (1973) Lee RS; Hysteroscopy Journ Am obst assoc 77;118 1977 Lindemann HJ ; Hysteroscopy for the diagnosis of intrauterine pathology.
3. Sugimoto O ; Hysteroscopic diagnosis of endometrium.
4. Hamo J.E ; Microhysteroscopy , Clinical obst gyneac vol No ; 2, edit Pitkis R.M 289-301 , 1982
5. Speroff K.L. GLan R.H. Kare N.G Dysfunctional uterine bleeding Novak's text book of gynaecology Kistener's text book of gynaecology.
6. Bacsko G ; Uterine surgery by operative hysteroscopy J obst & gynaecol 1997 Feb 71 (2).
7. Di Spiezio Sardo A, Mazzon I Bettochi S, Guide M , Nappi C (2008). Hysteroscopic myomectomy; a comprehensive review of surgical technique. Hu Reprod Update. 14 (2) ; 101-19. Laproscopy and Hysteroscopy.A Guide for patients, Revised 2012. From the American Society for Reproductive medicine, Patient Education Committee.
8. Polyzos, N.P; Zavos, A; Valachis, A Dragamestianos, C; Blockeel, c; Stoop, D; Papanikolaou, E.G;Tournaye, H, Devroey, P; Messinis, I.E. (2016).Misoprostol prior to hysteroscopy in premenopausal and postmenopausal women.
9. Van Kruchten PM Vermelis JM, Herold I Van Zundert AA(2010). Hypotonic and isotonic fluid overload as a complication of hysteroscopic procedure; two case reports. Minerva Anestesiol.
10. Yang J Yin TL Xu WM Li AB Hu J (2006) outcome after hysterscopic guided biopsy. Photomed surgery(5);625.