

Algorithm of Radiological Methods to Diagnose Infertility Induced by Pelvic Organ Pathology and Fallopian Tube Abnormality

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ABSTRACT

Infertility affects millions of people and has an impact on their families and communities. Estimates suggest that approximately one in every six people of reproductive age worldwide experience infertility in their lifetime. In the female reproductive system, infertility may be caused by a range of abnormalities of the ovaries, uterus, fallopian tubes, and the endocrine system, among others [1,2].

For the assessment of tubal patency there are several radiological methods used nowadays: hysterosalpingography (HSG) and sonohysterosalpingography (sonoHSG). In Our study we have used both to asses tubal patency. In 73 cases of infertile woman in their reproductive age from 25 to 36 years we have used sonoHSG and have diagnosed different abnormalities in 41% of the cases (submucosal fibroid, endometrial polip, uterine abnormalities, endometrial hyperplasia), in 42 cases we have used both HSG and sonoHSG to asses tubal patency and diagnosed different types of tubal abnormalities.

Results: In our study in 44% of the cases sonoHSG clearly reveals different uterine abnormalities and the fact of tubal patency without visualization of localization of tubal blockage and/or degree of blockage as a reason of infertility. In 56% of the cases where both sonoHSG and HSG was done we could diagnose tubal patency with localization of the blockage and degree of it.

Conclusion: as a conclusion we can say that in the case of structural pathologies (like fibroid, endometrial polip or uterine abnormalities e.t.c.) and patency of tubes easily diagnosed by using only sonoHSG and there is no need to extend diagnostic method thus it is possible to avoid ionizing radiation of the patient and possibilities of allergy to contrast media used during HSG. But if structural abnormalities of uterus were not seen extension of diagnostic method using HSG is helpful to visualize localization of tubal blockage and degree of it. It is widely known that localization and the degree of the tubal block do not have clinical value and has no influence on the strategy of the management.

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Introduction

Infertility affects millions of people – and has an impact on their families and communities. Estimates suggest that approximately one in every six people of reproductive age worldwide experience infertility in their lifetime. In the female reproductive system, infertility may be caused by a range of abnormalities of the ovaries, uterus, fallopian tubes, and the endocrine system, among others [1, 2].

Infertility globally effects millions of couples. Nowadays worldwide there are 86.000 couples infertile (WHO) and leading reason is secondary tuba abnormality, majorly induced by infection, stress, environmental pollution, unhealthy nutrition, smoking, drug addiction etc [3, 4].

For the assessment of tubal patency there are several radiological methods used nowadays: hysterosalpingography (HSG) and sonohysterosalpingography (sonoHSG). HSG-traditional method gives an opportunity to visualize endometrium with high quality resolution and confirms the fact of tubal patency when contrast media pours into abdominal cavity. SonoHSG is an additional method used by ultrasound guidance, reveling pathological changes of reproductive organs more detailed compared to HSG. In some clinical cases

combination of two diagnostic methods increases chances of accurate definition of reason of the infertility [5, 6, 7].

Fallopian tubes play the most important role in the process of fertilization, Assessment of fallopian tubes is one of the most important diagnostic opportunities to estimate the condition of female reproductive system, it also shortens the time of identifying the reason and making the correct and adequate plan of consequent management [8, 9].

Structural pathologies of the reproductive system together with tubal abnormalities can be a reason of infertility thus identifying clear diagnostic possibilities of sonoHSG and HSG may help clinicians to avoid using unneeded diagnostic assessment of lady's in their reproductive age.

Material and Method

On the base of TSMU The First University Clinic Department of Clinical Radiology we have studied 73 case of reproductive aged (25-36 years old) woman. In all cases the reason to address hospital was infertility with excluded male factor of it. In 31 cases (41 %) we have used only sonoHSG and both sonoHSG and HSG was used in

42 case (57%) for the assessment of reproductive system. In 34 cases there was secondary infertility with a history of STD.

Study inclusion criteria:

1. Reproductive age
2. The first case of addressing to the hospital
3. Absence of male factor of infertility
4. Absence of pregnancy proved by blood HSG test
5. Signed informed consent.

Sono HSG has been done as protocol-based procedure. The assessment of patients has been done in the first phase of menstrual cycle, with standard vaginal swab bacterioscopy to exclude ascending infection. We have also done transvaginal overview ultrasound for primary assessment of reproductive organs. External cervical os was visualized by Cusco speculum and cleaned by antiseptic solution without using toothed tenaculum for cervix immobilization, thus excluding the risk of tubal spasm as a reflective reaction to the pain and possibility to receive false positive results of tubal occlusion. Balloon catheter was positioned on the level of internal cervical os and followed by inflation with saline solution to keep it immobile and obturate cervical canal from pouring installed contrast media. Later we were positioning ultrasound vaginal transducer into an anterior or posterior vaginal fornix for observation of contrast movement. During infusion of contrast, we were scanning uterus by fan shape longitudinal view directing from one uterus angle to another, followed by 90-degree angle frontal view of uterus from internal cervical os to uterus fundus including bilateral tubal scanning from tubo-uterine angle to the direction of tubal fimbriae. We have used two contrast media hyper and anechohonic. By using anechohonic contrast we could easily see outlining of uterus cavity by identifying endometrium, intrauterine and uterine n structural pathologies. It was also easily possible to identify tubal patency. To confirm the pouring of the contrast to the abdominal cavity we were observing paraovarial spaces bilaterally reveling turbulent fluid into a peritoneal cavity. In the case of patent tube contrast media pours freely giving possibility to visualize ovaries apparently and finally occurring in a Douglas paunch. But exact localization and degree of the occlusion is not seen by sono HSG.

In 42 cases where combination of two methods has been used it was done by 2-3 days intervals. Procedure of HSG is almost similar to the one used during sonoHSG. During HSG we were using 10 ml of contrast media water diluting iodine and were taking 4 consequent X-ray pictures subsequently by 4 phases of filling. First was early filling phase of the uterus, second full filling phase of the uterus, third filling of tubes and the fourth pouring of the contrast into an abdominal cavity.

Results

Among 73 patients studied by us by using sonoHSG in 31 case (41%) we have diagnosed different types of uterine abnormalities (Table 1

Table: 1

Pathologic	N	%
Endometrial hyperplasia	5	6.8
Endometrial polip	7	9.5
Submucosal fibroid	11	15
Uterine anomalies:	4	5.4
• Septate uterus		
• Bicornuate uterus	2	2.7
• Arcuate uterus	2	2,7

Endometrial hyperplasia was defined by diffuse hyperechogenic changes in a proliferative phase of menstrual cycle with heterogeneous structures. Thickness of the endometrium was increased compared to normal proliferative phase, but because of compression by fluid it occurred slightly thinner than defined by routine ultrasound assessment done before sonoHSG (figure 1)

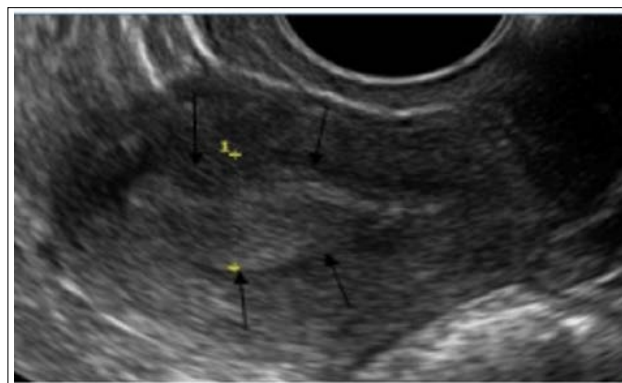


Figure 1: SonoHSG. Endometrial hyperplasia 20mm shown by arrows

Endometrial polip was diagnosed as local hyperplasia of the endometrium. In two case polip was located near uterine angles, in 5 case in uterine fundus. Polyps were clearly vizualised by contrast as oval or round shape structure. Size of polip was from 2mm to 5 cm. Pedicule and hyperechogenic contour of polips made it easy to differentiate it from diffuse endometrial hyperplasia (figure 2)

In 11 case of our study we have diagnosed uterine fibroid by routine ultrasound assessment and by sonoHSG it was possible to define direction of fibroid growth (figure 3)

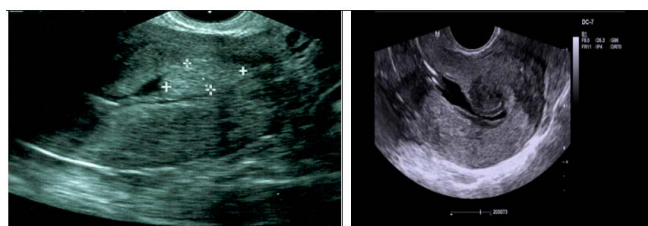


Figure 2, 3: SonoHSG. Endometrial polip 1.9/1.2 cm SonoHSG Submucosal fibroid

Sonohysterogramm. Submucosal Fibroid

Uterine septum was well visualized by using anechohonic contrast media, it was localized asymmetrically connecting two uterine walls. Bicornuate uterus also was well visualized by using anechohonic contrast media showing specific configuration. To reveal uterine anomalies, we have used 5-10 ml of contrast application into uterine cavity (figure 4, 5, 6)

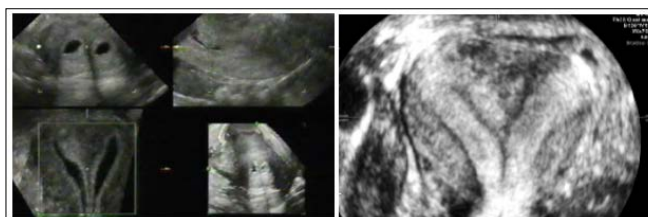


Figure4,5:Sonohysterogramm. Bicornuate uterus Sonohysterogramm. Septate uterus



Figure 6: SonoHSG. Arcuate uterus

Among 73 patients studied by us two diagnostic methods sonoHSG using two contrast media hyper and hypoechogenic and consecutively HSG has been used in 42 cases. In all 42 case HSG was used by us after sonoHSG to determine localization and degree of tubal damage which was not possible by sonoHSG as this method gave us information only about fact of tubal patency having seen free fluid into Douglas paunch with turbulent flow. (figure 7)

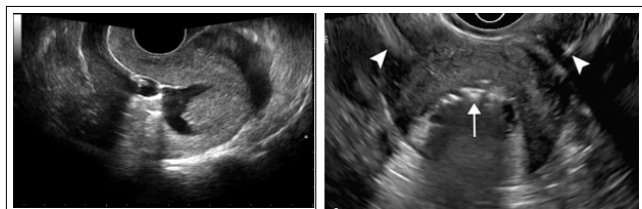


Figure 6, 7: SonoHSG. Arcuate Uterus SonHSG Side Arrows Showing Bilateral

Fluid Flow into Abdominal Cavity

In our study by using HSG we have revealed different types of tubal damage: long tubes bilaterally - 4 case, nodular salpingitis - 3 case, hydrosalpingis - 2 case, ampullar tubal block - 7 case, isthmic tubal block - 2 case, tubal spasm or narrowing - 6 case. (figure 8,9,10,11)



Figure 8, 9: HSG. Nodular Salpingitis HSG. Elongate Tube

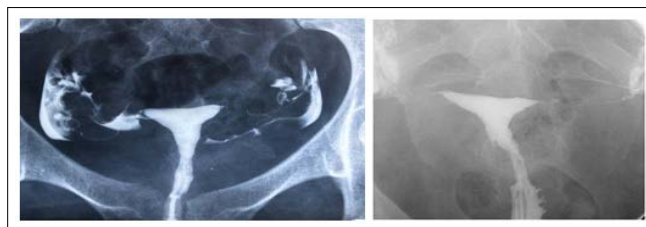


Figure 10,11: HSG. Interstitial Tubal Spasm HSG, Bilateral Isthmic Block

Conclusion

As a conclusion we can say that in the case of structural pathologies (like fibroid, endometrial polip or uterine abnormalities e.t.c.) and patency of tubes easily diagnosed by using only sonoHSG and there is no need to extend diagnostic method thus it is possible to avoid ionizing radiation of the patient and possibilities of allergy to contrast media used during HSG. But if structural abnormalities of uterus were not seen extension of diagnostic method using HSG is helpful to visualize localization of tubal blockage and degree of it. It is widely known that localization and the degree of the tubal block do not have clinical value and has no influence on the strategy of the management, that's why sonoHSG only can be successfully used to assess reproductive organs diagnose localization of the damage and paln furute management.

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