Hysterosalpingo-Contrast-Sonography (HyCoSy) and Colour Doppler for the Evaluation of Tubal Patency as an Outpatient procedure in Infertility Clinic

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ABSTRACT

Objective: This study was aimed to analyze the applicability of Hysterosalpingo-contrast- sonography (HyCoSy) and colour Doppler in the evaluation of tubal patency in infertile women, as an outpatient procedure in an infertility clinic.

Method: 50 women suffering from primary and secondary infertility were evaluated for tubal patency within one year from January 2012, with HyCoSy and colour Doppler. A combination of 100ml (200mg) injection ciprofloxacin, 100mg hydrocortisone and 4cc of air is used as the contrast medium. Using a No. 8 pediatric Foleys catheter this contrast medium is injected into the uterine cavity. This test was done in early follicular phase, between 8th to 10th days of period. In HyCoSy tubal patency was confirmed by visualizing the spill of contrast media from the fimbrial end of fallopian tubes, known as water fall sign and mosaic pattern in colour Doppler, during the injection of contrast media in to the tube. Post procedure collection of fluid in cul- de- sac and free floating fimbria of the tube are other supportive signs.

Results: Out of 50 women studied bilateral tubal patency was confirmed in 42 giving an incidence of 84%. Bilateral tubal block was seen in 2 women (4%) and 6 had unilateral tubal block giving an incidence of 12%. There were no major side effects. 12 women (24%) complained of lower abdominalpain, 2 of them which lasted up to 12 hours and 2 (4%) had vaginal spotting lasting up to one day. Procedure was not completed in three women because two had syncope after inflating the Foleys bulb and in one it was not possible to introduce the catheter. The failure rate was 5.6% (3/53). Successful completion of HyCoSy was possible in 94.3% of subjects without any major complications.

Conclusion: HyCoSy offers certain advantages over hysterosalpingography (HSG), such as the elimination of iodinated contrast and exposure to ionizing radiations. TVS provides complete examination of the entire pelvis thus delineating uterine and ovarian pathology. HyCoSy is more convenient, less expensive and non invasive procedure to evaluate tubal function. In conclusion HyCoSy is the method of choice in assessing tubal patency as an outpatient procedure in an infertility clinic

Keywords: Hysterosalpingo-contrast-sonography (HyCoSy), Hysterosalpingography (HSG), Colour Doppler, Transvaginalsonography (TVS), Hysterolaparoscopy

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INTRODUCTION

The prevalence of tubal disease in infertile couples varies from 20 to 30 % depending on the population. The incidence of tubal factor in infertility is rapidly increasing with increasing prevalence of salpingitis, tubal surgeries, ectopic pregnancies and STDs. There for most gynecologists encounter this problem frequently. Ever since Rubin introduced his patency test using CO2 insufflations, several diagnostic modalities have been used in the evaluation of the tubal patency in infertile patients. The introduction of HyCoSy has provided an effective tool for the evaluation of fallopian tube in infertile women. HyCoSy is performed easily and rapidly at relatively low cost, and is virtually devoid of complications. Its use in selective infertile patients obviates the need for more invasive diagnostic procedures. The technique of SSG was first described by Richman et al in 1984; he used it with Transabdominal sonography to determine tubal patency.

MATERIALS AND METHODS

This study was conducted in 50 infertile women presented with primary and secondary infertility in my clinic within one year starting from January 2012. In all these patients, detailed history with respect to nature and duration of infertility and history suggestive of etiological factors were taken, menstrual history, and past obstetric history in secondary infertility, and significant personal and past history were recorded. History regarding male factor infertility was also taken.

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These patients were subjected to general, abdominal and bimanual pelvic examination to detect any obvious pathology. Routine investigations, husband's semen analysis and other relevant investigations were done in all subjects

All infertile women underwent Transvaginal sonography at 3rd day of menstrual period using Aloka Prosound SSD 3500 SX, 7.5MHz vaginal transducer. Uterus was scanned in both sagittal and coronal planes to evaluate the myometrium and endometrium. Both ovaries were studied in detail. Those women who require Hystero-laparoscopy were excluded from this study.

All the 53 selected infertile women were subjected to HyCoSy on 8th to 10th day of periods. NSAID (brufen-600mg) was given half an hour before the procedure to alleviate the pain. A combination of, 100ml (200mg) of injection ciprofloxacin mixed with 100mg hydrocortisone and4cc of air was used as the contrast media

At first vaginal sonography was done to assess the endometrium, follicle and any fluid collection in the cul-de-sac. Patient was kept in the dorsal position. A self retaining speculum was introduced into the vagina and the cervix was exposed. After cleaning the cervix with betadine solution, a No. 8 pediatric Foleys catheter was introduced into the cervix. After introducing about 5cm, Foleys bulb was inflated with 2cc of normal saline and then the catheter was pulled to fix the bulb at the internal os. TVS was repeated to confirm the position of Foleys bulb. After scanning the uterus and ovaries, the area between the left cornu of the uterus and the left ovary was focused. About 50 cc of contrast media was pushed through the Foleys catheter after shaking well for thorough mixing The left tube if patent distends and the contrast media gush past the ovary to give rise to what is known as water fall sign of Sonosalpingography, and the same fluid spill from the fimbrial end of the tube was seen as mosaic pattern in colour Doppler. The same procedure was repeated on the right side.

After pushing the contrast media and visualizing the fluid spill from the fimbrial end, the pelvic cul- de-sac was looked for fluid collection. If both the tubes are patent then there is sufficient amount of fluid in the cul-de-sac which helps to visualize the tubes floating in the pelvis especially the ampullary region and the fimbrial end of the tube. Because the fluid keeps the tubes completely away from the intestines, proper visualization of the tubal fimbria, ampullary segment and the ovaries are possible.

Patients with bilateral tubal block complained of sharp acute lower abdominal pain, the moment the contrast media was injected and the reflex fluid pressure was seen very clearly in the stem of Foleys catheter. While injecting the fluid we could feel the resistance in the syringe and there is no fluid collection in POD after the procedure. Patients with unilateral tubal block also complained of pain. Distension of tube proximal to the site of block and absence of fluid spill were the positive findings. There is relative resistance while pushing the fluid into the Foley's catheter.

Finally endometrial cavity was visualized for the regularity of the cavity or any submucosal myoma, polyp or Ascherman's syndrome

Average time requirement for Sonosalpingography was 10mts. Women were allowed to rest for a while and send home

RESULTS

HyCoSy was done in 50 infertile women. Both the tubes were patent in 42 women giving an incidence of 84%. Bilateral tubal block was seen in 2 (4%) subjects. 6 of them had unilateral tubal block giving an incidence of 12%. Three of them had right tubal block and three had left tubal block (table-1).

Table 1. Result of HyCoSy in 50 subjects

Total subjects	50	100
Bilateral tubal patency	42	84%
Right tubal block	03	06%
Left tubal block	03	06%
Bilateral tubal block	02	04%

The procedure could not be completed in three women (3/53). Two of them had syncope immediately after inflating the Foleys bulb and in one it was not possible to introduce the catheter due to tight nulliparous cervical os. (Table 2) the failure rate is 5.6%. HyCoSy was successfully completed in 94.3% of women.

Table 2. Causes of failure in HyCoSy

Syncope	2/53	3.7%
Failure to introduce the catheter	1/53	1.8%
Total	**3/53**	**5.6%**

There were no serious complications. Procedure related minor side effects were 28%. Out of 50 subjects 12 (24%) had lower abdominal pain and 2 of them, it lasted up to 12 hours and 2 (4%) subjects had vaginal spotting lasting for one day (table 3). All these 50 individuals

were reviewed after two weeks for any other complications. There were no procedure related infections and no other complications.

Table 3. Untoward effects of HyCoSy

Lower abdominal pain	12/50	24%
Spotting p/v	2/50	4%
Total	**14/50**	**28%**

Out of 50 infertile women 15 become pregnant till date giving an incidence of 30 % (table 4) both the tubes were patent in all these pregnant subjects.

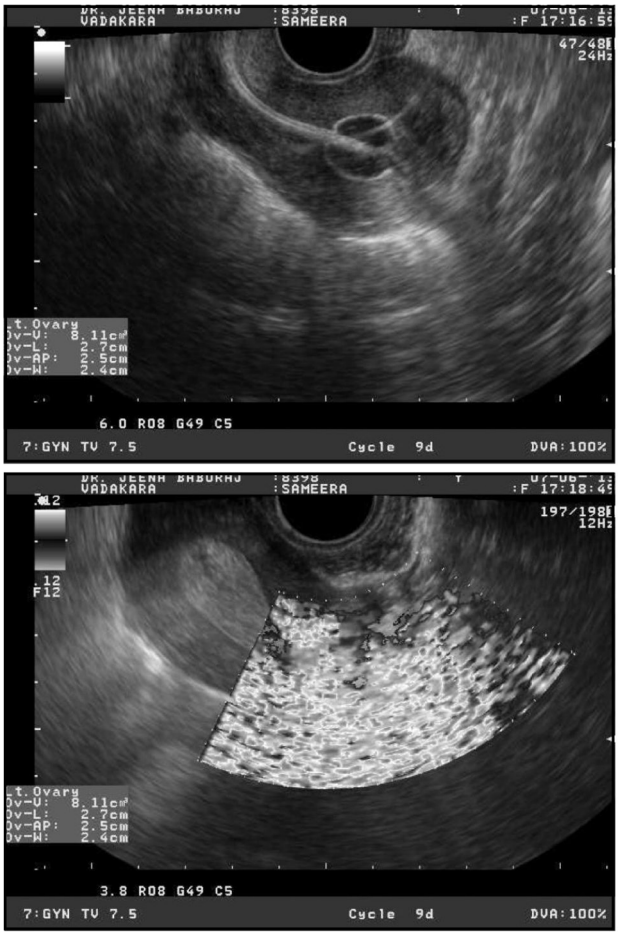

Figure 1. Foleys catheter inside the uterine cavity

Table 4. Pregnancy Rate

Total subjects	50	100
pregnancy	**15**	**30%**

DISCUSSION

The investigation of tubal patency is difficult to perform by ultrasound alone because the normal fallopian tube is a poor sonic reflector and devoid of defined interfaces that produce clear organ outlines. In 1984 a technique, termed Sonosalpingography was

Figure 2. Tubal patency is seen as mosaic pattern in colour Doppler

described using Hyskon, (hypertonic fluid) as the intrauterine distension medium. Sonosalpingography was also performed using saline by identifying subsequent fluid in pelvic cul-de-sac which implied the patency of at least one tube. In 1986 a model of hysterosalpingo-contrast-sonography (HyCoSy) was developed to obtain visualization of actual contrast media flow through each fallopian tube, using hyper echoic contrast agents either Echovist-200 or a mixture of saline and air. Detection of flow of Saline mixed with air through the fallopian tubes is made possible due to "scintillations" offered by the mixed air Tubal patency is studied by visualizing intratubal flow of echogenic contrast using b-mode (real time) ultrasound scanning for at least 5-10ss duration, or observation of spill of contrast media from the distal end of a tube over the adjacent ovary.

According to Volpi.etal's study of 154 unselected infertility patients with saline and air as contrast media bilateral tubal patency was confirmed in 68.8%, unilateral tubal occlusion 22% and bilateral tubal block was 8.4%. In my study out of 50 infertile women bilateral tubal patency was confirmed in 84% of subjects, Unilateral tubal occlusion was 12% and bilateral tubal block was 4%.

This difference may be due to the selection of patients. Sonologically detectable pathology which requires hysterolaparoscopy was excluded from the study. 84% subjects do not need any further invasive testing immediately for tubal evaluation

Bilateral tubal block was seen in 4% of subjects, this may be due to tubal pathology or tubocornual spasm. They were advised to do laparoscopy for further evaluation of tube. And unilateral tubal block was seen in 12% of subjects. These women were advised to do further investigations for the confirmation of diagnosis. Out of

these 50 infertile women only 8 women (16 %) required further invasive testing.

Some of the associated side effects were post procedure vaginal bleeding, infection, vasovagal reaction, and lower abdominal pain and referred shoulder pain. These adverse effects are comparable with conventional HSG procedure. In the study conducted by A.J. Hamilton et al using Echovist as contrast media participants reported mild, moderate and severe pain at a rate of 51%, 33% and 15.6% and 4/500women (0.8%) complained of prolonged vaginal bleeding for up to five days. In my study the rate of moderate to severe pelvic pain was 24% and in 2 subjects (4%) there was vaginal spotting lasting up to 24hrs

Post procedure pelvic infection rate of HyCoSy is equivalent to that of HSG. Post HSG infection incidence is 3.1% and serious infection rate is 0.3%-1.3%. In this study there were no post procedural infections. The contrast media used here is a combination of injection ciprofloxacin, injection hydrocortisone and air. Prophylactic antibiotic injections or post procedure oral antibiotics were not given. This contrast media also has a curative role if the patient is having any pelvic infection or inflammation

HyCoSy can be done successfully in 94.3% of subjects (50/53) and the procedure could not be completed in 3 subjects giving an incidence of5.6%(3/50), 2 of them(3.7%) had syncope immediately after inflating the Foleys bulb and one subject(1.8%) there was failure to introduce the catheter due to tight nulliparous cervical os. In a study done by A.J.Hamilton et al completion of HyCoSy procedure using Echovist as the contrast media was possible in 92.6%subjects. The incidence of syncope was 3/500 (0.6%) and catheterization failure was 8/500 (1.6%). Failure rate of the procedure was 11/500 (2.2%)

It is important to say that HyCoSy is suitable as an outpatient procedure for tubal factor diagnosis of infertility. In the case of normal findings i.e. positive tubal patency, the patient should be spared of more invasive diagnostic tests such as laparoscopy and attention can be directed to further steps in infertility diagnosis and management. This is possible because the false negative rate of HyCoSy is low 7.1% (Marcos.M.Reis et al). In the event of pathological findings in HyCoSymore invasive diagnostic methods could be instituted as early as possible, because the false positive rate of HyCoSy is 28.1%. A possible reason for this misdiagnosis would be tubal spasm

HyCoSy offers certain advantages over HSG such as the elimination of iodinated contrast, allergic reaction, exposure to ionizing radiation and pelvic infection. HyCoSy is capable of expanding the utility of pelvic ultrasonography to include a comprehensive evaluation of adnexal architecture, uterine cavity, myometrial assessment and tubal patency. A gynecologist with sufficient experience in pelvic sonography can perform this test easily.

Laparoscopy with chromopertubation is widely accepted as the gold standard method for evaluating tubal patency. At present it is considered as the most accurate diagnostic test available for evaluating tubal related sub fertility. Its advantages include an ability to simultaneously evaluate the abdominal cavity and other pelvic structures for an enhanced diagnostic evaluation of other etiologies of sub fertility and also therapeutic advantages. However laparoscopy includes operative risk, cost and post operative recovery. A retrospective review of worldwide gynecologic laparoscopic surgeries performed in more than 1.5 million women revealed an overall procedure related complication rate of 0.2—10.3%: of which 20—25% were unrecognized at the time of surgery, the overall hospital readmission rate was0.5%and conversion to laparotomy was 2.1 % (Magrina JF, 2002).As an invasive and expensive procedure, however it is not an ideal first line screening test for tubal infertility when suitable alternative office procedures like HSG and HyCoSy are available

CONCLUSION

HyCoSy has the following advantages, it is an office procedure, less time consuming, cost effective, non invasive procedure without anesthesia, helps in diagnosing both uterine anomalies and pelvic pathology and no radiation hazard and infection. HyCoSy can be considered as an effective screening test to assess tubal status in infertile women as it is a minimally invasive, office procedure, avoids usage of iodinated contrast. Though it can provide additional information about uterine and pelvic pathology, laparoscopy may be required for further tubal evaluation if occlusion is suspected or diagnosed.

END NOTE

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