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Research Article

Comparative study of saline infusion sonography and hysteroscopy for evaluation of uterine cavity in abnormal uterine bleeding

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ABSTRACT

Background: Intra-cavitary uterine pathology is the commonest cause of abnormal uterine bleeding. Hysteroscopy is considered as the gold standard for uterine cavity examination. However, in resource limited set-ups saline infusion sonography is an effective alternative to hysteroscopy. The current study aims to compare the accuracy of saline infusion sonography with hysteroscopy in identifying intra-cavitary lesions in women with abnormal uterine bleeding.

Methods: 52 patients with abnormal uterine bleeding underwent saline infusion sonography followed by hysteroscopy. The parameters studied were endometrial thickness, presence of sub-mucosal fibroid and endometrial polyp.

Results: Upon comparison of saline infusion sonography with hysteroscopy, for detecting endometrial hyperplasia the sensitivity, specificity, positive and negative predictive value were 100%, 94%, 40% and 100% respectively. For endometrial polyp the sensitivity, specificity, positive and negative predictive values were 90.90%, 92.68%, 76.92% and 97.43% respectively. Similarly, the sensitivity, specificity, positive and negative predictive values for sub-mucosal fibroid were 86.36%, 83%, 79.16 % and 89.28% respectively.

Conclusions: Saline infusion sonography is a less invasive alternative to hysteroscopy for diagnosis of intra-cavitary lesions in women with abnormal uterine bleeding.

Keywords: Saline infusion sonography, Hysteroscopy, Abnormal uterine bleeding, Uterine cavity abnormalities

INTRODUCTION

Abnormal uterine bleeding is one of the main reasons for women to consult a gynecologist. Approximately 33% of all admissions to gynecology clinics are due to abnormal uterine bleeding.¹ Confirming the diagnosis and planning the treatment of abnormal uterine bleeding is very important in clinical practice. It is essential to distinguish organic causes from functional causes. Although dysfunctional causes require medical treatment, organic causes such as endometrial polyp, uterine fibroid, endometrial hyperplasia and endometrial cancer may require surgical treatment. Transvaginal ultrasonography is highly applicable, non-invasive and preferred initially in evaluation of women with abnormal uterine

bleeding.^{2,3} However, the accuracy of transvaginal sonography is limited in the diagnosis of focal endometrial lesions. This can be overcome by saline infusion sonography, which can be performed easily and rapidly and is well tolerated by patients. It can accurately differentiate focal endometrial lesions and provide information about the localization and the extent of sub-endometrial lesions affecting the uterine cavity.^{4,5} Hysteroscopy is an effective procedure, but is more expensive than Saline Infusion Sonography (SIS). Direct visualization of uterine cavity is possible by hysteroscopy but it does not give any information about myometrium and adnexa. The aim of this study was to compare the diagnostic accuracy of SIS with the gold standard,

hysteroscopy for detecting intra-cavitary abnormalities in women with abnormal uterine bleeding.

METHODS

This comparative study was conducted after obtaining clearance from Hospital Ethics Committee. 52 women in the age group of 25 to 55 years, who complained of abnormal uterine bleeding and did not respond to conventional medical therapy, were recruited for the study after taking informed consent. Of these, only 52 patients underwent both SIS and hysteroscopy. Bleeding due to coagulopathies, patients with past history of malignancy, pregnancy or suspecting pregnancy, bleeding due to systemic diseases and women with active pelvic infections were excluded from this study.

A detailed history was taken with special attention towards the menstrual history regarding onset, course, duration and flow. A complete general examination followed by local examination to assess uterine size, position, mobility, any adnexal mass and tenderness or presence of any cervical mass was determined. Patients who satisfied inclusion and exclusion criteria were included in the study and informed consent was taken from them.

SIS was done for the patients in the postmenstrual phase. Conventional transvaginal sonography of the uterus was performed in both sagittal and oblique transverse planes with the 7.5MHz probe (PHILIPS HD 7). Subsequently, maintaining asepsis a No.8 Foley's catheter was passed through the cervix into the uterine cavity without dilating the cervix or use of any local anesthesia. The balloon was inflated to fix the catheter into the cavity to provide stable filling and prevent backflow of saline. About 10-15 ml of 0.9% saline was instilled slowly into the endometrial cavity to provide hypoechogenic contrast to get optimal visualization of abnormal structures. Transvaginal probe was reinserted to look for endometrial pathology like polyp and sub-mucosal fibroid and to measure the endometrial thickness.

Following SIS, all patients were subjected to hysteroscopy using rigid, continuous flow hysteroscopy of 2.9 Fr (PROMIS, Germany). If there was any intrauterine pathology, the shape, size and site of it was noted. At the end of the procedure, the hysteroscope was slowly withdrawn through the cervical canal to visualize and detect any intra-cervical pathology. Operative hysteroscopy was done immediately whenever it was needed.

Parameters studied were the presence of endometrial hyperplasia, sub-mucosal fibroid or an endometrial polyp. Data was entered separately for SIS and hysteroscopy and analyzed. The sensitivity, specificity, positive and negative predictive values were calculated.

RESULTS

In the present study, mean age of women with abnormal uterine bleeding was 43 years. Of these, 27 (51.9%) women belonged to the age group of 40-50 years. Majority of women were multiparous, accounting for 90.38% of the study population and belonged to low socio-economic status. Among them 18 (34.61%) had menorrhagia, 17(32.69%) had metrorrhagia, 11 (21.15%) had meno-metrorrhagia and 4 (7.69%) had other menstrual disturbances. Only 2 women had dysmenorrhea (3.84%) (Table 1).

Table 1: Patient profile.

	No. of patients	Percentage (%)
Age group (years)		
20-30	1	1.92%
30-40	13	25%
40-50	27	51.93%
50-60	11	21.15%
Total	52	100%
Parity		
Nulligravida	1	1.93%
Primipara	4	7.69%
Multipara	47	90.38%
Total	52	100%
Socio economic status (SES)		
I	0	0
II	3	5.76%
III	15	28.84%
IV	18	34.64%
V	16	30.76%
Total	52	100%

Among the 52 women who underwent saline infusion sonography, 10 (19.23%) had normal endometrium, 5 (9.61%) had endometrial hyperplasia, endometrial polyps were seen in 12 (23.07%) and 25 (48.07%) had sub-mucosal fibroids. Hysteroscopy was performed in all these women and normal cavities were found in 17 (32.69%), endometrial hyperplasia in 2 (3.84%), endometrial polyp in 11(21.15%) and sub-mucosal fibroid in 22 (42.30%) (Table 2).

Table 2: Comparison of saline infusion sonography with hysteroscopy.

Findings	SIS (%)	Hysteroscopy (%)
Normal	10 (19.23)	17 (32.69)
Endometrial hyperplasia	5 (9.61)	2 (3.84)
Endometrial polyp	12 (23.07)	11 (21.15)
Sub mucosal fibroid	25 (48.07)	22(42.30)
Total	52 (100)	52 (100)

The sensitivity, specificity, positive and negative predictive values of saline infusion sonography to detect endometrial hyperplasia in comparison to hysteroscopy were 100%, 94%, 40% and 100% respectively. The sensitivity, specificity, positive and negative predictive values to detect endometrial polyps were 90.90%, 92.68%, 76.92% and 97.43% respectively. Similarly, the sensitivity, specificity, positive and negative predictive value of saline infusion sonography in comparison to hysteroscopy for detecting sub-mucosal fibroid was 86.36%, 83%, 79.16% & 89.28% respectively (Table 3).

Table 3: Test validation of SIS with hysteroscopy.

	Sensitivity	Specificity	PPV	NPV
Endometrial hyperplasia	100%	94%	40%	100%
Endometrial polyp	90.90%	92.68%	76.92%	97.43%
Sub-mucosal fibroid	86.36%	83%	79.16%	89.28%

DISCUSSION

In the present study we evaluated the diagnostic accuracy of saline infusion sonography with reference to the current gold standard hysteroscopy for detecting intra-uterine pathology in women with abnormal uterine bleeding. More than 40% of women with abnormal uterine bleeding have some intrauterine pathology.⁶ A systematic review by Farquhar C et al.⁷ on investigations for abnormal uterine bleeding in premenopausal women using transvaginal sonography, saline infusion sonography and hysteroscopy showed that the most common abnormalities detected were sub-mucosal fibroids, endometrial polyps and endometrial hyperplasia. We used these three pathologies to assess the diagnostic accuracy of saline infusion sonography in comparison to

hysteroscopy. We observed that majority of women with abnormal uterine bleeding belonged to the age group of 40-50 years (51.9%) and the commonest bleeding pattern was menorrhagia (34.6%). Various other studies have also reported menorrhagia as the most common menstrual abnormality due to some intrauterine pathology in premenopausal women during their 3rd or 4th decades of life.^{8,9}

In our study, we found 10 normal cavities during saline infusion sonography, which were also found to be normal during hysteroscopy. Intra-cavitary anatomical cause was found in 80.7% women with SIS and 67.2% in hysteroscopy which reasserts the need for early evaluation of uterine cavity in women who are not responding well to medical management for abnormal uterine bleeding. The most common abnormality detected in both saline infusion sonography and hysteroscopy was sub-mucosal fibroid. Haemila et al.⁹ and Rudra et al.¹⁰ also found sub mucous fibroid as the predominant lesion associated with abnormal uterine bleeding in both pre and post-menopausal women.

Our findings of various lesions in saline infusion sonography were endometrial hyperplasia (9.6%), endometrial polyp (23.1%) and sub-mucosal fibroid (48.1%). Subsequently, diagnostic hysteroscopy showed endometrial hyperplasia in 3.8%, endometrial polyp in 32.7% and sub-mucosal fibroid in 42.3%. Among the various lesions, endometrial hyperplasia was most accurately detected using SIS with a sensitivity of 100% and specificity of 94%. This finding is reflected in other studies as shown in Table 4.^{9,11,12} The least sensitivity for detection with saline infusion sonography was for sub-mucosal fibroids. 5 patients were diagnosed with sub-mucosal fibroids during SIS. However, two of them were found to have polyp and three had normal cavities on diagnostic hysteroscopy.

Table 4: Diagnostic accuracy of SIS for various endometrial pathology.

Pathology		Our study	Rudra et al. ⁸	Btosis et al. ¹⁰	Dasgupta et al. ¹¹
Endometrial hyperplasia	Sensitivity	100%	97.9%	-	88
	Specificity	94%	100%	-	90.6%
Endometrial polyp	Sensitivity	90.9%	97.3%	96%	97.6%
	Specificity	92.6%	93%	96%	97.6%
Sub mucosal fibroid	Sensitivity	86.36%	97.3%	99%	98.7%
	Specificity	83%	88.2%	88%	85.7%

Overall, the diagnostic accuracy for detecting intracavitary abnormalities with saline infusion sonography had a high sensitivity and high negative predictive value approaching 100%. Our findings are in close agreement to the other studies as shown in Table 5.^{9,13-15} Women with abnormal uterine bleeding who have failed medical management and found to have normal cavity during saline infusion sonography can avoid being

subjected to further evaluation with the more invasive, expensive, and not easily available procedure of hysteroscopy in resource limited settings. Other advantages of saline infusion sonography are that it offers additional information about myometrium and adnexa.¹⁶ Therefore, in the absence of a hysteroscopy, saline infusion sonography offers an excellent choice in the evaluation of intrauterine abnormalities.

Table 5: Diagnostic potential of SIS compared to hysteroscopy for detecting uterine intra-cavitary abnormalities.

	Our study	Rudra et al. ⁸	Widrich et al. ¹²	Krampl et al. ¹³	Kamel et al. ¹⁴
Sensitivity	100%	90.9%	96%	94%	93.1%
Specificity	58.8%	88.3%	88%	84%	93.9%
Positive predictive value	82.5%	86%	89%	89%	94.6%
Negative predictive value	100%	92.5%	96%	98%	92%

The limitation of our study was that neither the patients nor the investigators were blinded about the findings. Small sample size and lack of correlation of findings with histopathology were also other limitations of our study.

CONCLUSIONS

Transvaginal sonography is a routine procedure which is easily available for the evaluation of abnormal uterine bleeding; however the accuracy of transvaginal sonography in the diagnosis of focal endometrial lesions is limited. So, for the identification and assessment of uterine lesions, saline infusion sonography is a simple, safe, reliable, effective and well tolerated method without complications which compliments transvaginal sonography in the preoperative examination of uterine pathology. Besides these advantages the diagnostic potential and accuracy of saline infusion sonography makes it an excellent option in most hospitals where it can be performed easily and conveniently for evaluation of intrauterine abnormalities.

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