

Assessment of Tubal Patency in Infertile Women: Can Hycosy be performed in place of Hysterosalpingography?

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Objective: To determine the advantages and accuracy of hysterosalpingo-contrastsonography (HyCoSy) in the assessment of tubal patency with regards to conventional hysterosalpingography (HSG). **Study design :** Interventional study. **Setting:** The study was conducted at Lady Willingdon Hospital Lahore. **Study Period:** One year, from November 2003 to October 2004. **Patients and methods:** Thirty infertile women were examined with hysterosalpingo-contrastsonography (HyCoSy) using air and saline as contrast medium. The results were compared with those obtained from conventional hysterosalpingography.(HSG). **Results:** Altogether 30 patients were included in the study. They were examined with both HyCoSy and conventional hysterosalpingo graphy (HSG) and the results were calculated. Of the patients investigated by salpingo -contrastsonography, 22 were found to have patent tubes whereas 8 were having blocked tubes. Unilaterality or bilaterality could not be detected by this method. Bilateral tubal patency was found by hysterosalpingography in 22 cases. Unilateral tubal patency was found in 5 cases. Bilateral tubal occlusion was detected in 3 cases using either technique .Sensitivity and specificity of HyCoSy was 90.9% and 89.4% respectively. Positive predictive value was 83.3% and negative predictive value was 55.55%. **Conclusion:** The outcome of the study shows that HyCoSy with the combination of air and saline is cost effective, reliable and safe method and can replace conventional hystero salpingography as base line investigation of infertility on out patient basis.

Key words: Infertility, tubal patency, Hysterosalpingography, HyCoSy.

Female factor contribution to infertility is 40-60%¹ and is commonly due to tubal pathology accounting for approximately 30-40% of infertility cases². It makes the evaluation of tubal patency essential. To date hysterosalpingography and laparoscopic chromopertubation have been the gold standard in the assessment of tubal patency. Hysterosalpingography, however is associated with an increased risk of radiation, infection and pain. Whereas laparoscopic chromopertubation is an invasive procedure requiring anesthesia and hospitalization. It is desirable therefore to design a simple and reliable method that can be performed as a primary investigation for the assessment of tubal patency on the patients first visit to the infertility clinic.

HyCoSy was introduced in early 1980s and was well received as an investigation of primary infertility as it offered a quick method of assessing tubal patency, obviating the need for ionizing radiations or general anesthesia. Early reports highlighted its advantages, reproducibility, reliability and rapidity³. It does not require any premedication or hospitalization. In the literature standard acoustic emission technique was successfully applied to HyCoSy and allowed the visualization of the free spill of contrast agent in the peritoneal cavity in majority of cases⁴.

One of the most important advantages of this technique is the possibility of obtaining information on tubal status and the uterine cavity at the same time as conventional ultrasound scan is performed⁵. The aim of the present study was to evaluate the methodological practice in assessment of tubal patency and to obtain some preliminary data concerning the accuracy of salpingo-

contrastsonography as compared with hystero salpingography so that it can be implemented as basic test in out patient department.

Patients and methods

A total of 30 women attending infertility out door were recruited for the study between November 2003 to October 2004. The patients included were of the age range of 22-45 years having primary and secondary infertility. The exclusion criteria was the women with acute vaginal infection or pelvic inflammatory disease.

After taking informed consent detailed history was taken, about the patient's age, parity, educational status, duration of infertility, menstrual cycle, any treatment taken before .General physical, systemic and pelvic examination was performed to determine the size, position and mobility of the uterus, adnexal mass or tenderness. Investigations were advised including pelvic ultrasonography and husband's semen analysis. The patients were asked to keep the menstrual record. Both methods of study were applied to every patient included in the study and results were compared. They were called on the 6th day of menstrual cycle for HyCoSy at time and HSG for the second time in the next menstrual cycle. The principal aim to perform these diagnostic tests in the follicular phase was to ensure that the endometrium would be thin and less vascular. For HyCoSy,

The patients were given 2gms of secnidazole in a stat dose. They were put in lithotomy position, vagina was cleansed using chlorhexidin. Catheter was inserted into the cervical canal and the balloon was filled with 1-2 ml of saline. Two 20ml syringes were filled with 10ml of saline solution and 10 ml of air, which acted as contrast medium

in this study. Ultrasound probe was placed on the lower abdomen, longitudinal and then transverse view of the uterus was taken. The air was injected slowly and any undue pressure felt during injection was noted. Then saline was injected to cause the air bubble to flow more visibly otherwise saline collected in pouch of Douglas was noted. Exact site and side of tubal blockade could not be determined in every patient. The procedure took approximately 15-30min and was performed in radiology department of Lady Willingdon Hospital Lahore.

For HSG the patients were called in the follicular phase of next cycle. After putting the patients in lithotomy position and taking aseptic measures injection Urograffin was instilled through cervix and pelvic radiographs were taken. The procedure was performed in x-ray department of Lady Willingdon Hospital, Lahore.

Criteria for tubal patency in HyCoSy was either bubbles seen ejecting through the fimbrial end of tube or collection of fluid in pouch of Douglas. Criterion for exact site and side of tubal blockade in HSG was X-ray record of study group.

Results

A total of 30 patients were recruited from infertility clinic of Lady Willingdon Hospital, Lahore. The mean age of the study group was 30 ± 5.2 years. Primary infertility was diagnosed in 11 cases (36.7%) whereas secondary infertility accounted for 19 (63.3%) of the study group. The mean duration of infertility was 7.9 ± 3.6 years. The mean length of menstrual cycle was 29 ± 2 days. Among the patients with primary infertility 66.6% of the patients had regular menstrual cycle and 33.3% had menstrual irregularity. 16.6% of the patient were having history of D&C by Dai. 33.3% of the cases had history of pelvic inflammatory disease and were having vaginal discharge and 8.3% had history of tuberculosis.

Cases presented with secondary infertility were 60%. Among these 11.1% of the cases had history of tuberculosis and 33.3% had history of pelvic inflammatory disease and vaginal discharge. 11.1% cases had history of puerperal sepsis and 16.6% had tubal surgery for ruptured ectopic pregnancy. 66.6% of the patients were having tubal blockage with regular menstrual cycle whereas 33.3% of the patients had blockage with irregular cycles. 72.2% had D&C by Dai. In the study group no patient had history of contraception. There was history of lactational amenorrhoea in 30% cases of secondary infertility.

The basic ultrasound findings were abnormal in 3 patients. Two patients had polycystic like ovaries and one had small cysts in the ovaries. The mean endometrial thickness on the day of HyCoSy was 7 ± 2 mm. All the patients underwent HyCoSy and HSG. Regarding HyCoSy the procedure was easy to perform in 80% of the cases and was slightly difficult in 20% due to some technical problems. Some patients experienced few side effects or complications. 10% of them had lower abdominal pain and

1 patient had vomiting. Patients undergone HSG also had similar symptoms with increased severity especially the lower abdominal pain. 15% of them had severe lower abdominal pain, 6% of them had vomiting and 1 patient had post procedural hydrosalpinx. Findings with respect to the tubal patency are shown in Table 1.

Table 1: Findings of HyCoSy with respect to tubal patency (n=30)

HyCoSy	Tubes Blocked	Tubes Patent	Total
Positive	10	2	12
Negative	1	17	18

Of the patients investigated by salpingocontrastsonography, 19 were found to have patent tubes and 11 were having blocked tubes. Unilaterality or bilaterality could not be detected by this method. Bilateral tubal patency was found by hysterosalpingography in 22 cases. Unilateral tubal patency was found in 5 cases. Bilateral tubal occlusion was detected in 3 cases (Table 2).

Table 2: Unilateral or bilateral tubal patency as detected by HyCoSy and HSG (n=60)

Findings	HyCoSy	HSG
Bilateral tubal patency	0	22
Unilateral tubal patency	1	5
Saline in pouch of Douglas	18	0
Bilateral tubal occlusion	11	3

Sensitivity and specificity of HyCoSy

Sensitivity = $a/a+c \times 100 = 10/11 \times 100 = (90.9\%)$

Specificity = $d/d+b \times 100 = 17/19 \times 100 = (89.4\%)$

Positive predictive value = $a/a+b \times 100 = 10/12 \times 100 = (83.33\%)$

Negative predictive value = $a/c+d \times 100 = 10/18 \times 100 = (55.55\%)$

Sensitivity and specificity of HyCoSy was 90.9% and 89.4% respectively. Positive predictive value was 83.3% and negative predictive value was 55.55%.

Discussion

Infertility is the one of the most frequent and distressing complaint seen in gynaecological patients of reproductive age group. Among the causes of infertility, tubal factor still remains the commonest cause.

Tubal patency can be determined by different methods. Uptill now hysterosalpingography (HSG) and laparoscopic chromopertubation have been used for the assessment of tubal patency. HSG is performed in first half of the cycle, usually at day 9, on outdoor basis without anesthesia⁶ but hazards of radiations and hypersensitivity to dye are involved. In laparoscopy patient may face the complications of anesthesia and risk of infection. The new method, HyCoSy allows the visualization of free spill of contrast agent in the peritoneal cavity in majority of cases. The objective of the study was to determine accuracy of HyCoSy to apply it as basic test for tubal assessment.

A patent tube is easy to visualize with salpingosonography whereas the reliable diagnosis of an occlusion is more difficult. To differentiate between a real occlusion and spasm patience and experience is required.

HyCoSy is performed during the follicular phase of menstrual cycle due to many reasons. Endometrium is thin and less vascular so there may be better visualization. The catheter may better remain in place in cervical canal due to smaller amount of secretions than during secretory phase. There are some technical details which must be considered. The catheter must be of proper size. It is better to place catheter in the cervical canal for better evaluation of uterine cavity. In cases of patulous cervical os it should be placed in the lower part of uterine cavity so as to avoid its expulsion during procedure. It is not always possible to scan the entire tube. The utero-tubal junction sometimes cannot be visualized. The rest of the tube is not visualized due to distortion of the salpinx or abnormal position of the uterus. In these cases flow might be visible only in the distal part of the tube. If the flow of saline is slow or the patient is feeling pain it could be spasm of the tube or actual tubal occlusion. A spasm should pass in a minute or two. If the pain continues, it means that there is occlusion of tube / tubes, the procedure should be discontinued.

In this study we used air and saline as a contrast medium successfully because it is easy to use and the risk such as air embolism is minimal. Theoretically it may occur if cannula is inserted accidentally into a vein but volume of air required for fatal embolism in subclavian catheterization is approximately 150–250ml⁷. The amount of air used in our study was only 10–20ml and is injected very slowly. The maximum amount of saline used was 10-20ml. This amount can be injected safely without causing any severe pain. The combination of air and saline is useful and satisfactory as echovist is expensive and not always available.

Results of our study are comparable with a recent study in which tubal patency evaluation was done by laparoscopy, HSG and HyCoSy for insemination. They concluded that air and saline as contrast medium was a cost effective method regarding selection of subjects for insemination⁸.

Our results are concordant with the results of a study carried out in Akdeniz University School of medicine, Antalya, Turkey. The study concluded that HyCoSy is statistically comparable with the conventional methods with added advantage of being easily applicable, well tolerated, repeatable and may reduce false positive results when compared with HSG⁹.

Feeling of pain during the procedure was comparable in both HSG and HyCoSy, so both the procedures can be used in the evaluation of tubal pathology¹⁰. However comparing the risk of infection, none of our cases subjected to HyCoSy developed any post procedural infection whereas one case developed hydrosalpinx following HSG. Only a stat dose of secnidazole was given to the patients just before starting the procedure in both the methods, prophylactically, to prevent infection.

HyCoSy can be both diagnostic as well as therapeutic. Theoretically there may have been some

debris blocking the tube which may be washed out after rinsing with the saline solution. A fertility rate of 7.5% was reported in previous studies¹¹.

In the light of our present findings HSG provides no additional information on the etiology of infertility. If tubes prove to be patent in HyCoSy and the patient has no history of endometriosis, pelvic inflammatory disease, gynecological surgery and is having normal pelvic and ultrasound findings HSG is not indicated. But in doubtful cases or where there is tubal occlusion, laparoscopy should be advised as it is considered the gold standard¹².

Conclusion

HyCoSy is a new, promising, cost effective, reliable, safe and relatively painless procedure that can be used as primary investigation of infertility on an outpatient basis. Complications are almost nonexistent and benign. Its limitations are the need of sufficient expertise of the operator and a low negative predictive value. HyCoSy may replace HSG but will not supplant totally the use of laparoscopic chromopertubation in selected cases which remains to be the gold standard for the assessment of tubal patency.

References

1. Mantaya JM, Bernal A, Barrero C. Diagnostic in assisted human reproduction. *Reproductive biomedicine online* 2002; 5(2): 198-210.
2. Margava RA, Trew G. Tubal disease. Shaw RW, Souther WP, Stanten SL. 2nd ed. *Gynaecology*. Great Britain. Churchill Livingstone. Robert Sterens 1997:319.
3. Campbell S, Buorne TH, Tan SI, Collins WP. Hysterosalpingo contrastsonography (HyCoSy) and its future role within the investigation of infertility in Europe. *J Obstet Gynecol* 1994;4 :245-53.
4. Prefumo F, Serafini G, Martinolic, Gandolfo N, Gandolfo NG. The sonographic evaluation of tubal patency with stimulated acoustic emission imaging ultrasound obstetrics and gynaecology 2002; 20(4):386-9.
5. *J Am Assoc Gynecol Laparosc*. 2003 Aug; 10(3):367-72.
6. Balen FG, Allen CM, Siddle NC, Less WR. Ultrasound contrast hysterosalpingography-evaluation as an outpatient procedure. *Br J Radiol* 1993;66:592-9.
7. Borja AR. Current status of infraclavian vein catheterization. *Ann Thorac Surg* 1972;13 :615-24.
8. Ahinko-Hakamaa K, Huhatala H, Tinkanen H. The validity of air and saline hysterosalpingo-contrast sonography in tubal patency investigation before insemination treatment. *Eur J Obstet Gynecol Reprod Biol*. 2006 Sep 1.
9. Dijkman AB, Mol BW, van der Veen F, Bossuyt PM, Hogerzeil HV. Can hysterosalpingocontrast-sonography replace hysterosalpingography in the assessment of tubal subfertility? *Eur J Radiol*. 2000 Jul;35(1):44-8.
10. Cimon G, Trak B. The efficiency of hysterosalpingo-contrastsonography (HyCoSy) in the evaluation of tubal patency. *J Obstet Gynaecol*. 1999 Sep;19(5):516-8.
11. Volpi E, de Grandis T, Sismondi P. Transvaginal salpingosonography (TSSG) in the evaluation of tubal patency. *Acta Eur Fertil* 1991;6: 325-8.
12. *Ultrasound Obstet Gynecol*. 1996 Jan; 7(1):43-8.