

Sonohysterography in peri- and postmenopausal women with abnormal uterine bleeding or abnormal endometrial appearance

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Abstract

OBJECTIVES: To assess the usefulness of SIS and to compare its diagnostic accuracy with conventional transvaginal ultrasound (TVS) and hysteroscopy (HSC) to detect intracavitary abnormalities in peri- and postmenopausal women with abnormal endometrial appearance or abnormal uterine bleeding (AUB) prior to admission.

DESIGN AND SETTING: The study group consisted of 40 patients in peri- and postmenopausal period referred to the 1st Department of Obstetrics and Gynecology, Medical University of Warsaw due to AUB or abnormal endometrial appearance on TVS between January 2013 and June 2013. All the participants underwent TVS followed by SIS in order to plan further management. Only the patients with uterine abnormalities on TVS examination, proved by SIS were qualified for HSC. Hysteroscopic guided biopsies were taken in cases with focal lesions. The sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of TVS, SIS and HSC were calculated by comparison with the final pathological diagnosis as the gold standard.

RESULTS: The comparison of the three diagnostic procedures revealed that the diagnostic accuracy of SIS and HSC is superior to conventional TVS. SIS and HSC had identical accuracy for submucosal myomas (PPV and NPV 1.0 for both), while in case of polypoid lesions the accuracy of HSC was higher than of SIS (HSC: PPV 0.8, NPV 1.0; SIS: PPV 0.75; NPV 0.75).

CONCLUSIONS: Due to its accuracy and cost-effectiveness, SIS could be regarded as a primary diagnostic method allowing proper qualification for further invasive diagnostic or therapeutic procedures in the detection of uterine abnormalities among peri- and postmenopausal women.

INTRODUCTION

Abnormal uterine bleeding (AUB) and abnormal endometrial appearance on transvaginal ultrasound examination are the two main reasons for hospital admission among women in peri- and

postmenopause. Transvaginal ultrasonography (TVS) is a cheap, preferred non-invasive screening tool in the evaluation of the above patients (Dreisler *et al.* 2009). However, the accuracy of transvaginal ultrasound is limited, especially in the diagnosis of focal endometrial lesions (Soguktas *et al.* 2012).

Diagnostic hysteroscopy, combined with histopathological examination of the endometrial sample, is nowadays a “gold standard” in the diagnosis of intrauterine abnormalities in women of perimenopausal age. Nevertheless, it is an expensive and in some way invasive method in comparison to ultrasound diagnostic tools, especially when it turns out unnecessary. Saline infusion sonography (SIS) seems to be a perfect alternative and a complementary diagnostic method, since it is easy, rapid and non-invasive (Brown *et al.* 2000, Kotdawala *et al.* 2013). Some authors consider normal SIS as a proof of a normal uterine cavity (Goldstein *et al.* 1997, Parsons & Lense 2001). According to others such a result is an insufficient proof and cannot be relied on in clinical practice (Bernard *et al.* 2001, de Vries *et al.* 2000).

The objective of the study was to assess the usefulness of saline infusion sonography and to compare its diagnostic accuracy with conventional transvaginal ultrasound and hysteroscopy to detect intracavitary abnormalities in peri- and postmenopausal women with abnormal endometrial appearance or abnormal uterine bleeding prior to admission.

MATERIAL AND METHODS

The study group consisted of 40 patients in peri- and postmenopausal period referred to the 1st Department of Obstetrics and Gynecology, Medical University of Warsaw due to abnormal uterine bleeding or abnormal endometrial appearance on transvaginal ultrasound between January 2013 and June 2013. After obtaining a written informed consent, all the participants underwent transvaginal ultrasound with 6.5 MHz probe, followed by saline infusion sonography in order to verify the reason of referral and plan further management. The study was conducted according to the Declaration of Helsinki for Medical Research involving Human Subjects.

SIS technique

Upon insertion of vaginal speculum, the uterine cervix was cleaned with octenidine dihydrochloride solution. A special soft catheter (Cook Goldstein Sonohysterography™ Catheter) was placed into the endometrial cavity through cervical os and 10–20 ml of sterile saline solution was instilled in order to distend the cavity by pushing the opposed walls of the endometrium apart. During the distention the cavity was once again evaluated in transverse and longitudinal planes on transvaginal ultrasound. The contour, dimension, thickness and regularity of the endometrium, as well as the presence of focal lesions were assessed. Figure 1 presents conventional TVS image of endometrial polyp (1A), afterwards assessed during SIS (1B).

Only the patients with uterine abnormalities on TVS examination, proved by SIS were qualified for hysteroscopy (HSC; n=32). Hysteroscopy was performed under general anesthesia with the use of 4mm Karl Storz Bet-

occhi system or 8 mm unipolar resectoscope (Karl Storz, Germany), depending on the indications. Hysteroscopic guided biopsies were taken in cases with focal lesions. A dilatation and curettage were performed in patients with a history of abnormal bleeding or when diffuse endometrial abnormalities were observed. Tissue specimens were preserved in formalin and sent for histopathological examination.

Obtained data were given as means \pm standard deviation or percentages. The sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of TVS, SIS and HSC were calculated by comparison with the final pathological diagnosis as the gold standard.

RESULTS

The mean age of patients was 51.4 \pm 7.6 years (range 46–73). All 40 women underwent TVS and SIS upon referral. Hysteroscopy was performed in 32 women (80%). The remaining 8 subjects referred to the department with abnormal endometrial appearance on TVS with no abnormal bleeding were disqualified from further invasive management after normal SIS examination (i.e. normal endometrial thickness on SIS).

The final histopathological diagnoses were: normal endometrium (n=4; 12.5%), submucosal myoma (n=8; 25%), polypoid endometrial fragments with/without irregular proliferation (n=8; 25%) and endometrial polypoid lesion (n=12; 37.5%). No cases of endometrial hyperplasia or malignancy were diagnosed in the studied material. The results of TVS, SIS, HSC and histopathological examination are shown in Table 1.

The sensitivity, specificity, PPV and NPV of TVS, SIS and HSC were calculated for each abnormality of uterine cavity with respect to endometrial biopsy. The results are shown in Table 2.

The comparison of the three diagnostic procedures revealed that the diagnostic accuracy of SIS and hysteroscopy is superior to conventional TVS. SIS and HSC had identical accuracy for submucosal myomas, while in case of polypoid lesions the accuracy of HSC was higher than of SIS.

DISCUSSION

Transvaginal sonography is currently the first-line diagnostic tool in the evaluation of peri- and postmenopausal patients with abnormal bleeding. Unfortunately, its value is limited in the differentiating of intracavitary abnormal pathologies. Additionally, there is a group of women with abnormal endometrial appearance on routine TVS with no history of abnormal bleeding, who require further management. There are two alternative diagnostic tools, more effective in the detection of intrauterine pathologies than TVS: saline infusion sonography – non-invasive, simple and cost-effective and hysteroscopy – invasive and more expensive. Recently,

Tab. 1. The results of TVS, SIS, HSC and histopathological examination.

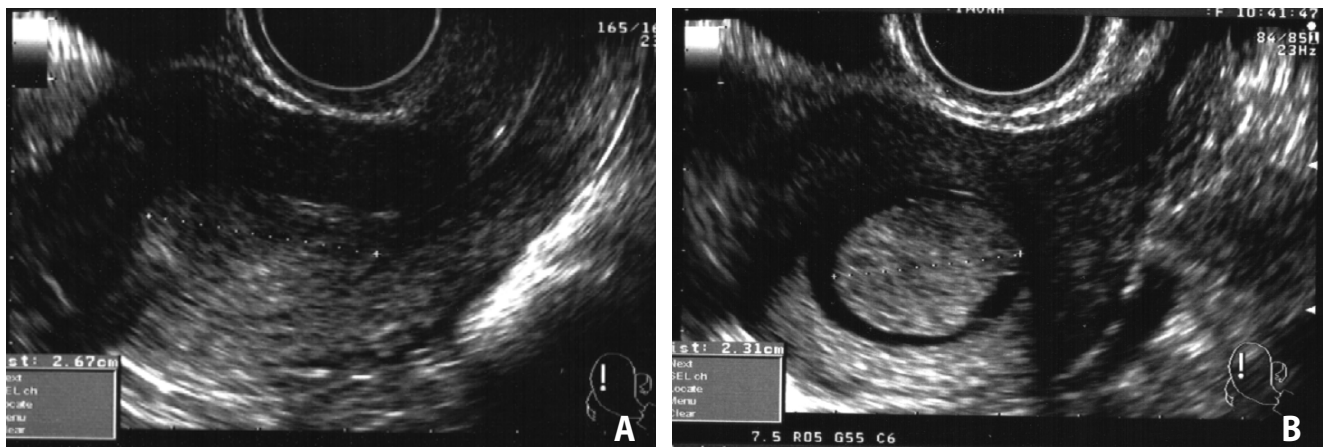
	TVS - n (%)	SIS - n (%)	HSC - n (%)	Histopathology - n (%)
Endometrial polypoid lesion	24 (60)	20 (50)	16 (50)	16 (50)
Submucosal myoma	4 (10)	8 (20)	8 (25%)	8 (25%)
Other findings	12 (30)	12 (30)	8 (35)	8 (25)
Total	40	40	32	32

Other findings: normal endometrium, irregular proliferation of endometrium

Tab. 2. Diagnostic accuracy parameters (95% confidence intervals) of TVS, SIS and HSC for polypoid lesions and submucosal myomas.

Pathological diagnosis	Sensitivity	Specificity	PPV	NPV
Polypoid lesion				
TVS	0.750 (0.595–0.905)	0.250 (0.095–0.405)	0.500 (0.397–0.603)	0.500 (0.191–0.809)
SIS	0.750 (0.546–0.890)	0.750 (0.546–0.890)	0.750 (0.546–0.890)	0.750 (0.546–0.890)
HSC	1.000 (0.820–1.000)	0.750 (0.570–0.750)	0.800 (0.656–0.800)	1.000 (0.760–1.000)
Submucosal myoma				
TVS	0.500 (0.216–0.500)	1.000 (0.905–1.000)	1.000 (0.432–1.000)	0.857 (0.776–0.857)
SIS	1.000 (0.699–1.000)	1.000 (0.900–1.000)	1.000 (0.699–1.000)	1.000 (0.900–1.000)
HSC	1.000 (0.699–1.000)	1.000 (0.900–1.000)	1.000 (0.699–1.000)	1.000 (0.900–1.000)

PPV – positive predictive value; NPV – negative predictive value

**Fig. 1.** A – Endometrial polyp suspected during conventional TVS; B – The same polypoid lesion in the uterine cavity seen during SIS.

they have become more popular in the management of AUB and abnormal TVS (Farquhar *et al.* 2003).

Typically, SIS can be applied in the diagnosis of uterine pathologies both in premenopausal and postmenopausal women. In premenopausal patients with AUB sonohysterography allows to differentiate functional bleeding from organic lesions. In postmenopausal women it allows to differentiate endometrial atrophy from focal lesions requiring histopathological examination. SIS also provides information regarding localization and the extent of the lesions affecting the uterine cavity (Mathew *et al.* 2010, Dueholm *et al.* 2001).

Grimbizis *et al.* suggest that SIS is more valuable than TVS and recommends its routine use before hysteroscopy in case of focal endometrial lesions for optimal preoperative preparation of the patients (Grimbizis *et al.* 2010). However, SIS does not provide the chance of treatment. Due to its higher diagnostic performance than TVS it is especially useful in women with no suspicious intracavitary lesions on conventional ultrasound (Soguktas *et al.* 2012). In the presented study 8 of 40 patients were disqualified from further invasive management because in contrary to TVS, SIS revealed normal uterine cavity.

Bingol *et al.* reported that the diagnostic accuracy of SIS in the detection of submucosal myoma was identical to HSC – sensitivity 70% and PPV 93.3% (Bingol *et al.* 2011). According to Soguktas *et al.* hysteroscopy was the most accurate diagnostic procedure for polypoid lesions (AUC=0.947), followed by SIS (AUC=0.894) and TVS (AUC=0.778) (Soguktas *et al.* 2012). De Kroon *et al.* concluded that the diagnostic accuracy of SIS is identical with diagnostic hysteroscopy with regard to the causes of abnormal uterine bleeding (De Kroon *et al.* 2003). According to Katsetos *et al.* both hysteroscopy and SIS were comparable in the diagnosis of intracavitary lesions and the duration of the procedure, however, the acceptance of SIS was significantly higher than HSC (Katsetos *et al.* 2013).

Other authors also report that the agreement between 2D SIS and hysteroscopy was similar to that between 3D SIS and hysteroscopy with regard to the presence of focal lesions (Opolskiene *et al.* 2009). 3D SIS can improve the precision of diagnosis of endometrial pathology with sensitivity and specificity reaching 83 and 99%, nevertheless these accuracy parameters are very high for 2D SIS as well (72% and 96%, respectively) (Kowalczyk *et al.* 2012). Ludwin *et al.* reported that 3D-SIS and hysteroscopy were equally valuable in uterine cavity assessment after metroplasty (Ludwin *et al.* 2014). In the presented material the diagnostic accuracy of SIS and HSC was similar to data presented by other investigators. In case of polypoid lesions HSC was the most accurate diagnostic tool, followed by SIS. In case of submucous myomas the accuracy of HSC and SIS was identical.

CONCLUSIONS

Saline infusion sonography is an accurate diagnostic tool in the detection of uterine abnormalities among peri- and postmenopausal women and is superior to transvaginal sonography. It could be regarded as a primary diagnostic method allowing proper qualification for further invasive diagnostic or therapeutic procedures, increasing cost-effectiveness of management.

Disclosure: Authors declare no conflict of interest

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