

## Original Article

# Transvaginal Sonography (TVS) and Saline Infusion Sonohysterography (SIS) in the Evaluation of Abnormal Uterine Bleeding (AUB)

Reddi Rani P<sup>1</sup>, Lakshmikantha G<sup>2</sup>.

<sup>1</sup>Professor, <sup>2</sup>Junior Resident

Department of Obstetrics and Gynaecology,

Jawaharlal Institute of Postgraduate Medical Education & Research (JIPMER), Pondicherry 605006, India

---

### Abstract

**Objective:** To determine the accuracy of transvaginal sonography (TVS) and saline infusion sonohysterography (SIS) in the evaluation of abnormal uterine bleeding (AUB) and to compare the diagnostic accuracy after hysterectomy. **Methods :** Prospective comparative study of TVS and SIS in the evaluation of AUB who are being subjected to hysterectomy with uterus less than 12 weeks size. **Result :** Fifty two patients were included in the study. 92% were premenopausal and 8% were post menopausal. Menorrhagia was the commonest symptom (73%) and most common finding was myoma. The overall sensitivity and specificity when correlated with intra-operative hysterectomy findings and HPE were 66% and 88% respectively for TVS and 82% and 95% for SIS respectively. The false positive and false negative rates were more in TVS compared to SIS. Commonest histopathology was intramural fibroid in 42% followed by sub mucous myoma in 21%.. **Conclusion :** SIS is a simple highly sensitive and specific technique to detect intrauterine pathology in the evaluation of AUB when TVS findings are inconclusive.

---

### Introduction

AUB is a common but complicated clinical presentation, diagnosis of which is often difficult as the cause may be variable from simple DUB to endometrial carcinoma. It accounts for 15% of office visits and almost 25% of gynecological surgeries<sup>1</sup>. Endometrial abnormalities are significant cause of AUB. Polyps and sub mucous myomas are responsible for more than 40%

of the cases of AUB in premenopausal women<sup>2</sup>. Though hysteroscopy has been considered as gold standard for evaluating the uterine cavity abnormalities, it is invasive, expensive, associated with complications like perforation, embolism and cannot assess the myometrial and adnexal pathology. TVS though it overcomes the above problems, its use is limited in distinguishing between polyp and diffuse lesions and may miss small intracavitary lesions. SIS is a simple, cost effective method with high sensitivity to overcome the problem of TVS. The present study is undertaken to determine the accuracy of TVS and SIS in the evaluation of AUB.

### Methods

The study was a comparative prospective study of TVS and SIS in the evaluation of AUB done in JIPMER, Pondicherry over two years from 2003 to 2005. Fifty two patients were included in the study that were having

---

*Paper received on : 13/03/2008 accepted on : 10/6/2009*

P Reddi Rani,  
Professor of Obs. & Gynaecology,  
JIPMER, Pondicherry 605006, India  
Email: atsahara11@yahoo.com  
Phone: 91 413 2272381-89 Ext. 4081 & 4083  
Fax: 91 413 2272066

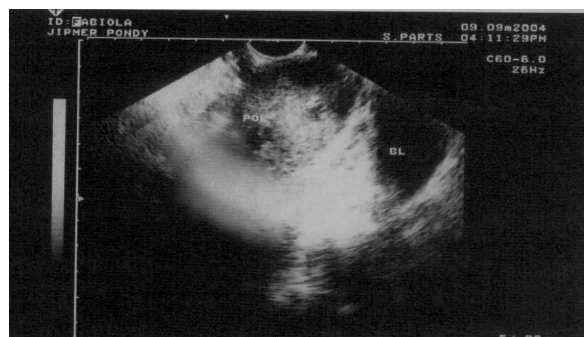


Fig1-A: Polyp suspected by TVS

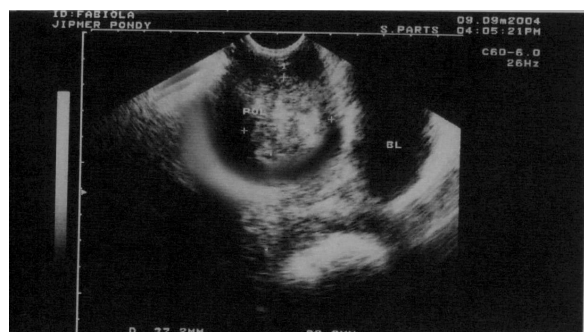


Fig1-B: Polyp seen clearly by SIS in the same patient

uterus less than 12 weeks being subjected to hysterectomy for AUB of various etiology. Cases of acute pelvic infection, uterus more than 12 weeks size, acute uterine hemorrhage, suspected or diagnosed cases of endometrial cancer and pregnancy are excluded from the study. All the patients were subjected to a detailed history and examination and relevant investigations. All

**Table 1.**  
**Clinical presentation**

| Symptoms               | Frequency | %    |
|------------------------|-----------|------|
| Menorrhagia            | 38        | 73.0 |
| Continuous bleeding PV | 08        | 15.3 |
| Polymenorrhoea         | 04        | 7.9  |
| Metrorrhagia           | 02        | 3.8  |
| Total                  | 52        | 100  |

the patients were subjected to TVS initially with empty bladder and in the post menstrual phase after obtaining the written consent. TVS was done using 5 MHz transvaginal probe, endometrial thickness (ET), uterine pathology, adnexal and any other pelvic pathology was noted. Vaginal probe was removed. No.10 F Foley's catheter was introduced into the uterine cavity, bulb inflated to 3ml of normal saline and mild traction given so as to place the bulb at the internal os. Vaginal probe was reintroduced and sterile saline was infused until the distension of uterine cavity was adequate to see any lesion or till pain appears and the findings were noted. Amount of normal saline infused, appearance of pain, procedure abandoned due to pain and any other complications were noted. The hysterectomy specimen was examined both grossly and histopathologically. Findings were compared with the findings at TVS and SIS. Findings were analyzed by Chi-square test, sensitivity, specificity; positive predictive value and negative predictive value were calculated.

**Table 2.**  
**TVS and SIS findings**

| Lesion                          | TVS       |            | SIS       |            |
|---------------------------------|-----------|------------|-----------|------------|
|                                 | Frequency | Percentage | Frequency | Percentage |
| 1. Intramural myoma             | 24        | 46.2       | 21        | 40.4       |
| 2. Submucous myoma              | 9         | 17.3       | 10        | 19.2       |
| 3. Polyp                        |           | 6          | 11.5      | 8          |
| 4. Thickened endometrium        | 8         | 15.4       | 10        | 19.2       |
| 5. Myohyperplasia               | 5         | 9.6        | 4         | 7.7        |
| 6. Could not distend the cavity | -         | -          | 3         | 5.8        |
| Total                           | 52        | 100        | 52        | 100        |

**Table 3.**  
**Comparison of TVS and SIS findings with intra-operative hysterectomy and HPE**

| Intraop and HPE          | TVS           |              |      |      | SIS           |              |      |      |
|--------------------------|---------------|--------------|------|------|---------------|--------------|------|------|
|                          | Sensitivity % | Specificity% | PPV% | NPV% | Sensitivity % | Specificity% | PPV% | NPV% |
| 1. Intramural myoma      | 77.3          | 76           | 70   | 82   | 86.4          | 93           | 90   | 90   |
| 2. Submucous myoma       | 27.3          | 85           | 33   | 86   | 81.8          | 97           | 90   | 95   |
| 3. Polyp                 | 71.4          | 97           | 83   | 95   | 74            | 97           | 75   | 91   |
| 4. Thickened endometrium | 87.5          | 97           | 87   | 97   | 87.5          | 93           | 70   | 97   |
| P value                  | <0.001        |              |      |      | <0.001        |              |      |      |

**Table 4.**  
**False findings of TVS & SIS**

| Intra-op and HPE findings | Imaging Study | False +ve% | False -ve% |
|---------------------------|---------------|------------|------------|
| Intramural myoma          | TVS           | 13.4       | 9.6        |
|                           | SIS           | 3.8        | 5.7        |
| Sub mucous myoma          | TVS           | 11.5       | 15.3       |
|                           | SIS           | 1.9        | 3.8        |
| Polyp                     | TVS           | 1.9        | 3.8        |
|                           | SIS           | 1.9        | 1.9        |
| P Value < 0.001           |               |            |            |

**Table 5.**  
**Overall efficiency of SIS compared with TVS**

| Study         | Procedure | Sensitivity % | Specificity % | Predictive values |      |
|---------------|-----------|---------------|---------------|-------------------|------|
|               |           |               |               | PPV%              | MPV% |
| Ryu JA et al7 | SIS       | 95            | 83            | 95                | 83   |
|               | TVS       | 79            | 46            | 83                | 39   |
| Saidi et al8  | SIS       | 90.9          | 83.3          | 90.9              | 16.7 |
|               | TVS       | 95.7          | 63.6          | 84.6              | 12.5 |
| Present study | SIS       | 82            | 95            | 81                | 93   |
|               | TVS       | 65.5          | 88            | 68                | 90   |



Fig2: Diagnosed as sub mucous myoma by TVS, was found to be intramural myoma by SIS

## Results

In this study 52 patients of AUB who were being subjected to hysterectomy and who were fulfilling the inclusion and exclusion criteria were analyzed. Mean age of the patients were 45.56 years, 92% were premenopausal and 8% post menopausal. The most common presenting complaint was menorrhagia in 38 patients (73%) (Table 1). Table 2 shows TVS and SIS findings. Intramural fibroid was the commonest finding in both TVS (46%) and SIS (40%). In three cases SIS was abandoned due to severe pain and all were post menopausal. Table 3 shows comparison of TVS and SIS findings with intra-operative hysterectomy findings and HPE. TVS findings were not correlated well with sub mucous myoma whereas SIS findings correlated well with intra operative findings and HPE. Table 4 shows false positive and false negative findings with TVS and SIS. These are less with SIS. The commonest HPE finding in our study was intramural leiomyoma in 42.3% of the cases, followed by sub mucous leiomyoma in 21.1%, simple cystic hyperplasia in 15.38%, adenomatous polyp (Fig. 1) in 9.62%, adenomyomatous polyp in 5.7% and myohyperplasia in 5.7% of the cases.

## Discussion

AUB is an important and common problem encountered in gynecology practice. Endometrial and uterine abnormalities such as leiomyoma, polyps and hyperplasia are more common than was previously thought. Though TVS is the first imaging modality of choice for the evaluation of endometrial cavity in AUB of less than 12 weeks size uterus, it has limitations in detecting small lesions, location of myoma and in differentiating diffuse and focal lesion. Hysteroscopy has been considered as the gold standard but it is

expensive, invasive and does not contribute in the evaluation of myometrial or ovarian pathology. SIS is found to be more accurate than TVS to visualize the endometrial cavity and it is a better alternative to hysteroscopy. Menorrhagia was the commonest symptom in 73% of the cases and the most common lesion was intramural myoma in 42%. TVS failed to locate the exact site of myoma in 12% of the cases in our study. Hill<sup>3</sup> in his study found that TVS was not able to determine the location of myoma in 10% the cases, whereas SIS helped to take exact measurement of myoma and also in determining the depth of penetration into the myometrium. de Kroon et al<sup>4</sup> in a meta analysis reviewed 16 studies comprising 877 procedures to determine the diagnostic accuracy of SIS in peri menopausal women with AUB and comparing it to hysteroscopy with or without HPE or hysterectomy, found sensitivity of SIS for evaluating the uterine cavity was 0.95 and pooled specificity was 0.88 and the sonographic procedure was successful in 86.5% of the postmenopausal women and 95% of the premenopausal women. This meta analysis suggested that SIS is an accurate means of evaluating uterine cavity in peri menopausal women with substantial cost savings as it can replace diagnostic hysteroscopy. Our study showed overall sensitivity of SIS to be 82% and specificity to be 95% which were comparable with the studies done by Schwarzler et al<sup>5</sup> and Rogerson et al<sup>6</sup>.

Our study showed that SIS has higher sensitivity and specificity when compared with TVS. Similar findings were seen in the studies by Ryu et al<sup>7</sup> and Saidi et al<sup>8</sup> (Table 5). TVS cannot distinguish endometrial hyperplasia from polyps as both can cause thickening of the endometrium, are hyper echoic and can contain cystic spaces whereas SIS can detect focal lesions from diffuse thickening. SIS correlation with intra operative hysterectomy findings and HPE for sub mucous myoma showed sensitivity of 82% and specificity of 97% with false positive rate of 1.9% and false negative rate of 3.8% whereas with TVS there was good correlation for intramural myoma but with sub mucous myoma sensitivity was 27.3% and specificity was 85% with a false positive rate of 11.5% and false negative rate of 15.3%.

All imaging techniques have a number of false results even in experienced hands. In our study false positive and negative were higher in TVS than SIS which was due to large intramural myoma compressing the cavity (Fig. 2), hemorrhagic debris, sessile polyps, and polyps arising from endocervix or when the inflated Foley's

bulb compresses these lesions. Ryu et al<sup>7</sup> found 12% false negative and false positive cases in TVS which were due to small polyps of less than 5mm, synechia and chronic endometritis. Three of the post menopausal women (6%) experienced severe pain in our study whereas in the study by Cicinelli et al<sup>9</sup> 11% of the patients experienced severe pain. The pain due to distension of uterine cavity can be minimized if saline instillation is controlled and stopped as soon as the lesion is detected. There was no evidence of infection in our study. Chung et al<sup>10</sup> in their review of 900 procedures of SIS observed infection rate of 0.6%. Bonnamy et al<sup>11</sup> found 1% infection rate and 1% pelvic pain.

## Conclusion

TVS is a simple, minimally invasive low cost technique and it should be the first diagnostic method of choice in evaluating AUB. The appropriate clinical place for SIS is a second line diagnostic procedure in the evaluation of AUB if TVS findings are inconclusive. It is highly sensitive and specific especially for diagnosing, sub mucous myoma, endometrial polyps and thickened endometrium. It is an alternative to hysteroscopy with the additional advantage of evaluating myometrial and adnexal pathology besides being less invasive and cost effective.

## References

1. Laughead MK, Stones LM. Clinical utility of saline solution infusion sonohysterography in a primary care obstetric-gynecologic practice. *Am J Obstet Gynecol* 1997;176:1313-6.
2. Albers JR, Hull SK, Wesley RM. Abnormal uterine bleeding. *Am Fam Physician* 2004;69:1915-26.
3. Hill DA. Sonohysterography in the office: Instruments and technique. *Contemp Obstet Gynecol* 1997;42:95-110.
4. de Kroon CD, de Bock GH, Dieben SW et al. Saline contrast hysterosonography in abnormal uterine bleeding: a systematic review and meta-analysis. *BJOG* 2003;110:938-47.
5. Schwarzler P, Concin H, Bosch H et al. An evaluation of sonohysterography and diagnostic hysteroscopy for the assessment of intrauterine pathology. *Ultrasound Obstet Gynecol* 1998;11:337-42.
6. Rogerson L, Bates J, Weston M et al. A comparison of outpatient hysteroscopy with saline infusion hysterosonography. *BJOG* 2002;109:800-4.
7. Ryu JA, Kim B, Lee J et al. Comparison of transvaginal ultrasonography with hysterosonography as a screening method in patients with abnormal uterine bleeding. *Korean J Radiol* 2004;5:39-46.
8. Saidi MH, Sadler RK, Theis VD et al. Comparison of sonography, sonohysterography and hysteroscopy for evaluation of abnormal uterine bleeding. *J Ultrasound Med* 1997;16:587-91.
9. Cicinelli E, Romano F, Anastasio PS, et al. Transabdominal sonohysterography, transvaginal sonography and hysteroscopy in the evaluation of submucous myomas. *Obstet Gynecol* 1995;85:42-7.
10. Chung PH, Parsons AK. A practical guide to the using saline infusion sonohysterography. *Contemp Obstet Gynecol* 1997;42:21-34.
11. Bonnamy L, Marret H, Perrotin F et al. Sonohysterography a prospective survey of results and complications in 81 patients. *Eur J Obstet Gynecol Reprod Biol* 2002;102:42-7.