DIAGNOSTIC ACCURACY OF SALINE HYSTEROSONOGRAPHY IN CASES OF ABNORMAL UTERINE BLEEDING

Uzma Nisar, Mohammad Zeeshan Ali, Sajjad Hussain, Ali Zia Asghar, Taimur Hussain Babar, Shakil Sarwar

Military Hospital Rawalpindi

ABSTRACT

Objectives: To evaluate diagnostic accuracy of saline hysterosonography in diagnosing endometrial hyperplasia taking histopathology as gold standard.

Study Design: Validation study.

Setting: Radiology Department MH/CMH Rawalpindi form 10th July 2006 to 10th January 2007.

Patients and Methods: Fifty cases of Abnormal Uterine Bleeding comprising both pre and post menopausal patients were included. They were selected on non probability convenience sampling technique. Saline hysterosonography was conducted in the Radiology Department and results compared with histopathological findings.

Results: Among 50 patients who underwent saline hysterosonography, 40 patients were diagnosed to have positive findings while 10 did not show any abnormality on saline hysterosonography. Of the 10 patients whose endometrium did not show any abnormality on saline hysterosonography, 8 were found to be normal on histopathology and 2 cases showed abnormality. One case was of endometrial hyperplasia and the other showed a benign endocervical polyp which was missed on saline hysterosonography. This showed that Saline hysterosonography has a sensitivity of 94.7%, specificity of 66.7%, and an overall diagnostic accuracy of 88%.

Conclusions: Saline hysterosonography is highly accurate in the diagnosis of endometrial pathologies. It is cost effective, well tolerated by patients and can be performed as an outpatient procedure.

Keywords: Abnormal uterine bleeding, Endometrial hyperplasia, Saline hysterosonography.

INTRODUCTION

Abnormal uterine bleeding (AUB) is a common complaint in women[1]. Saline hysterosonography (SHS) is a relatively new technique which is used for evaluating patients with AUB and has high sensitivity, specificity and positive and negative predictive values[2-6]. Ultrasonography has been used for almost three decades for pelvic imaging and in diagnosing causes of AUB[7] and in peri-menopausal and post menopausal women approximately 70% gynaecological consultations are due to this problem[8].

Menstrual disorders are the reason for 19.1% of the total visits to physician offices for gynaecologic conditions[9]. It is said that about 25% of gynaecologic surgeries involve AUB[10]. The AUB can either be dysfunctional which can be treated medically or due to pathological uterine lesions which are generally treated surgically. It is very importance to differentiate between the two as the management differs. The results of several studies indicate that anatomic causes of abnormal uterine bleeding like polyps, hyperplasia and leiomyoma are more common than previously thought[11-15].

Until recently, endometrial biopsy and transvaginal ultrasonography (TVUS) were the only investigations performed to evaluate the endometrium for the work-up of patients with AUB although in the mid 80,s fluid enhancement of the uterine cavity was carried out with transabdominal ultrasound[16] (US) but it did not gain widespread use[17].

These procedures were often inadequate for evaluation because approximately 50% of cases of (AUB) are caused by focal lesions such as polyps, sub mucosal fibroids, and focal endometrial hyperplasia[18] which can be missed at routine endometrial biopsy because of sampling error and under diagnosed at (TVUS) as it has limitations in the evaluation of double-layer thickness[1,12].

Correspondence: Sqn Ldr Uzma Nisar, Senior Medical Officer, PAF Academy, Risalpur
Received: 08 June 2011; Accepted: 26 Sep 2011

In order to circumvent these problems, saline hysterosonography (SHS) has emerged as a technique which has gained widespread acceptance because of its ability to show exquisite detail of the endometium. Various names have been given to the procedure like sonohysterography, hysterosonography, saline infusion sonohysterography and saline infused sonography[19].

In this technique fluid is instilled into the uterine cavity via cervix and this provides enhanced endometrial visualization during transvaginal ultrasound examination. The saline distends the cavity, pushing the opposed walls of the endometrium apart. As the fluid is anechoic, it is juxtaposed against the echogenic endometrium, giving excellent detail of the uterine lining[20]. The technique improves sonographic detection of endometrial pathology, like polyps, hyperplasia, adhesions and leiomyomas. It can also help avoid invasive diagnostic procedures in some patients. In a study, it was found that, the sensitivity and specificity of SHS for detection of polyps were significantly higher than for TVUS alone (93% and 94% for SHS versus 75% and 76% for TVUS)[21]. It is easily and quickly performed at minimal cost, well-tolerated by patients, and has virtually no complications.

This study was designed to evaluate diagnostic accuracy of saline hysterosonography in diagnosing endometrial hyperplasia taking histopathology as gold standard.

PATIENTS AND METHODS

This validation study was conducted at Military Hospital Rawalpindi and Combined Military Hospital for six months from 10 July 2006 to 10 January 2007. After seeking proper permission from concerned authorities and 'Hospital Ethics Committee' the study was started. The patients included were willing to be included in the study and were both pre and post menopausal with abnormal uterine bleeding. Pregnant women, patients with pelvic inflammatory disease, patients on hormone therapy, patients with known endometrial carcinoma and unwilling patients were excluded.

Fifty cases were included by non probability convenience sampling with complaints of abnormal uterine bleeding from both out patient departments and wards of Departments of Obstetrics and Gynaecology Military Hospital and Combined Military Hospital Rawalpindi. Saline hysterography was done at radiology department while the histopathological specimens were sent to Army Medical College Pathology Laboratory Rawalpindi for analysis. All the patients were examined with Toshiba APLIO ultrasound machine having a transvaginal probe frequency of 5-10MHz. The data was collected by a resident radiologist and supervised by the consultant radiologist. Following technique was used,

Ultrasound Technique

Patients were fully informed about the procedure and informed consent was obtained After voiding the a brief per vaginal bimanual examination was done to locate the cervix. A sterile speculum was placed into the vagina, so that the cervix would come into view and was then cleansed with povidone-iodine solution. A 5-8 Fr foley catheter was first flushed with sterile saline before insertion to remove small amounts of air, which would cause an echogenic artifactual appearance. It was then inserted to the uterus by holding it with a ring forceps and gently pushing it through the cervical os. The speculum was then taken out carefully to avoid dislodging the catheter. The vaginal probe was then inserted and a 10-20 mL saline filled syringe was attached to the catheter. Fluid was gently pushed in while the transducer was moved from side to side and the uterus was examined longitudinally and axially. The fluid acted as a negative contrast medium. The amount of fluid varied between 10-35 ml depending upon the uterine size, vaginal efflux, image produced on the monitor, and patient's comfort. In cases where there was excessive fluid efflux due to a patulous os, the catheter balloon was inflated in the cervical os with 1-3 ml of fluid to prevent efflux and visualize the endometrial lining properly.

Interpretation was done there and then and the findings were recorded. The patients

from out patient department were allowed to go home if they did not have any complaints while the admitted patient was sent back to the ward. Post procedure complications were assessed by asking patients to report any fever, persistent pain, excessive vaginal discharge or heavy bleeding after the procedure. All the patients under went either diagnostic dilatation and curettage or hysterectomy as advised by their treating gynaecologists. The specimens from the uterine endometrium were sent to Army Medical College Pathology Laboratory Rawalpindi for histopathological examination and results were collected after approximately 10 days.

Ultrasound Diagnostic Criteria

In pre menopausal women endometrium was considered as thickened if it was more than 8-15 mm[3] (double layer) depending on the stage of the menstrual cycle. In post menopausal women, endometrium was taken as thickened if it were more than 5mm (double layer)[3]. Endometrial hyperplasia included both diffuse hyperplasia and endometrial polyps

Data Analysis Procedure

All the data was analyzed using SPSS version 11. Mean and standard deviation were calculated for age. Frequency and percentages of presenting complaints, SHS findings and histopathological findings were calculated. Diagnostic measures of SHS in diagnosing endometrial hyperplasia were calculated using 2x2 table.

RESULTS

A total of 50 patients were studied there were 25 (50%) out of these were pre menopausal and 25 (50%) post menopausal patients. The patients had a mean age of 46.6±8.34 years. All were subjected to SHS. Findings of the SHS were matched against the histopathological findings. Forty (80%) patients were diagnosed to have positive findings while 10(20%) did not show any abnormality on SHS (Fig 1). Of the 40 positive cases 20 were endometrial hyperplasia and 20 were polyps. Histopathology of endometrium confirmed our initial diagnosis in 36(90%) patients which were the true positive cases. Four cases which did not match histopathology were the false positive cases. They were all in pre menopausal patients. Of the 10 patients whose endometrium did not show any abnormality on SHS, 8 were found to be normal on histopathology and 2 cases showed abnormality, keeping histopathology as gold standard. One case was of endometrial hyperplasia and the other showed a benign endocervical polyp which was missed on SHS. SHS had 94.7% sensitivity, 66.7% specificity, 90% positive predictive value, 80 % negative predictive value and 88% diagnostic accuracy.

Out of 40 patients of endometrial pathology as detected by SHS, premenopausal women were 18 (45%) and post menopausal women were 22 (55%). Out of 40 patients who had increased endometrial thickening, 20 had findings consistent with endometrial hyperplasia and 20 were found to have endometrial polyps.

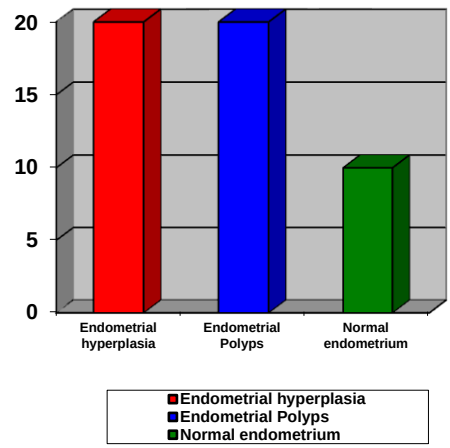

Fig: Sonohysterographic Findings

DISCUSSION

Abnormal uterine bleeding (AUB), a common complaint, affects almost every woman at some point in her life and is responsible for about 20% of gynecologic-related visits to a physician[22]. It is a source of great concern to those affected. Heavy bleeding is frequently associated with fatigue, discomfort, and depression, thus having a detrimental effect on quality of life, including limitation of activity and alterations in sexual

functioning. It imposes a significant financial burden as a result of missed workdays[23-25] and the cost of medical and surgical treatment. More than half a million hysterectomies are performed annually in the United States; many for heavy bleeding [26].

Abnormal uterine bleeding can be the presenting symptom of many endometrial pathologies. The data in older radiology and gynaecology literature suggest that anatomic reasons for bleeding are less common than endometrial atrophy, which is a diagnosis made when no anatomic cause is found. More recently, however, the results of several studies[1,7,11-15,18,27] including ours, have indicated that anatomic causes of post

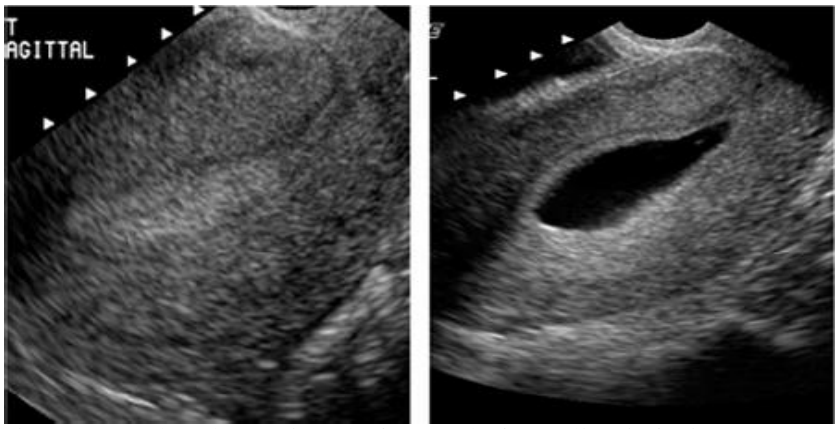

Fig.2: Normal endometrium before and after saline infusion.

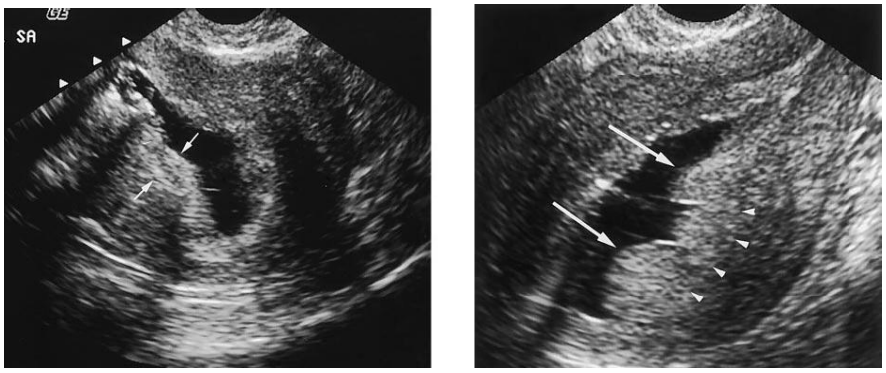

Fig. 3: Typical endometrial hyperplasia and Atypical endometrial hyperplasia.

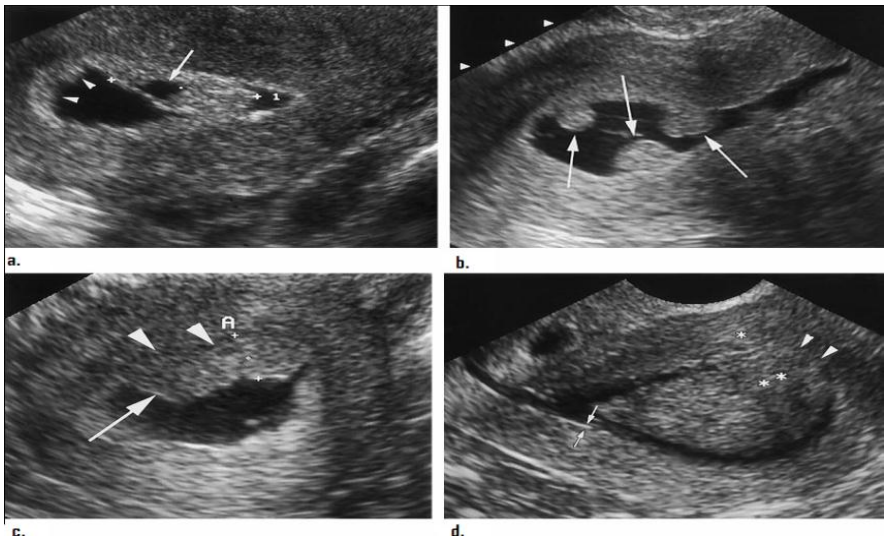

Fig 4a: Cystic endometrial polyp. (arrow). Fig 4b: Multiple endometrial polyps. (arrows). Fig 4c: Flat endometrial polyp with a broad base. Fig 4d: Hypoechoic endometrial polyp.

menopausal bleeding, such as polyps, and hyperplasia, are more common than was previously thought. Common causes of abnormal uterine bleeding are endometrial hyperplasia polyps or endometrial carcinoma and submucosal fibroids.

Saline sonohysterography has been increasingly used for detection of endometrial pathologies[2,4,7,13,18] which constitute an important cause of AUB. Our patients were subjected to SHS examination with the technique which was in accordance with international published literature[19,20,21]. Various studies have given the technique guidelines. They have advocated the use of different catheters for performance of SHS[7,19,20,27,28]. Decision to use specific equipment very much depends upon cost effectiveness, easy availability, expertise of technical staff and polices of the diagnostic centre.

We used 5-8 Fr Foley catheters because of its low price and easy availability. It had the option of balloon inflation and that option was utilized in 3 cases with patulous cervical os where there was efflux of saline from the uterine cavity. An average of 10-35 ml of saline was used which is in the range of that used in published literature[7,27,29]. In the beginning transabdominal US was used for SHS but the use of TVUS in SHS has bolstered the diagnostic power of transvaginal ultrasonography[22].

We have also used transvaginal sonography for SHS as this is the current practice in all recent studies [7,18,21,30,31-34]. Several studies have found the sensitivity and specificity of SHS comparable with the high sensitivity and specificity of diagnostic hysteroscopy[4,35,36]. Krampl et al[4] found sonohysterography to be significantly better than transvaginal ultrasonography in detecting focal intrauterine pathology. Visual examination at operative hysteroscopy did not yield any additional information to the detection or exclusion of focal lesions than was obtained at outpatient SHS. They concluded that sonohysterography may replace diagnostic hysteroscopy in many patients with AUB[4]. Numerous reports have demonstrated high specificity and sensitivity of sonohysterography for detection of benign endometrial pathology, ranging from 86% to 100%[2,3,5,37]. Our data was consistent with these findings.

Some investigators have attempted to assess the diagnostic values of SHS examination by correlating and comparing it with pathologic and hysteroscopic findings, just as we did[2,7,38]. In a prospective randomized unblinded study, 38 TVS and SHS were performed on 197 women and the finally obtained surgical-pathologic findings were compared with the results obtained from TVUS and SHS. Sensitivity, specificity, positive, and negative predictive values were calculated for each procedure. The sensitivity, specificity, positive predictive value, and negative predictive value of hydrosonography in the detection of intracavitary pathology were 81, 73, 83, and 70%, respectively.

Mihm et al[2] did a study to determine the accuracy of endometrial biopsy and SHS. The combination of endometrial biopsy and SHS for the 113 patients who completed the study had a sensitivity and specificity for the detection of abnormal pathologic features of 97.0% (95% CI, 88.6-99.5) and 70.2% (95% CI, 55.0-82.2) and a positive and negative predictive value of 82.1% (95% CI, 71.4-89.5) and 94.3% respectively. The combined technique of blind biopsy and SHS permitted diagnosis of the cause of abnormal uterine bleeding in most women, without the need for more invasive procedures. A systematic review and meta-analysis was done by de Kroon et al[39] which included 24 studies and 2278 procedures. They reported a sensitivity of SHS as 95% and specificity as 88%. They found the accuracy of SHS to be equal to that of diagnostic hysteroscopy and concluded that SHS with combination of aspiration biopsy in selected cases can be used as a standard diagnostic procedure in patients with AUB.

The most fundamental finding of our study wss also that it establishes SHS highly accurate in diagnosing endometrial pathologies like endometrial hyperplasia and endometrial

polyps thus proving our hypothesis. This is in accordance with most studies carried out to date [7,17,18,27,39,40].

Our study has certain clinical applications. Firstly, as SHS is an easy non invasive technique and cost effective technique, it can be used as a screening method in both premenopausal and postmenopausal patients with AUB. SHS appearances of normal endometrium and various endometrial pathologies are shown in fig2, 3 and 4.

In general, SHS has been used as a second-line test for abnormal vaginal bleeding. If the TVUS shows a thin homogeneous endometrial stripe, then the probability of endometrial abnormality is very unlikely, and often SHS is deferred. However, Laifer-Narin et al[31] found that 14% of 114 patients with a normal-appearing endometrium on TVS had abnormalities discovered on SHS. These abnormalities were either endometrial polyps or leiomyomas. Intervention in this setting can provide resolution of symptoms.

SHS yielded additional clinically important information over TVUS. Therefore, the authors advocated that SHS be a first-line test in patients with abnormal vaginal bleeding. This procedure can be performed in the same sitting as TVUS and will save many patients from invasive procedures like hysteroscopy because of its high sensitivity. This will definitely reduce the psychological trauma to patients and will reduce burden on hospital resources. Secondly, there is need to improve level of skill of radiologists and gynaecologists in performing the procedure as this is not performed widely in our country and only very few studies are conducted here.

Procedure-related side effects and complications are very mild and not common. These included difficulty in passing the catheter, inadequate distension of uterine cavity, infection and dissemination of cancer. False positive findings (i.e. suspected pathology not confirmed by histopathology) have been attributed to blood clots, intrauterine debris, mucous plugs, breaking of normal endometrium.

CONCLUSION

SHS has dramatically improved our ability to diagnose endometrial abnormalities. This procedure can be performed in the same sitting as TVUS and enables us to save many patients from invasive procedures like hysteroscopy because of its high sensitivity. With further improvement of the expertise in performing the procedure, SHS can be used as first line investigation in diagnosis of endometrial pathologies and excellent results can be obtained as depicted in this study.

REFERENCES

1. Bree RL, Bowerman RA, Bohem VM, Benson CB, Doubilet PM, DeDreu S et al. US evaluation of the uterus in patients with postmenopausal bleeding: a positive effect on diagnostic decision making. Radiology 2000; 216:260-4.
2. Mihm LM, Quick VA, Brumfield JA, Connors AF, Finnerty JJ. The accuracy of endometrial biopsy and saline sonohysterography in the determination of the cause of abnormal uterine bleeding. Am J Obstet Gynecol. 2002; 186(5):858-60.
3. Ryu J, Kim B, Lee J, Kim S, Lee SH. Comparison of transvaginal ultrasonography with hysterosonography as a screening method in patients with abnormal uterine bleeding. Korean J Radiol: 2004; 5:39-46.
4. Krampl E, Bourne, T, Hurlen-Solbakken, H, Istre, O. Transvaginal ultrasonography sonohysterography and operative hysteroscopy for the evaluation of abnormal uterine bleeding. Acta Obstet Gynecol Scand 2001; 80:616-22.
5. Soares SR, Barbosa dos Reis MM, Camargos AF. Diagnostic accuracy of sonohysterography, transvaginal sonography, and hysterosalpingography in patients with uterine cavity diseases. Fertil Steril 2000;73: 406-11.
6. Khan NA, Rahim N, Habib U, Zaidi NR. Role of saline infusion sonohysterography in diagnosing endometrial polyps. Ann King Edward Med Coll, 2004: 10 (2):149-51
7. Patil AD. Use of sonohysterography in the diagnosis and management of abnormal uterine bleeding. Ultrasound Obstet Gynecol, 2001;18 (1):10
8. Pasrija S, Trivedi S, Narula MK. Prospective study of saline sonhysterography in evaluation of perimenopausal and postmenopausal women with abnormal uterine bleeding. J Obstet Gynaecol 2004; 30(1):27-33
9. Nicholson WK, Ellison SA, Grason H, Powe NR. Patterns of ambulatory care use for gynaecologic conditions: a national study. Am J Obstet Gynecol 2001; 184:523-30.
10. Goodman A. Abnormal genital tract bleeding. Clin Cornerstone 2000;3:25-35.
11. Bronz T, Suter T, Rusca T. The value of transvaginal sonography with and without saline instillation in the diagnosis of uterine pathology in pre and postmenopausal women with abnormal bleeding or suspect sonographic findings. Ultrasound Obstet Gynecol 1998;178: 956-61.
12. O'Connell LP, Fries MH, Zeringue E. Triage of abnormal postmenopausal bleeding: a comparison of endometrial biopsy and transvaginal sonohysterography versus fractional curettage with hysteroscopy. Am J Obstet Gynecol 1998; 178:956-61
13. Saidi MH, Sadler RK, Theis VD. Comparison of sonography, sonohysterography, and hysteroscopy for evaluation of abnormal uterine bleeding. J Ultrasound Med 1997; 16:587-91.

14. Dubinsky TJ, Parvey HR, Maklad N. The role of transvaginal and endometrial biopsy in the evaluation of peri- and postmenopausal bleeding. AJR Am J Roentgenol 1997; 169:154-9.

15. Schwarzler P, Concin H, Bosch H. An evaluation of sonohysterography and diagnostic hysteroscopy for the assessment of intrauterine pathology. Ultrasound Obstet Gynecol 1998; 11:337-42.

16. Randolph JR, Ying YK, Maier DB. Comparison of realtime sonography hysterosalpingography and laparoscopy / hysteroscopy in evaluation of uterine abnormalities and tubal patency. Fertil Steril 1986;46: 828-32.

17. Goldtein SR. Abnormal uterine bleeding: the role of ultrasound. Radiol Clin N Am 2006; 44: 901-10.

18. Davis PC, O'Neill MJ, Yoder IC, Lee SI, Mueller PR. Sonohysterographic findings of endometrial and subendometrial conditions. Radiographics 2002; 22:803–16.

19. Lindeim SR, Sprague C, Winter TC. Hysterosalpingography and sonohysterography: lessons in technique. AJR Am J Roetgenol 2006;186:24-9.

20. Goldstein SR. Saline sonohysterography [online]. UptoDate 2007 [cited year month date]. Available at http://www.uptodate.com.

21. American Institute of Ultrasound in Medicine. AIUM standard for the performance of saline infusion sonohysterography. J Ultrasound Med 2003; 22:121–26.

22. Albers JR, Hull SK, Wesley RM. Abnormal uterine bleeding. Am Fam Physician 2004; 69: 1915-26.

23. Kuppermann M, Varner RE, Summitt RL, Learman LA, Ireland C, Vittinghoff E, et al., for the Ms Research Group. Effect of hysterectomy vs medical treatment on health-related quality of life and sexual functioning: The medicine or surgery (Ms) randomized trial. JAMA 2004; 291:1447-455.

24. Munro MG. Dysfunctional uterine bleeding: advances in diagnosis and treatment. Curr Opin Obstet Gynecol 2001;13: 475-89.

25. O'Leary AJ, Tejura H. Medical management of menorrhagia. Rev Gynecol Pract 2005; 5:159-65.

26. Munro MG. Medical management of abnormal uterine bleeding. Obstet Gynecol Clin North Am 2000; 27: 287-304.

27. Berridge DL, Winter TC. Saline infusion sonohysterography: technique, indications, and imaging findings. J Ultrasound Med 2004; 23: 97 -112.

28. Dessole S, Farina M, Capobianco G, Nardelli GB, Ambrosini G, Meloni GB. Determining the best catheter for sonohysterography. Fertil Steril 2001; 76:605–9.

29. Epstein E, Ramirez A, Skoog L, Valentin L. Transvaginal sonography, saline contrast sonohysterography and hysteroscopy for the investigation of women with postmenopausal bleeding and endometrium > 5 mm. Ultrasound Obstet Gynecol 2001;18:157-62.

30. Parker JD. The prevalence of endometrial polyps as diagnosed by saline infusion sonohysterography among different body mass indexes.Fertil Steril 2007;88: 201-2.

31. Laifer-Narin S, Ragavendra N, Parmenter EK, Grant EG. False-normal appearance of the endometrium on conventional transvaginal sonography: Comparison with saline hysterosonography. AJR Am J Roentgenol 2002;178:129–33.

32. Becker E Jr, Lev-Toaff AS, Kaufman EP. The added value of transvaginal sonohysterography over transvaginal sonography alone in women with known or suspected leiomyoma. J Ultrasound Med 2002; 21:237.

33. Dessole, S, Farina, M, Rubattu, G. Side effects and complications of sonohysterosalpingography. Fertil Steril 2003; 80: 620.

34. Spieldoch RL, Winter TC, Schouweiler C, Ansay S,. Evans MD, Lindheim SS, et al. Optimal catheter placement during sonohysterography.A randomized controlled trial comparing cervical to uterine placement. Obstet Gynecol 2008; 111:15-21.

35. De Vries LD, Dijkhuizen FP, Mol BW, Brolmann HA, Moret E, Heintz AP, et al. Comparison of transvaginal sonography, saline infusion sonography, and hysteroscopy in premenopausal women with abnormal uterine bleeding. J Clin Ultrasound 2000;28: 217-23.

36. Szpurek D, Sroka L, Moszinski R, Saidak S. Clinical assessment of sonohysterography in the diagnosis and management of abnormal uterine bleeding. Ginekol Pol 2002; 73(11):980-84.

37. Farquhar C, Ekeroma A, Furness S, Arroll B. A systematic review of transvaginal ultrasonography, sonohysterography and hysteroscopy for the investigation of abnormal uterine bleeding in premenopausal women. Acta Obstet Gynecol Scand 2003;82: 493–504.

38. Guven MA, BeseT, Demirkiran F. Comparison of hydrosonography and transvaginal ultrasonography in the detection of intracavitary pathologies in women with abnormal uterine bleeding. Int J Gyneco Cancer 2004;14:57-63.

39. De Kroon CD, De Bock GH, Dieben SW, Jansen FW. Saline contrast hysterosonography in abnormal uterine bleeding: a systematic review and meta-analysis. Br J obstct Geyncol, 2003; 110:938.

40. O'Neill MJ. Sonohysterography. Radiol Clin North Am 2003; 41:781–97.