Gynecol Surg (2004) 1:227–230
DOI 10.1007/s10397-004-0050-z

ORIGINAL ARTICLE

Altay Gezer · Adnan Şaar · Fuat Demirkiran · Ali Benian · Yavuz Şimşek · Mustafa Albayrak · Derin Kösebay

The efficacy of hysteroscopy for endometrial pathology: the experience of a university clinic on diagnostic accuracy and the comparison with the other methods

Published online: 31 August 2004

Abstract Hysteroscopy procedures were retrospectively reviewed in order to reveal the diagnostic accuracy and the efficiency of the diagnostic procedures (transvaginal ultrasonography/TvUsg, saline infusion sonography/SIS, hysteroscopy) for an educational institution in the management of abnormal uterine bleeding. The study was completed in the Department of Gynecology and Obstetrics of the Istanbul University Cerrahpaşa School of Medicine by reviewing the hospital records of the patients on whom hysteroscopy had been performed between 1 January 1997 and 31 December 2002. The records of 385 patients were eligible. The sensitivity, specificity and positive and negative predictive values for saline infusion sonography and hysteroscopy were calculated for specific histopathological diagnoses. The sensitivity and specificity of hysteroscopy for the detection of endometrial polyps were calculated as 83.9 and 63.0%, respectively. The positive predictive value (PPV) was 74.6% and negative predictive value (NPV) 75.2%. The sensitivity and specificity of saline infusion sonography for the detection of endometrial polyps were found to be 87.2 and 33.3%, respectively. PPV was 71.4% and NPV was 57.6% for SIS. The sensitivity and specificity of hysteroscopy for the detection of submucosal leiomyoma were determined to be 80.0 and 92.4%, respectively. PPV was 43.2% and NPV was 98.0%. The sensitivity and specificity of SIS for the detection of submucosal leiomyoma were 71.4 and 92.3%, respectively. PPV was calculated as 52.6% and NPV as 75.2% for SIS. Due to its high diagnostic accuracy and lower complication rate even in the educational setting, we believe that hysteroscopy will retain its place as the "gold standard" procedure for the investigation of endometrial pathology.

Keywords Hysteroscopy · Transvaginal ultrasound · Saline infusion sonography · Endometrial pathology

A. Gezer · A. Şaar · F. Demirkiran · A. Benian · Y. Şimşek · M. Albayrak · D. Kösebay
Department of Obstetrics and Gynecology,
Cerrahpaşa School of Medicine of Istanbul University,
Istanbul, Turkey

A. Gezer (✉)
Hıfzı Özcan Caddesi, Adalet Sitesi, C-Blok No: 33,
34750 Kügükbakkalköy, Istanbul, Turkey
e-mail: agezer@superonline.com
Tel.: +90-212-4400039/10342
Fax: +90-212-4400037

Introduction

The diagnostic tests for evaluating the endometrial cavity have evolved in the last 40 years. The uterine cavity can be investigated with hysterosalpingography, transvaginal ultrasound, saline infusion sonography, endometrial biopsy and hysteroscopy. Hysteroscopy has been validated as the most efficient of these tests. It can be utilized either for diagnosis or treatment.

This study was designed to review the hysteroscopy procedures [preoperational diagnostic evaluation including transvaginal ultrasound (TVUsg) and saline infusion sonography (SIS), the hysteroscopy operation and the postoperative pathologic examination] of our clinic over the last 5 years (1997–2002) to reveal the diagnostic accuracy and efficiency of these modalities for the diagnosis of endometrial polyps and submucosal leiomyoma in the case of abnormal uterine bleeding in an educational institution.

Materials and methods

The records of all the hysteroscopy procedures that had been performed between 1 January 1997 and 31 December 2002 in the Department of Obstetrics and Gynecology of Istanbul University, Cerrahpaşa School of Medicine, were reviewed. There were 452 hysteroscopy procedures, of which 385 were eligible for analysis during the study period. In 239 cases, TvUsg records and in 144 cases SIS records were available.

The age, menopausal status, medical and obstetric history of the patient, the findings of TvUsg and SIS (if available), the characteristics and the findings of hysteroscopy and the result of histo-

pathological examination of biopsies obtained during the hysteroscopy procedure were noted. SIS procedures were performed during the follicular phase of the menstrual cycle. First, transvaginal pelvic ultrasound was performed in the dorsolithotomy position. A transvaginal transducer was inserted into the vagina and endometrium, and the myometrium was evaluated in the longitudinal and transverse planes. Endometrial thickness was measured in the anteroposterior direction in the longitudinal plane. Later, a standard speculum was inserted into the vagina to visualize the cervix. After visualization, the vagina and cervix were washed with povidone iodine solution. The cervix was fixed with a tenaculum, and a pediatric Foley catheter (no. 8) was inserted into the uterine cavity. The catheter was fixed in the uterine cavity with its balloon filled with 1 cc sterile 0.9% saline solution. After the catheter was fixed, the speculum was removed, and the transvaginal ultrasound transducer was placed into the vagina. Sterile 0.9% saline solution was infused into the uterine cavity until the uterine cavity was clearly demarked. SIS procedures were carried out with Siemens Adara or General Electronics Logic 500 ultrasound machines. A 5-MHz transvaginal ultrasound transducer was utilized. The endometrial cavity was evaluated in the longitudinal and transverse planes. When a space-occupying lesion was detected, the greatest dimension and localization of the pathology were noted.

Hysteroscopy procedures were performed during the follicular phase of the menstrual cycle. The operation was performed under general anesthesia with a Karl Storz 8-mm hysteroscopy and Wolf 4015 cold light source. The uterine cavity was distended with liquid media (resectesol or 1.5% glycine). Continuous infusion was enabled with a pneumatic cuff under manometer-enhanced pressure control. The infusion was made with a pressure of 100–150 cm H_2O. The procedure was monitored and recorded with video equipment. After careful evaluation of the cervical canal and uterine cavity, either biopsy or resection was performed if a lesion was detected.

All of the diagnostic procedures were performed by senior residents under the supervision of clinical consultants. When an operative procedure was necessary, the clinical consultants performed the operation.

The data were collected in a database in the SPSS 11.5 statistical package program. The sensitivity, specificity and negative and positive predictive values were calculated according to the comparison of the findings during the procedures and the results of the histopathological examination. The diagnostic accuracy was recalculated in the case of the specific pathologies (endometrial polyp and submucosal leiomyoma).

Results

There were 452 hysteroscopy procedures, of which 385 were eligible for analysis between 1 January 1997 and 31 December 2002. The mean age of the patients was 38±10 years. Premenopausal patients constituted 321 of the cases, while 64 patients were postmenauposal. The indication was irregular menstrual pattern (prolonged menstrual bleeding or intermenstrual bleeding) in 222 patients (57.7%) and excessive menstrual bleeding in 112 cases (29.4%). In 50 patients, the hysteroscopy was performed without any complaint in case of an abnormality in TVUsg (13%). In this subset of patients, an endometrial pathology was detected in 78% (39/50, 35 endometrial polyp, 3 submucous leiomyoma, 1 endometrial adenocarcinoma).

In 239 cases TvUsg records and in 144 cases SIS records were available. In the case of TvUsg, the appearance of the lesion detected was noted as 'highly suggestive for endometrial polyp' in 118 cases (30.5%). In 63 cases, the appearance of the uterine cavity was marked as non-homogenous. Among the cases in which SIS was performed, in 114 patients (29.6 %) the preoperative diagnosis was 'endometrial polyp' (Table 1).

The mean operation time was 34±24 min. The mean postoperative hospital stay was 10±17.4 h. In 65% of the patients, resectesol (250 cases) was used as the distention medium and 1.5% glycine in 33.5% (127 cases). The mean volume of the medium used was 1,310±1,077 (100–7,200) ml and the mean deficit volume was 183±257 (0–3,100) ml. Of the procedures, 97% were completed without any complication. There was only one case of mortality during the study period. The case was a submucosal myoma resection that continued for 75 min with a deficit volume of 1,000 cc. There were 11 intraoperative complications. In five cases, there was uterine perforation, and in six cases, there was cervical laceration. In the cases of uterine perforation, a diagnostic laparoscopy was performed. In the case of active bleeding from the perforation site, it was repaired with sutures at laparotomy (two cases).

The comparison of SIS and hysteroscopy findings is presented in Table 2 (n=144) and the distribution of the results of the histopathological examination with respect to hysteroscopy findings (n=298) and SIS findings (n=131) in Tables 3 and 4, respectively.

Table 1 The preoperative findings in TvUsg and SIS

	No.	%
Transvaginal ultrasound (n=239)		
Normal	21	5.5
Non-homogenous appearance	63	16.5
Submucous leiomyoma	37	9.5
Endometrial polyp	118	30.5
Saline infusion sonography (n=144)		
Endometrial polyp	114	29.6
Submucous leiomyoma	20	5.1
Adhesion	6	1.5
Asymetry in endometrial echo	4	1

Table 2 The comparison of SIS and hysteroscopy findings

	Hysteroscopy					
	Total	Normal	Polyp	Myoma	Adhesion	Septum
SIS						
Polyp	114	16	86	8	3	1
Myoma	20	0	7	13	0	0
Adhesion	6	4	1	1	0	
Asymetric End. Echo	4	0	4	0	0	0
Total	144	20	98	22	3	1

Table 3 The distribution of the results of the histopathological examination with respect to hysteroscopy findings

Histopathological examination					
	Total	Normal	Polyp	Myoma	Endometrial cancer
Hysteroscopy					
Normal	53	39	13	1	0
Polyp	189	44	141	2	2
Myoma	37	11	10	16	0
Adhesion	14	10	3	1	0
Septum	5	4	1	0	0
Total	298	108	168	20	2

Table 4 The distribution of the results of the histopathological examination with respect to SIS findings

Histopathology					
	Total	Normal	Polyp	Myoma	Endometrial cancer
SIS					
Polyp	105	26	75	3	1
Myoma	19	2	7	10	0
Adhesion	3	2	0	1	0
Asymetric End. echo	4	0	4	0	0
Total	131	30	86	14	1

Table 5 The diagnostic accuracy of SIS and hysteroscopy for specific pathologies

HYSTEROSCOPY								
Pathology	Sensitivity	Specificity	PPD	NPD	LR+	LR-	False (+)	False (−)
	%	%	%	%	%	%	%	%
Polyp	83.9	63.0	74.6	75.2	2.26	0.25	16.1	37.0
Myoma	80.0	92.4	43.2	98.0	10.5	0.21	20.0	7.6
SIS								
Pathology	Sensitivity	Specificity	PPD	NPD	LR+	LR-	>False (+)	False (−)
	%	%	%	%	%	%	%	%
Polyp	87.2	33.3	71.4	57.6	1.30	0.38	12.6	66.7
Myoma	71.4	92.3	52.6	75.2	9.27	0.30	28.2	7.7

According to the data presented, the sensitivity and the specificity of hysteroscopy to reveal endometrial polyps were calculated as 83.9 and 63.0%, respectively. The positive predictive value (PPV) was 74.6% and negative predictive value (NPV) 75.2%. The sensitivity and the specificity of SIS to detect endometrial polyps were calculated as 87.2 and 33.3%, respectively. PPV was 71.4%, and NPV was 57.6% for SIS (Table 5).

When the same calculations were performed for submucosal leiomyoma, the sensitivity and specificity of hysteroscopy to reveal submucosal leiomyoma were calculated as 80.0 and 92.4%, respectively. PPV was 43.2%, and NPV was 98.0%. The sensitivity and the specificity of SIS to detect submucosal leiomyoma were calculated as 71.4 and 92.3%, respectively. PPV was 52.6%, and NPV was 75.2% (Table 5).

Discussion

Transvaginal ultrasound, saline infusion sonography and hysteroscopy are the commonly utilized diagnostic procedures for the evaluation of the uterine cavity. Transvaginal ultrasound is usually the first diagnostic modality in the case of a suspected endometrial pathology, but it was reported to be insufficient to determine lesions smaller than 2 cm [1]. Some retrospective studies suggest that 22% of leiomyoma cannot be detected by ultrasound, and the uterus is reported as normal [1]. Intracavitary lesions are particularly difficult to diagnose by ultrasound, and its diagnostic accuracy is reported between 88–96% [2]. The sensitivity of transvaginal ultrasound in detecting endometrial pathologies ranges between 46–100% in different studies [3, 4, 5, 6, 7]. The positive likelihood ratio (LR) is between 10.5–51.56, and the negative LR is between 0.07–0.79 [6]. Compared to other radiological modalities, the accuracy of the ultrasound is highly dependent on the observer's experience and skills. Despite these limitations, transvaginal ultrasound is accepted to be more sensitive than blind endometrial biopsy.

The diagnostic accuracy of saline infusion sonography is reported to be higher than transvaginal ultrasound, especially for intracavitary lesions. De Vries suggested equivalent diagnostic efficiency with SIS compared to

hysteroscopy in 72% of the patients [1]. In our series, we determined 87.2% sensitivity to detect endometrial polyps and 71.4% sensitivity for documenting submucosal leiomyoma in SIS procedures, while the respective values were 83.9 and 80.0% for the hysteroscopy procedures. These data are consistent with the literature [8, 9, 10]. Soares et al. proposed 100% diagnostic accuracy for SIS to determine endometrial polyps and hyperplasia [11]. There are reports suggesting higher false positive rates for SIS in the case of small endometrial polyps of isthmic localization [12, 13]. In general, the sensitivity of SIS to detect intrauterine pathologies was reported between 85–100%, while its specificity was between 81–100% [7]. Positive LR is accepted as 1.96–80.0, and negative LR is approximately 0.12 [7].

Hysteroscopy is presented as a highly sensitive diagnostic tool to detect endometrial pathologies in the postmenopausal period. Garutti reported the sensitivity of hysteroscopy to reveal any endometrial pathology in the postmenopausal period as 96.5% with a specificity of 93.6% [14]. Hysteroscopy had excellent results to reveal endometrial atrophy, but the sensitivity to diagnose endometrial hyperplasia and cancer was somewhat lower, 67.6 and 78.9%, respectively [14].

The sensitivity of hysteroscopy for any endometrial pathology was reported between 90–97% and specificity between 62–93% [7]. Positive LR is 2.55–14.56, and negative LR is 0.07 [7]. The sensitivity for submucosal leiomyoma is 53–100% and the specificity 97–100%. The sensitivity and specificity for endometrial hyperplasia are 90–100% and 97–100%, respectively [7]. We calculated the sensitivity of hysteroscopy to determine endometrial polyps as 83.9% and its specificity as 63.0%. The sensitivity for diagnosing submucous leiomyoma was 80.0% with a specificity of 92.4%. The lower value of the sensitivity compared to SIS procedures in our series and the lower value of specificity to detect endometrial polyps compared to the literature can be attributed to the heterogeneity of the operators who were mainly senior residents, and the effect of the learning curve could have prevented the sensitivity and specificity from being higher.

Among these diagnostic modalities, transvaginal ultrasound is the best tolerated. The rate of being 'unpleasant' due to the procedure was reported as 2% and pelvic pain as 40%. The same parameters were 13 and 53%, respectively, for the SIS procedure [7]. Operative hysteroscopy is mainly performed under general anesthesia so cannot be compared to ultrasound and SIS in these terms.

The reported average time to complete transvaginal ultrasound is 8±1.7 min. SIS requires a longer time (15±2.7 min), while 11±1.7 min are enough for a diagnostic hysteroscopy [7]. We observed an average time of 34±24 min (5–210) for hysteroscopy procedures. This time is much longer than reported in the literature. The longer operation time seems the most important difference of the hysteroscopy procedures in the educational setting.

The complication rate for hysteroscopy was reported as approximately 3%. The most frequent complication is uterine perforation (14/1,000) followed by postoperative bleeding (2.5/1,000) and water intoxication (2/1,000) [7]. In our series, the uterine perforation rate is 5/385 (approximately 12/1,000), and the water intoxication rate is 1/385 (approximately 2.5/1,000). These are equivalent to the numbers in the literature and can be accepted for a group of operators in their learning curve.

Even though comparable diagnostic accuracy can be achieved with SIS, hysteroscopy is a rather easy procedure to learn and to perform, which consolidates its place as the 'gold standard' for the diagnosis of endometrial pathologies as it enables the immediate treatment of any intracavitary lesion detected.

References

1. De Vries L, Paul F, Dijkkhuizen HLJ (2000) Comparison of transvaginal sonography, saline infusion sonography and hysteroscopy in premenopausal women with abnormal uterine bleeding. J Clin Ultrasound 28:217–223
2. Shalev J, Meizner I, Bar-Hava I (2000) Predictive value of transvaginal ultrrasonography performed before routine diagnostic hysteroscopy for evaluation of infertility. Fertil Steril 73:412–417
3. Karlsson B, Granberg S, Wikland M (1995) Transvaginal sonography of the endometrium in postmenopausal women to identify endometrial abnormality: A Nordic multi-center study. Am J Obstet Gynecol 172:1488–1494
4. Abu-Hmeidan F, Bilek K, Baier D (1992) Das sonographische Bild des Endometriumkarzinoms. Ultraschall Med 13:178–182
5. Dorum A, Kristensen B, Langebrekke A (1993) Evaluation of endometrial thickness measured by endovaginal ultrasound in women with postmenopausal bleeding. Acta Obstet Gynecol Scand 72:116–119
6. Williams CD, Mashburn PB (1998) A prospective study of transvaginal hydrosonography in the evaluation of abnormal uterine bleeding. Am J Obstet Gynecol 179:292–298
7. Farquhar C, Ekeroma A, Furness S, Arrol B (2003) A systematic review of transvaginal ultrasonography, sonohysterography and hysteroscopy for the investigation of abnormal uterine bleeding in premnopausal women. Acta Obstet Gynecol Scand 82:493–504
8. Widrich T, Bradley LD, Allison R, Mitchinson MPH, Collins RL (1996) Comparison of saline infusion sonography with office hysteroscopy for the evaluation of the endometrium. Am J Obstet Gynecol 174:1327–1334
9. Goldstein SR (1994) Use of ultrasonohysterography for triage of perimenopausal patients with unexplained uterine bleeding. Am J Obstet Gynecol 170:565–570
10. Fukuda M, Shimizu T, Fukuda K (1993) Transvaginal hysterosonography for differential diagnosis between submucous and intramural myoma. Gynecol Obstet Invest 35:236–239
11. Soares SR, Reai MMBB, Camargos AF (2000) Diagnostic accuracy of sonohysterography, transvaginal sonography and hysterosalpingography in patients with uterine cavity diseases. Fertil Steril 73:406–411
12. Van Roessel J, Wamsteker K, Exalto N (1987) Sonographic investigation of the uterus during artificial uterine cavity distension. J Clin Ultrasound 15:439–450
13. Cohen JR, Luxman D, Sagi J (1994) Sonohysterography for distinguishing endometrial thickening from endometrial polyps in postmenopausal bleeding. Ultrasound Obstet Gynecol 4:227–230
14. Garutti G, Sambruni I, Cellani F (1999) Hysteroscopy and transvaginal ultrasonography in postmenopausal women with uterine bleeding. Int J Gynecol Obstet 65:25–33