Testing Fallopian tubes patency with use of hysterosalpingography method in infertility diagnostics

Own experience and current state of knowledge
Infertility concerns about 15-20% of all couples. It is defined as the inability to conceive a child within 12 months of regular sexual relations without the use of contraceptives [1]. The most common causes of infertility include male factor (45%), ovulation disorders (37%), and disorders of the Fallopian tubes function (18%) [2, 3].

**Diagnostic imaging in the diagnosis of female infertility**

Imaging plays a key role in the female infertility diagnostics [4-6]. Transvaginal ultrasound examination (USG-TV) is in this case the standard procedure of first choice. The irregularities can be further evaluated by hysterosalpingo-contrast sonography HCoSy. It has been found that it is highly sensitive, specific and accurate in identifying uterine abnormalities, such as polyps. However, it has limited value in assessing the Fallopian tubes abnormalities. Magnetic resonance imaging - MRI can be used to evaluate various congenital anomalies of Müllerian ducts and internal endometriosis diagnostics, leiomyomata and endometriosis, but its role in evaluating Fallopian tubes patency is currently limited [7, 8].

**HSG (hysterosalpingography)**

The primary diagnostic test allowing assessing Fallopian tubes and the uterus is hysterosalpingography (HSG), i.e. visualisation of these organs using X-rays after administration of contrast through the cervical canal. HSG is still the most widely used, important, first-line diagnostic procedure to evaluate the uterine cavity and Fallopian tubes patency.

On the radiographic film Fallopian tubes should be visible as thin, smooth lines that extend to the ampullary section. Irregularities observed by HSG may be congenital or may result from contraction, occlusion or infection. Tubal occlusion is manifested by a sudden cut-off of contrast material, lack of translucency in the distal part of Fallopian tube. It may be unilateral or bilateral. Adhesions around the Fallopian tubes prevent from penetration of contrast material into the abdominal cavity and its free distribution [8, 9].

HSG can also be helpful in assessing abnormalities of the uterine cavity. It is believed that it has high sensitivity (60-98%) but low specificity (15-80%) in detecting abnormalities of the uterus, and therefore hysteroscopy remains the method of choice in the final differentiation. The differential diagnosis of intrauterine filling defects by HSG includes polyps, submucosal fibroids, adhesions and intrauterine barriers. Such anomalies require further investigation by hysteroscopy (or hysteroscopy combined with laparoscopy), supporting and providing an improved treatment of a given disease [1].

In 2008 the guidelines published by the European Society of Human Reproduction and Embryology (ESHRE) have recommended that prior to testing tubal patency the analysis of semen and ovulation should be carried. Laparoscopy should be offered first to women with high probability of pathology occurrence. Due to this approach there is also a therapeutic option in addition to diagnostic option in case of irregularities of Fallopian tube and pelvis.

The examination is carried out in the first phase of the menstrual cycle. Some authors successfully use hormonal contraceptives to optimize the period of test performance and to ensure security against possible exposure to X-rays in early pregnancy. The contraindications for HSG, besides pregnancy, include: inflammations in pelvic organs and severe allergy to iodine-based contrast agents. Depending on anaesthesia method during the surgery, the patients should be informed about performing the procedure on an empty stomach.
Own experience

In our institution HSG is carried out with use of analgesics administered intravenously or in the form of suppositories. In many centres HSG is performed under sedation with propofol. Sedation is performed by the anaesthesiologist, and the patient is informed in advance about the theoretical threats, such as aspiration or an allergic reaction. Proponents of this method postulate that HSG procedure is then very well tolerated by the patients. Although the administration of propofol is clearly more comfortable, in many other centres the procedure is performed without sedation. The benefits of this solution should be considered from the point of view of additional costs. It seems that using general anaesthesia for HSG is a bit exaggerated approach taking into account the recent reports of good pain tolerance by women subjected to this short, simple and minimally invasive diagnostic method. It should be reserved for a group of patients with very low pain threshold, having bad experiences from the past in connection with performance of procedure within the cervix. Moreover, many centres routinely use an antibiotic prophylaxis in the perioperative period.

The cervix is cannulated by a gynaecologist with a thin double-lumen balloon catheter for HSG (produced by Balton) to seal the internal os. After proper location of the catheter in the uterine cavity and inflating the balloon a water soluble iodine contrast (e.g. Guerbet hystero Telebrix ® AG, France) is administered under fluoroscopic control. Contrast medium allows for visualisation of uterine cavity morphology and contours. Further injection of contrast agent allows for revealing the outlines of the uterine horns, the isthmic and ampullary parts of Fallopian tubes, the degree of contrast agent penetration into the abdominal cavity, and tubal patency. If it is impossible to introduce the tip of single use catheter into the cervical canal, facilitation consists in fixing the cervix using the bullet forceps. It leads to a natural straightening of the cervical canal. In case of further difficulties it is recommended to carry out the examination with use of metal Schultze camera.

The most common causes of inability to perform the test using a thin catheter is a state after cervical procedures, strong, fixed retroverted uterus and lack of experience of the practitioner.

In our institution after administration of contrast four X-ray images are taken of each patient, including the image before and after filling the uterus cavity, after imaging tubal contours and contrast agent penetration to abdominal cavity. In selected cases it is also possible to make additional imaging, e.g. after administration of the agents inhibiting the peristalsis, but these are rather rare cases. During the examination the radiologist and the gynaecologist evaluate the images and determine the diagnosis. Radiological report and images, as well as the scopy record are made available to the patients for possible further consultations on digital carrier (CD-ROM, USB).

Hysterosalpingography is relatively simple for performance and now it is commonly carried out in out-patients clinics.

According to the guidelines of ESHRE and NICE (National Institute for Health and Clinical Excellence) 2012 [11] the Fallopian tubes patency examination should be recommended by HSG or HyCoSy method after exclusion of male infertility factor. In case of suspicion or detection of any Fallopian tube or uterus organs pathology, the laparoscopy, hysteroscopy should be made with use of USG-TV.

In recent years the important role of research in the direction of Chlamydia is postulated as an important screening test in case of deciding about the test methods of tubal patency, [10]. Hysterosalphinosonography with contrast has become an important tool in the diagnosis of uterus and Fallopian tube pathology [12, 13]. It is more challenging for the investigator than HSG and has a longer learning curve. HyCoSy advantages are that it costs less, causes less pain and that it does not bring any exposure to radiation.

HSG is a safe, cheap and – in case of applying the sedation with propofol - a very well-tolerated procedure for evaluation of the Fallopian tube, which should be applied in infertility examination protocol.


MD Piotr Marianowski, MD Iwona Szymusik
Department of Obstetrics and Gynaecology, Medical University of Warsaw, Pl. Starynkiewicza 1/3, Warsaw