

Role of Sonohysterography in Evaluation of Abnormal Uterine Bleeding

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Abstract

Abnormal uterine bleeding is one of the common conditions encountered by gynecologists. The major task of the clinician is to identify organic pathology in order to manage it effectively. The transvaginal ultrasound has been used in diagnosing intra uterine pathologies with 83% sensitivity %and 70.6%specificity. However ,it does sometimes produce ambiguous findings' especially when the thick endometrium is mistaken for a physiological state. Use of contrast enhancement with physiological saline -sonohysterography -has shown to improve diagnostic accuracy with a sensitivity of 95% and a specificity of 88%.Sonohysterography not only aids in diagnosis of intra uterine pathology and in determination of appropriate site for endometrial biopsy, but also helps in making decision regarding surgical versus medical management of patients and directs the approach and instrumentation required when surgical treatment is warranted. Sonohysterography is as good as hysteroscopy in detecting intra -cavity abnormalities with sensitivity and specificity of 81.3%, 100% and 87.5%and 100% respectively. It can be performed in outpatient clinics with minimal inconvenience to the patient ,in short time; with simple and inexpensive instruments .This makes it a suitable option over diagnostic office hysteroscopy. The use of Sonobiopsy catheter for sonohysterography and endometrial biopsy at the same sitting, can thus decrease the number of patients requiring diagnostic hysteroscopy and curettage.

INTRODUCTION

Abnormal uterine bleeding is one of the common conditions encountered by gynecologists. The major task of the clinician is to ,exclude endometrial cancer in women over forty years and to identify organic pathology, in women below 40years, in order to it manage effectively.¹

Ultrasound imaging of the reproductive organs especially by the transvaginal route has come to the rescue of gynecologists .Its high frequency transducers and close proximity to the organs aid in diagnosing intra uterine pathologies with 83% sensitivity %and 70.6%specificity .² Goldstein advocates the routine use of ultrasound in gynecological consultations, referring to it as 'ultrasound-enhanced bimanual examination' . Though it's an inexpensive, non invasive and convenient method to indirectly visualize the uterine cavity, conventional endovaginal ultrasonography (USG) does sometimes produce ambiguous findings³, especially in evaluating Premenopausal patients with abnormal uterine bleeding, as the thick endometrium is mistaken for a physiological state. In these patients the use of contrast enhancement with physiological saline has shown to improve diagnostic accuracy. ⁴This use of saline infused through a catheter into

the endometrial cavity provides slight distension and separation of cavity walls, allowing for better visualization of intracavity pathology. This technique has been referred to as Hysterosonography, saline infusion sonography and most commonly sonohysterography.³

In 1991 Klug ⁵ described ultrasound of the uterine cavity after instillation of gel. Since then, many authors have reported on the success of saline infusion Sonography in detecting intra uterine abnormalities, such as polyps and sub mucous myomas. Diagnostic accuracy of sonohysterography is superior to that of transvaginal ultrasound without contrast ^{2, 6-8}and has a sensitivity of 95% and a specificity of 88%, according to a meta-analysis in 2003.²

Sonohysterography not only aids in diagnosis of intra uterine pathology but also in decision regarding surgical versus medical management of patients and directs the approach and instrumentation required when surgical treatment is warranted. It also helps in determination of appropriate site for endometrial biopsy and alleviates the problems associated with blind biopsy.³

Sonohysterography can be done in any setting where

endovaginal US is performed and the patient preparation is similar to that used before radiologic Hysterosalpingography .It can be performed during any phase of the cycle while evaluating abnormal uterine bleeding but the best time to perform this procedure is during the first phase of the cycle especially when the indication is sterility or thickened endometrium at transvaginal sonography. 9, 10 This modality of investigation has thus challenged hysteroscopy and hysteroscopy guided biopsy -gold standard in evaluating abnormal uterine bleeding as an safe ,economical and non invasive alternative.

Sonohysterography has been critically compared with other diagnostic modalities used to evaluate the intra uterine pathologies and endometrium e.g. Hysterosalpingography, hysteroscopy, MRI

Hysterosalpingography requires the use of radiation and iodinated contrast material .Its expensive and provides indirect information about the uterine cavity. One can delineate fibroids and polyps but cannot comment on endometrial thickness.

Hysteroscopy provides an accurate topographical map of the cavity but it cannot determine the extent of sub mucous myomas and endometrial thickness. It's expensive and requires distension of cavity with gas or liquid medium including use of anesthesia in some cases for satisfactory evaluation .3Kelekci S,et al reported that hysterosonography was less painful than office hysteroscopy. 11

MRI an expensive modality provides excellent images of the uterus and myometrial pathology disrupting the endometrium; however, intracavity lesions are not well demonstrated. Due to its inability to discriminate subtle tissue differences CT scan offers little in evaluation of pathology uterine cavity .12

Sonohysterography is useful in diagnosing various conditions associated with abnormal uterine bleeding. The following paragraphs briefly describe its role in evaluating polyps, Leiomyomas, and endometrial hyperplasia, effects of tamoxifen on endometrium, endometrial carcinoma, retained products of conception and intrauterine adhesions.

Uterine Polyps can be asymptomatic or be a cause of menorrhagia or infertility. On TVS they appear hyper echoic in contrast to the hypo echoic spongy endometrium in the proliferative phase of menstrual cycle without disruption of the endo –myometrial interface.

Recent evidence suggests that 10 % of asymmetrical premenopausal females will have evidence of polyp's .Hysterosonography in addition, to determining the number and position of polyps helps in detecting small polyps difficult to see on TVS and large polyps during the secretory phase of the cycle.3

On HSG, polyps can be confused with myomas, intrauterine adhesion or air bubbles; Polyps are very well seen on hysteroscopy and can be resected in the same sitting. Studies have shown sonohysterography is at least as good as hysteroscopy for detecting these lesions and can be used in selecting women for hysteroscopic resection of polyps .13Epstein and co-workers compared conventional transvaginal ultrasonography with SHG and diagnostic hysteroscopy under general anesthesia. They also concluded that, Sonohysterography is as good as hysteroscopy at detecting focally growing lesions in the uterine cavity in women with postmenopausal bleeding. 14, 15,

Cepni et al reported that sonohysterography and hysteroscopy were equally accurate in diagnosing polyps and leiomyomas in premenopausal women but hysteroscopy was more accurate in post menopausal group. However, performing TVS, SIS and D&C could reduce the number of diagnostic hysteroscopy's performed for the evaluation of uterine cavity abnormalities by 71.5% in premenopausal patients and by 40% in the postmenopausal group.16 interestingly, neither hysteroscopy nor SHG can reliably discriminate between benign and malignant focal lesions.17

Leiomyomas are benign masses arising from the myometrium. The number, the size and location of the myomas determine the symptoms produced by them which can vary from menorrhagia to infertility and recurrent abortions. They appear hypo echoic on TVS. Thus sub mucous myoma may thus be difficult to identify from the hypo echoic spongy endometrium during the proliferative phase. Thus scanning is recommended during the secretory phase when the endometrium is hyper echoic.

Sonohysterography helps in differentiating polyps from sub mucous myoma during any phase of the cycle. It helps to define the precise location and depth within the myometrium. This information aids in planning the appropriate surgical management. Neither HSG nor hysteroscopy are able to determine the size and depth of myomas thus provide no help in planning surgical treatment of myomas which could vary from limited surgical intervention to no intervention.17-20 Jansen et al reported

the accuracy of hysterosonography and diagnostic hysteroscopy to be equal in detecting intrauterine myomas and polyps. 21 Sensitivity and specificity of Sonohysterography and hysteroscopy in detecting intra-cavity abnormalities 81.3%, 100% and 87.5% and 100% respectively. Thus, sonohysterography can be also be used as alternative technique for evaluating uterine cavity where office hysteroscopy is not available. 18

ENDOMETRIAL HYPERPLASIA

Endometrial thickness depends on the age, cycle phase, parity, hormonal status and medications. Endometrium greater than 16mm in pre-menopausal woman and greater than 8mm postmenopausal age group is considered to be abnormally thickened. 3 (These numbers include the sum of thickness of both endometrial walls).

Most cases of endometrial hyperplasia result from high levels of estrogens, combined with insufficient levels of the progesterone-like hormones which ordinarily counteract estrogen's proliferative effects on this tissue. This may occur in a number of settings, including polycystic ovary syndrome, estrogen producing tumors (e.g. Granulosa cell tumor) and certain formulations of estrogen replacement therapy. Endometrial hyperplasia is a significant risk factor for the development of endometrial cancer so careful monitoring and treatment of women with this disorder is essential.

Sonohysterography helps in differentiating hyperplasia from mass lesion and determining the location for biopsy. HSG is unable to demonstrate endometrial hyperplasia. Like Sonohysterography, hysteroscopy can detect hyperplasia but cannot provide histological diagnosis.

EFFECT OF TAMOXIFEN ON ENDOMETRIUM

Tamoxifen is used for treatment of breast cancer and produces varied effects on endometrium ranging from cystic changes, polyps, hyperplasia to endometrial cancer. The data shows that effect of endometrium is time dependent. Endometrial cancer usually develops after three years of use. The biological and histological data shows that there is no evidence to state that tamoxifen induced polyps are premalignant.

In patients taking tamoxifen, micro cysts of the proximal myometrium representing reactivation of adenomyosis foci have been described. These changes were initially thought to be related to the endometrium, rather than the myometrium. These changes can be detected by TVS but

sonohysterography can assist in clarifying their location and distinguish between cysts and polyps 22, 23

Thus in order to monitor women on tamoxifen it would be best to do a baseline sonography to exclude pre existing lesions: a second endometrial evaluation by TVS could be scheduled after three year, in case of endometrial hyperplasia sonohysterography could then be used to differentiate polyps from simple cystic endometrium.

POST MENOPAUSAL BLEEDING (PMD)

Post menopausal bleeding is the most common symptom of endometrial cancer and all women with PMD should undergo further evaluation. Transvaginal ultrasound can reliably distinguish women with low risk pathology (endometrium < 4mm) and women who are at high risk (endometrium >5mm) and sonohysterography can rule out focal lesions with the reported sensitivity of 93-100% and false positive rate 6-15% and is a method of choice for diagnosing focal lesions. 24

Sonohysterography has been found useful to assess the depth of myometrial invasion and may have a role in preoperative staging. 15, 25

However, till date there are no conclusive studies to answer whether this procedure results in dissemination of malignant cells and alter the prognosis of endometrial cancer. Studies have been done to see the whether hysteroscopy performed before hysterectomy in women with endometrial cancer lead to dissemination of malignant cells from uterine cavity into the abdomen. It was seen that positive peritoneal cytology in absence of extra uterine disease or other poor prognostic factors seems to have no effect on the recurrence or survival of patients with endometrial cancer. 24

S dessole et al 2006 conducted study to evaluate the risk sonohysterography in patients with endometrial cancer and found that there was spillage of malignant cells in 25% of cases. Thus in absence of conclusive data, it is best not to perform sonohysterography in patients with suspicious diagnosis of endometrial cancer.

ABNORMAL UTERINE BLEEDING IN PATIENTS TAKING HRT

There is a high prevalence of benign abnormalities (36-40%) and low prevalence of carcinoma and atypia in patients on HRT. Thus invasive procedures are not justified for the assessment of asymptomatic women taking HRT as the benign pathology observed may not become clinically

relevant. Currently there is no data to support the screening for women on HRT. Should it ever be thought, then sonohysterography could be a viable option as a screening tool.²³

Endometrial thickness of more than 4 mm is caused by focal lesion in 33 to 66% of cases and Sonohysterography in these cases can be used to select patients for operative hysteroscopy. In the rest, the diffuse endometrial pathology can be evaluated using endometrial sampling without use of hysteroscopy. The evaluation can be made further easy by using novel instrument that functions both as a sonohysterography catheter and endometrial sampling device. The Goldstein Sonobiopsy Catheter is now available and is unique in that it combines Saline Infusion Sonohysterography (SIS) and biopsy functionality in a single device.²⁷

RESIDUAL TROPHOBLASTIC TISSUE.

Residual trophoblastic tissue post partum or post abortion presents with abnormal uterine bleeding. Exact evaluation helps clinician in deciding the management protocol – medical or surgical. Sonohysterography is superior to TVS in detecting whether the retained tissue is adherent to the uterine wall or is free floating. This information plays a vital role in planning the management as the adherent retained products of conception would mandate surgical management and free floating retained bits can be managed conservatively avoiding anesthesia and sequelae of curettage.

Focal endometritis can mimic retained trophoblastic tissue and requires sharp clinical acumen to differentiate and make as diagnosis as its management is medical therapy and not surgical intervention. Intra uterine synechiae can be diagnosed by sonohysterography a focal strands like echoes extending into or across the cavity, and difficulty in distending the cavity with saline. It is also useful in monitoring the result of intra uterine adhesiolysis.

ROLE OF THREE DIMENSIONAL HYSTEROSONOGRAPHY OVER 2 DIMENSIONAL HYSTEROSONOGRAPHY

Cornelis D. de Kroon et al conducted study to evaluate the clinical relevance of 3-dimensional saline infusion sonography (3D-SIS) in addition to conventional SIS in women with abnormal uterine bleeding suspected of having intrauterine abnormalities. Saline infusion sonography and 3D-SIS were equally accurate in evaluating the histological nature, intrauterine extent, and location of intrauterine

abnormalities (respective values: 0.85 versus 0.93; $P = .88$; 0.83 versus 0.83; and 0.77 versus 0.80; $P = .81$). The reliability of 3D-SIS was good: intraobserver and intraobserver agreement () were 0.78 and 0.72. They concluded that Three-dimensional saline infusion sonography is valid and reliable in women suspected of having intrauterine abnormalities. It may have relevant clinical value in addition to conventional SIS as the endometrial cavity is three dimensional.²⁸

CONCLUSION

Hysteroscopy was considered gold standard for diagnosing intra uterine diseases but the current review of literature suggest sonohysterography to be a feasible and accurate alternative of office hysteroscopy for diagnosing causes of abnormal uterine bleeding and specially in distinguishing focal and diffuse endometrial pathologies^{29,30}. The fact that it can be performed in outpatient clinics with minimal inconvenience to the patient, in few minutes, (average time 10 minutes)with instruments that are simple and inexpensive makes it a suitable option over office hysteroscopy. The use of Sonobiopsy catheter to combine sonohysterography and endometrial biopsy at the same sitting will reduce the number of patients requiring diagnostic hysteroscopy and curettage.

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References

1. Steven r Goldstein. Abnormal uterine bleeding: The role of ultra sound Radiol clinics of North America 2006 .Nov; 44:901-10
2. Kroon CD, de Bock GH, Dieben SW and Jansen FW. Saline contrast hysterosonography in abnormal uterine bleeding: a systematic review and meta-analysis. BJOG 2003;110: 938-947.
3. Spangler NA. Using sonography to evaluate uterine bleeding Journal of American Academy of Physician Assistants. 2002 Aug; 15(8):37-42
4. Hans A.M, Brölmann. Evolution of ultrasound imaging in gynaecology http://www.medforum.nl/gynfo/overview_article3.asp
5. Klug PW. Vaginal sonographic contrast imaging of the endometrium with gel Geburtshilfe Frauenheilkd 1991; 51: 469–73.
6. Erdem M, Bilgin U, Bozkurt N, Erdem A Comparison of transvaginal ultrasonography and saline infusion sonohysterography in evaluating the endometrial cavity in pre- and postmenopausal women with abnormal uterine bleeding. Menopause. 2007 Sep-Oct; 14(5):846-52.
7. Mathew M, Gowri V, Rizvi SG. Saline infusion sonohysterography - an effective tool for evaluation of the endometrial cavity in women with abnormal uterine

- bleeding. *Acta Obstet Gynecol Scand.* 2010; 89(1):140-2.
8. Elsayes KM, Pandya A, Platt JF, Bude RO. Technique and diagnostic utility of saline infusion sonohysterography. *Int. J Gynaecol Obstet.* 2009 Apr; 105(1):5-9.
9. Dessole S, Capobianco G, Ambrosini G Timing of sonohysterography in menstruating Women. *Gynecol Obstet Invest.* 2000; 50(2):144.
10. IgalWolman et al timing of sonohysterography in menstruating women. *Gynecologic and obstetric investigation* 1999;48,4
11. Kelekci S, Kaya E, Alan M, Alan Y, Bilge U, Mollamahmutoglu L .Comparison of transvaginal sonography, saline infusion sonography, and office hysteroscopy in reproductive-aged women with or without abnormal uterine bleeding. *Fertil Steril.* 2005 Sep; 84(3):682-6
12. Dueholm M, Lundorf E, Hansen ES, et al. Evaluation of the uterine cavity with magnetic resonance imaging, transvaginal sonography, hysterosonography examination, and diagnostic hysteroscopy. *Fertil Steril* 2001; 76: 350–7
13. Jansen FW, de Kroon CD, van Dongen H, Grooters C, Louwé L, Trimbos-Kemper T Diagnostic hysteroscopy and saline infusion sonography: prediction of intrauterine polyps and myomas. *J Minim Invasive Gynecol.* 2006 Jul-Aug; 13(4):320-4.
14. Dueholm M, Forman A, Jensen ML, Laursen H, Kracht P Transvaginal sonography combined with saline contrast sonohysterography in evaluating the uterine cavity in premenopausal patients with abnormal uterine bleeding. *Ultrasound Obstet Gynecol.* 2001 Jul; 18(1):54-61.
15. Epstein E, Valentin L. Managing women with post-menopausal bleeding. *Best Practice and Research Clin Obstet Gynaecol.* 2004; 18(1):125-43
16. Cepni I, Ocal P, Erkan S, Saricali FS, Akbas H, Demirkiran F, Idil M, Bese T Comparison of transvaginal sonography, saline infusion sonography and hysteroscopy in the evaluation of uterine cavity pathologies. *Australian & New Zealand Journal Obstet Gynaecol.* 2005 Feb; 45(1):30-5.
17. O Martinez-Perez, T Perez-Medina, J Bajo-Arenas Ultrasonography of endometrial polyps. *Ultrasound Review of Obstetrics and Gynecology.* Mar 2003.Vol. 3(1); pg. 43-51
18. Gunes M, Erol O, Kayikcioglu F, Ozdegirmenci O, Secilmis O, Haberal. A Comparison of saline infusion sonography and histological findings in the evaluation of uterine cavity pathologies. *Arch Gynecol Obstet.* 2008 Dec; 278(6):513-6.
19. Lev-Toaff AS, Toaff ME, Liu JB, Merton DA, Goldberg BB Value of sonohysterography in the diagnosis and management of abnormal uterine bleeding. *Radiology.*1996 Oct; 201(1):179-84
20. Widrich T, Bradley LD, Mitchinson AR, Collins RL Comparison of saline infusion sonography with office hysteroscopy for the evaluation of the endometrium. *Am J Obstet Gynecol.* 1996 Apr; 174(4):1327-34
21. De Kroon CD, Jansen FW Saline infusion sonography in women with abnormal uterine bleeding: an update of recent findings. *Curr Opin Obstet Gynecol.* 2006 Dec; 18(6):653-7
22. Goldstein SR.Unusual ultrasonographic appearance of the uterus in patients receiving tamoxifen. *Am J Obstet Gynecol.* 1994; 170:447-451
23. Enrico Ferrazzi, F FPGleone. Investigating abnormal bleeding on HRT or tamoxifen: the role of ultrasonography. *Best Practice and Research Clin Obstet Gynaecol.* 2004 .Feb vol 18(1)145-156
24. Gordon AN, Fleischer AC, Dudley BS, Drolshagan LF, Kalemeris GC, Partain CL, Jones HW 3rd, Burnett LS Preoperative assessment of myometrial invasion of endometrial adenocarcinoma by sonography (US) and magnetic resonance imaging (MRI).. *Gynecol Oncol.* 1989 Aug; 34(2):175-9
25. Dessole S, Rubattu G, Farina M, Capobianco G, Cherchi PL, Tanda F, Gallo O, Ambrosini G Risks and usefulness of sonohysterography in patients with endometrial carcinoma. *Am* 2006 Feb; 194(2):362-8.
26. S dessole et al Myometrial invasion assessed by sonohysterography may be useful in pre operative staging Lab Business week Atlanta 2009 April pg295
27. Reports from Cook Medical detail the recent activities Pharma Business Week. Atlanta: Sep 17, 2007. pg. 2487
28. Cornelis D. de Kroon, Leonie A. Louwé, J. Baptist Trimbos, Frank Willem Jansen. The Clinical Value of 3-Dimensional Saline Infusion Sonography in Addition to 2-Dimensional Saline Infusion Sonography in Women with Abnormal Uterine Bleeding .*J Ultrasound Med* 23:1433-1440
29. Chittacharoen A, Theppisai U, Linasmita V, Manonai J. Sonohysterography in the diagnosis of abnormal uterine bleeding. *JObstet Gynaecol Res.* 2000 Aug;26(4):277-81.
30. Schwärzler P, Concini H, Bösch H, Berlinger A, Wohlgenannt K, Collins WP, Bourne TH. An evaluation of sonohysterography and diagnostic hysteroscopy for the assessment of intrauterine pathology. *Ultrasound Obstet Gynecol.* 1998 May; 11(5):337-42.

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