ULTRASOUND

Saline infusion sonohysterogram as initial investigation of the endometrium and uterine cavity

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SUMMARY

The results of 54 consecutive saline infusion sonohysterograms (SIS) are presented. Sonohysterogram, in conjunction with Pipelle endometrial sampling, was found to be a reliable and accurate method of initial investigation of the endometrium and uterine cavity with good correlation with other methods of investigation. It was well tolerated in an outpatient setting, saved two out of three of the women from needing a hysteroscopy and curettage, and yielded information beyond that available from hysteroscopy and curettage.

INTRODUCTION

Saline infusion sonohysterogram (SIS) is a new modality to evaluate the endometrium and endometrial cavity. Several authors also use SIS to evaluate tubal patency.^{1,2,3} and even to search for retained products of conception.⁴ It has been shown to be more useful than transvaginal ultrasound scanning (TVS) of the pelvic organs.^{5,6,7,8,9,10,11,12,13,14,15} especially for evaluation of endometrial thickness, and the detection of polyps when the double layer endometrium was thin at TVS.

We reviewed the records of the first 54 patients to undergo SIS at the Kirwan Hospital for Women, Townsville, to evaluate its effectiveness, reliability, and correlation with established methods, as the initial investigation where endometrial assessment is indicated.

MATERIALS AND METHODS

SIS was carried out in the ultrasound department of the Kirwan Hospital for Women. After an initial standard TVS was performed by the sonographer, an 8FG infant feeding tube, pre-filled with saline, was inserted through the cervix via a bivalve vaginal speculum using a sponge holding forceps. After removal of the speculum a 50 mL syringe filled with saline was

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PA Kraus RFD MB BS FRCOG FRANZCOG Consultant, RJ Boston MB BS MRANZCOG Registrar attached to the tube. The transvaginal probe was then re-inserted and as much saline as necessary to obtain a good view of the cavity injected. In one case a small Foley's catheter was needed to overcome leaking of saline through the cervix.

All patients in this series whose endometrium needed evaluation were subjected to SIS as it has been found that small endometrial polyps can still be present even with a thin double thickness endometrium on ordinary TVS. Initially, patients whose single layer endometrial thickness was $\leq 3 \,$ mm and who had a clear endometrial/myometrial interface were not subject to endometrial biopsy with the Pipelle device. Patients with focal endometrial thickness, endometrial polyps, or in whom SIS was unsuccessful, were booked for hysteroscopy and curettage. Pipelle endometrial sampling was carried out on the rest. Table 1 shows the age distribution of the 54 cases. As is to be expected this was concentrated on the peri- and postmenopausal years.

Table 1 Age distribution of the 54 cases

Age	< 30	31-39	40-49	50-59	60+
n	2	8	21	17	6

Table 2 shows the indication for the procedure, as determined retrospectively from the patient records. In six cases this information was not apparent.

 Table 2 Indication for the procedure, determined retrospectively from patient records

Indication	n	
Post menopausal bleeding	14	
Irregular menses	9	
Menorrhagia	18	
Tamoxifen therapy	2	
Cervical polyp	5	

Table 3 Findings at SIS

Findings		n	
Endometr	ial polyp	9	
Focal endometrial thickening		3	
Suspected carcinoma		0	
Fibroids:	Intra-mural	6	
	Distorting cavity	3	

Table 4 Endometrial thickness where recorded

	To 3 mm	To 5 mm	Thickness To 10 mm	Over 10 mm	'Normal'
n	15	17	6	4	3

Histology of Pipelle specimen was reported as 'normal' in 15 cases and showed benign hyperplasia in one case. There was no atypia, malignancy or other abnormality. SIS was unsuccessful in six cases, all of which proceeded to hysteroscopy and curettage. In total, 18 of the 54 cases proceeded to hysteroscopy and curettage, ie in addition to the six technical failures there were 12 in whom SIS findings indicated the need for further such evaluation.

Two or three patients complained of menstrual type cramping during the procedure. None were sufficiently severe to cause discontinuation. No other complications were encountered.

DISCUSSION

Hysteroscopy and curettage is currently the gold standard where endometrial evaluation is indicated. In our institution, in common with many others, this is performed as inpatient day surgery under general anaesthesia.

Reliable methods of evaluating the endometrium which avoid both admission to hospital and general anaesthesia are of obvious value in reducing cost and avoiding the risks and inconvenience of general anaesthesia.

Outpatient hysteroscopy is useful in this regard, but requires significant capital investment, which can be prohibitive both for a hospital department with a limited budget and for private practice rooms. TVS is widely available to obstetrician/gynaecologists in the Australian setting. Equipment needed to proceed to SIS is very simple, cheap and already available in the hospital or rooms.

The preliminary series reported here demonstrates a high reliability for this procedure, consistent with other reported series, 10.14.15.16.17.18.19.20.21 and resulted in a two-thirds reduction in hysteroscopy/curettage.

Hysteroscopy and curettage must not be considered absolute. In the time we have been practising SIS the authors have seen a fleshy, apparently endometrial, polyp almost the size of a little finger nail, on a hysterectomy specimen. This polyp was missed at previous hysteroscopy and turned out to be a sarcoma. Another case had a submucous fibroid polyp noted at hysteroscopy but not seen on the hysterectomy specimen.

Saline infusion sonohysterogram has better patient tolerance and causes less discomfort with more rapid recovery than outpatient hysteroscopy.

The technique used is simple. Our failure rate was comparable with other series,^{13,22,23} but could be reduced by greater use of currently existing equipment, for example steadying the cervix with a single tooth vulsellum and using a uterine sound. It was necessary to use a small Foley's catheter to prevent leakage in only one case in the present series, and this has not been required in the cases done since.

We have yet to trial other refinements of technique, eg use of a bivalve speculum hinged on one side only, and using an intrauterine insemination catheter instead of an infant feeding tube, etc. Use of these devices may expedite the procedure and reduce the failure rate.

Pipelle endometrial sampling in conjunction with a uniformly thick endometrium at SIS gives a diagnostic accuracy comparable to hysteroscopy/ curettage. Where the endometrium is shown to be uniform at ultrasound the Pipelle sample can be considered representative of the entire cavity.

Hysteroscopy done immediately after curettage often shows large areas of endometrium untouched by the curette whereas SIS demonstrates the entire endometrium. It also shows focal thickening of the endometrium, which is not evident on hysteroscopy, and demonstrates the extent and disposition of intramural fibroids which is especially valuable where the fibroids distort the cavity and endoscopic resection is considered.

A SIS is also able to demonstrate invasion of the myometrium by an endometrial malignancy, although MRI is the best modality for this.¹² Furthermore, SIS is better tolerated than outpatient hysteroscopy.²⁴

A number of our cases were followed by hysterectomy. Comparison of the endometrial thickness as reported by the pathologist with endometrial thickness as judged at SIS gave excellent correlation. This contrasts with TVS alone, where sub-endometrial echoes can give a false impression of a thick endometrium when it is in fact quite thin.¹²

Some authors,¹¹ do not proceed to SIS if a thin endometrium is demonstrated at TVS, but we have found several instances of endometrial polyps, sometimes of reasonable size, despite a thin double thickness endometrium at TVS. These may not be malignant, but are the cause of recurrent postmenopausal bleeding and should not be missed.

We have had several cases of single small endometrial polyps at SIS which were not shown at hysteroscopy, but in each of these cases it was noted that the endometrium was thick and polypoid.

Two of the cases in this series were aged under 30.

In retrospect, where assessment of the endometrium is indicated in this age group it may be better to proceed directly to hysteroscopy and curettage as menstrual problems in this age group often have an inflammatory component which would not be picked up by SIS but would be visible at hysteroscopy.

In common with other authors^{23,25,26} we found that SIS avoids the expense, inconvenience and risks of an operative procedure and can be done in the outpatient department of a hospital or in private rooms where TVS is available, at minimal cost and with minimal risk and with a high degree of reliability.

REFERENCES

- Cullinan JA, Fleischer AC, Kepple DM, Arnold AL, Sonohysterography: a technique for endometrial evaluation. Radiographics 1995; 15: 501-516.
- 2 Tufekci EC, Girit S, Bayirli E, Durmursoglu F, Yalti S. Evaluation of tubal patency by transvaginal sonosalpingography. Fertil Steril 1992; 57: 336-340.
- 3 Fleischer AC, Vasquez JM, Cullinan JA, Eisenberg E. Sonohysterography combined with sonosalpingography: correlation with endoscopic findings in infertility patients. J Ultrasound Med 1997; 16: 381–384.
- 4 Wolman I, Gordon D, Yaron Y, Kupferminc M, Lessing JB, Jaffa AJ. Transvaginal sonohysterography for the evaluation and treatment of retained products of conception. Gynecol Obstet Invest 2000; 50: 73-76.
- 5 Bradley LD, Falcone T, Magen AB. Radiographic imaging techniques for the diagnosis of abnormal uterine bleeding. Obstet Gynecol Clin North Am. 2000; 27: 245-276.
- 6 Balen FG, Allen CM, Siddle NC, Lees WR. Ultrasound contrast hysterosalpingography - evaluation as an outpatient procedure. Br J Radiol 1993; 66: 592-599.
- 7 Bronz L. 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 1997; 9: 53–58.
- 8 Schwarzler P, Concin H, Bosch 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; 11: 337–342.
- 9 Ballard P. Tetlow R. Richmond I. Killick S. Purdie DW. Errors in the measurement of endometrial depth using transvaginal sonography in postmenopausal women on tamoxifen: random error is reduced using saline instillation sonography. Ultrasound Obstet Gynecol 2000; 15: 321-326.
- 10 Williams CD, Marshburn PB. A prospective study of transvaginal hydrosonography in the evaluation of abnormal uterine bleeding. Am J Obstet Gynecol 1998; 179: 292–298.
- 11 Dijkhuizen FP, De Vries LD, Mol BW, Brolmann HA, Moret E,

Heintz AP. Comparison of transvaginal ultrasonography and saline infusion sonography for the detection of intracavitary abnormalities in premenopausal women. Ultrasound Obstet Gynecol 2000; 15: 372–376.

- 12 Lerner JP, Timor-Tritsch IE, Monteagudo A. Use of transvaginal sonography in the evaluation of endometrial hyperplasia and carcinoma. Obstet Gynecol Surv 1996; 51: 718-725.
- 13 Elhelw B, Ghorab MN, Farrag SH. Saline sonohysterography for monitoring asymptomatic postmenopausal breast cancer patients taking tamoxifen. Int J Gynaecol Obstet 1999; 67: 81–86.
- 14 Jorizzo JR, Riccio GJ, Chen MY, Carr JJ. Sonohysterography: the next step in the evaluation of the abnormal endometrium. Radiographics 1999; 10: 117-130.
- 15 Pasqualotto EB, Margossian H, Price LL, Bradley LD. Accuracy of preoperative diagnostic tools and outcome of hysteroscopic management of menstrual dysfunction. J Am Assoc Gynecol Laparosc 2000; 7: 201–209.
- 16 Bernard JP, Lecuru F, Darles C, Robin F, de Bievre P, Taurelle R. Saline contrast sonohysterography as first-line investigation for women with uterine bleeding. Ultrasound Obstet Gynecol 1997; 10: 121-125.
- 17 Laughead MK, Stones LM. Clinical utility of saline solution infusion sonohysterography in a primary care obstetric-gynecologic practice. Am J Obstet Gynecol 1997; 176: 1313–1318.
- 18 Gronlund L, Hertz J, Helm P, Colov NP. Transvaginal sonohysterography and hysteroscopy in the evaluation of female infertility, habitual abortion or metrorrhagia. A comparative study. Acta Obstet Gynecol Scand 1999; 78: 415–418.
- 19 Laifer-Narin SL, Ragavendra N, Lu DS, Sayre J, Perrella RR, Grant EG. Transvaginal saline hysterosonography: characteristics distinguishing malignant and various benign conditions. Am J Roentgenol 1999; 172: 1513–1520.
- 20 Sohaey R; Woodward P. Sonohysterography: technique, endometrial findings, and clinical applications. Semin Ultrasound CT MR 1999; 20: 250–258.
- 21 Chittacharoen A, Theppisai U, Linasmita V, Manonai J. Sonohysterography in the diagnosis of abnormal uterine bleeding. J Obstet Gynecol Res 2000; 26: 277-281.
- 22 de Crespigny L, Kuhn R, McGinnes D. Saline infusion sonohysterosalpingography, an under utilised technique. Aust N Z J Obstet Gynaecol 1997; 37: 206-209.
- 23 Turner RT, Berman AM, Topel HC. Improved demonstration of endometrial polyps and submucous myomas using salineenhanced vaginal sonohysterography. J Am Assoc Gynecol Laparosc 1995; 2: 421-425.
- 24 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; 174: 1327-1334.
- 25 Goldstein SR, Schwartz LB. Evaluation of abnormal vaginal bleeding in perimenopausal women with endovaginal ultrasound and saline infusion sonohysterography. Ann NY Acad Sci 1997; 828: 208-212.
- 26 Goldstein SR. Use of ultrasonohysterography for triage of perimenopausal patients with unexplained uterine bleeding. Am J Obstet Gynecol 1994; 170: 565–570.