



Comparative evaluation of sonosalpingography hysterosalpingography, and laparoscopy for determination of tubal patency

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OBJECTIVE(S) : To find out whether sonosalpingography, which is a less invasive method, can be used for assessment of tubal factor in cases of primary and secondary infertility initially instead of the invasive methods like hysterosalpingography and diagnostic laparoscopy with chromopertubation which are associated with significant morbidity and even some mortality.

METHOD(S): A total of 100 patients, 73 with primary infertility and 27 with secondary infertility, attending our infertility clinic were studied from January 2004 to December 2004. All underwent sonosalpingography, hysterosalpingography, and laparoscopic chromopertubation. Chi square charts were used for statistical analysis to find out the sensitivity and specificity of the tests.

RESULTS : Sonosalpingography has 97.3% sensitivity and 92% specificity in comparison to laparoscopic chromopertubation whereas hysterosalpingography has 94.6% sensitivity and 84% specificity.

CONCLUSION(S) : As sonosalpingography has high sensitivity and specificity and is less invasive. It should be used initially to assess tubal patency in cases of infertility.

Key words : sonosalpingography, tubal factor assessment, infertility

Introduction

Tuboperitoneal factors are responsible for about 30-40% of female infertility. The incidence of tubal disease in infertility varies from country to country. In India it has been estimated to be about 40%¹. The prevalence of pelvic inflammatory disease, genital tract tuberculosis, and chronic infection is quite common in our country and hence the incidence of tubal factor in infertile women is high. Ever since Rubin described the tubal insufflation test in 1920 by using CO₂

numerous methods have been developed for evaluation of tubal factors. Hysterosalpingography (HSG) and laparoscopic chromopertubation are widely employed. Recently the newer technique of sonohysterosalpingography popularly known as sonosalpingography (SSG) is evolved.

Every method has its own merits and demerits. Laparoscopy is an invasive procedure and carries some amount of risk, whereas HSG fails to detect extratubal and peritoneal factors.

We evaluated tubal factors by traditional techniques i.e. by HSG and laparoscopic chromopertubation along with the newer technique of sonosalpingography (SSG) and compared the results of these techniques.

Methods

The study involved a series of 100 patients of primary or

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secondary infertility attending our clinic, over a period of 1 year from January 2004 to December 2004. Patient's detailed history was taken, clinical examination was done and chest x-ray and ECG were carried out. For the evaluation of male partner semen analysis was done in all the cases.

SSG was done on 7th or 8th day of the menstrual cycle and HSG on 9th or 10th day. Diagnostic laparoscopy with chromopertubation was done on 21st or 22nd day of the cycle.

The data were subsequently analyzed to compare the results of the three procedures and to find out the accuracy of sonosalpingography in comparison with the other two methods.

Procedure for sonosalpingography

The procedure involved instillation of normal saline into the endometrial cavity during vaginal sonography and inspection of the tubes for spillage. The procedure was explained to the patients and informed consent obtained. The vulva and the vagina were cleaned with an antiseptic solution. A sterile speculum was introduced into the vagina and a special catheter of 5 F pediatric feeding tube was inserted into the uterus upto the level of the fundus. The catheter was prefilled with saline prior to insertion to minimize artifact. A Foley catheter of no. 10 size was introduced through the external os upto just beyond the internal os and the balloon was distended with 3mL of normal saline to prevent retrograde leakage of saline in the vagina.

The speculum was then removed and the transvaginal transducer inserted into the vagina. The catheter's position in the endometrial cavity was identified and it was repositioned if necessary. Sterile saline was then injected slowly through the catheter under continuous sonographic control. The uterus was scanned systematically in sagittal and coronal planes to delineate the entire endometrial cavity and appropriate images were recorded. A course of prophylactic antibiotic was given subsequently.

Hysterosalpingography (HSG) was done on day 9 or 10 of the cycle using conray 280.

Laparoscopic chromopertubation along with endometrial biopsy was done on day 21 or 22 of the cycle, preferably in the same cycle. During laparoscopy the whole of the pelvis was first inspected and then diluted methelene blue was injected and the passage of the dye through the fimbrial ends of the tubes was looked for.

Results

Table 1 shows that primary infertility was the main reason for assessing tubal function in our study and majority (64%) of the women with primary infertility belonged to the age group of 20-30 years.

Table 1. Profile of the patients (n=100).

| | Primary infertility n=73 | Secondary infertility n=27 |
|-----------------------------|-----------------------------|-------------------------------|
| Age (years) | | |
| 20-25 | 17 (23.3%) | 3 |
| 26-30 | 30 (41.1%) | 8 |
| 31-35 | 24 (32.8%) | 11 |
| > 35 | 3 | 5 |
| Socioeconomic status | | |
| Lower | 45 | 17 |
| Middle | 21 | 8 |
| High | 7 | 2 |
| Total | 73 | 27 |

Table 2 shows that SSG for diagnosis of patent tubes has 97.3% sensitivity and 92% specificity i.e., in this group of patients the diagnosis of tubal patency made by sonosalpingogrpahy was always confirmed by subsequent conventional HSG or laparoscopy. The sensitivity of HSG is slightly less (94.6%) and specificity 84%.

In two patients we got false positive results (in left tube) i.e., patent tubes on sonosalpingography but blockage on laparoscopy and/or HSG. In both the cases there was hydrosalpinx which may itself be the reason for the false positive result since the turbulence of flow of saline through the dilated tubes may simulate spillage on USG screen.

Table 2 : Assessment and correlation amongst the three tests for tubal patency (n=100).

| | Both tubes patent | Bilateral tubal blockage | Right tube patent | Left tube patent |
|---------------------------|-------------------|--------------------------|-------------------|------------------|
| Sonosalpingography | 73 (97.3%) | 7 | 11 | 9 |
| Hysterosalpingography | 71 (94.6%) | 9 | 13 | 7 |
| Laparoscopy with dye test | 75 | 6 | 12 | 7 |

In two patients false negative results were elicited i.e., tubes were blocked on SSG but patent on HSG and laparoscopy. This may be due to tubocornual spasm, mucous plugs blocking the tubes, and technical or human error.

Table 3 shows that pelvic pathologies were better detected by laparoscopy than by SSG and HSG and SSG detected more pelvic pathology than HSG.

Table 3. Associated pelvic pathology detected in the study.

| Pelvic pathology | Sonosalpin-gography | Hysterosal-pingography | Laparoscopy |
|------------------------------------|---------------------|------------------------|-------------|
| Hydrosalpinx | 6 | 5 | 8 |
| Tuboovarian mass | 4 | - | 2 |
| Endometriosis | 4 | - | 5 |
| Peritubal adhesions | - | - | 2 |
| Fibroid uterus | 2 | - | 4 |
| Ovarian cysts and polycystic ovary | 6 | 2 | 8 |
| Total | 22 | 7 | 29 |

Discussion

While comparing the results of SSG, HSG and diagnostic laparoscopy we found that the sensitivity of SSG is 97.3% and of laparoscopy 94.6%. Kore et al¹ also found that when results of SSG were compared with those of laparoscopy 97% correlation was noted whereas there was 93% correlation between the results of SSG and HSG.

HSG has certain disadvantages. It detects only the endotubal pathology. Sometimes it causes allergic manifestations and reactions to the drugs used. Known hydrosalpinx, acute PID or cervicitis, and adnexal mass palpable on bimanual examination all constitute contraindications to HSG. It also exposes women to radiation. However HSG has the advantage of detecting the site of blockage, isthmica nodosa, benign polyps, and tubal endometriosis.

Laparoscopy is the best technique for diagnosing tubal and peritoneal disease. It allows visualization of all the pelvic organs and permits detection of uterine fibroids, peritubal and periovarian adhesions, and pelvic endometriosis. Laparoscopy also allows careful assessment of the external architecture of the tubes and in particular the visualization of the fimbria. But it has the disadvantage of being an invasive procedure associated with morbidity and mortality. With the discovery of ultrasound, its use in the management of infertility was an expected development. Ultrasound visualization of the internal genital tract using exogenous contrast medium was first described by Nannini et al²,

Richman et al³ and Randolph et al⁴ who performed abdominal sonography after intracervical injection of fluid.

Sharma⁵ also did abdominal sonography for detection of tubal pathology with limited success. Abdominal sonography requires full bladder which is sometimes troublesome for the patients. With the invention of transvaginal transducer of high frequency the genital organs can be better visualized. It also allows evaluation of tubal patency.

The sonosalpingography has also certain other advantages.

1. It is an outpatient procedure, less time consuming and cost effective.
2. It is a noninvasive procedure.
3. No anesthesia is required.
4. It helps in the diagnosis of both uterine anomalies and pelvic pathologies.
5. It carries no radiation hazard.
6. It is reproducible and reliable for assessment of tubal patency.
7. It avoids allergic reactions seen in HSG.
8. Tubal patency can be shown to the patients in real time.

Its disadvantages and limitations are –

1. Tubal spasm may lead to the diagnosis of tubal occlusion.
2. In hydrosalpinx, tubal flow may give a false impression of tubal patency.
3. It requires a degree of technical competence
4. Site of the blockage cannot be detected precisely.
5. Intratubal pathology can't be detected.
6. Peritubal adhesions and motility of the tubes cannot be assessed properly.
7. The findings are subjective.

Thus SSG offers a much less invasive method of diagnosing tubal pathology while maintaining a high sensitivity and specificity similar to that of laparoscopic chromopertubation. Moreover SSG can be done for patients who have bronchial asthma or cardiac problems and are temporarily unfit for surgery.

SSG can be offered initially to infertile patients. HSG or chromolaparoscopy can be deferred for 6 months after the start of treatment for infertility during which time other endocrinological and immunological factors can be worked up⁵. If any discrepancy is found when assessing the tubal factors then other tests can be done subsequently. If any abnormality is detected on SSG, HSG or laparoscopy can be done for confirmation.

Conclusion

Sonosalpingography should be used as initial test to assess tubal patency.

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