Diagnostic performance of Hysterosalpingography for Intrauterine pathology in infertile women: A comparative analysis with Hysteroscopy.

Poster No.: C-1650
Congress: ECR 2015
Type: Scientific Exhibit
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Keywords: Education and training, Hysterosalpingography, Fluoroscopy, Genital / Reproductive system female
DOI: 10.1594/ecr2015/C-1650

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Aims and objectives

Uterine pathology is a significant factor in the causation of miscarriage and infertility, seen in 10-15% of women. Hysterosalpingography (HSG) is an important investigational technique in the assessment of infertility and recurrent miscarriage. Hysteroscopy allows for direct inspection of the cervical canal and the uterine cavity. Further, it gives the gynecologist the option of proceeding with an operative procedure such as removal of a polyp or resection of a septum.

The aim of this poster is to evaluate the diagnostic accuracy of HSG compared to hysteroscopy in the detection of intrauterine pathology in infertile women.

Methods and materials

I) HYSTEROSALPINGOGRAPHY

It is a fluoroscopic examination of the uterus and the fallopian tubes most commonly used in the investigation of infertility.

The procedure should be performed during the proliferative phase of the patient's menstrual cycle (days 6-12), when the endometrium is thinnest. This improves visualisation of the uterine cavity, and also minimises the possibility that the patient may be pregnant. If there is any uncertainty about the patient's pregnancy status, a bHCG is warranted prior to commencing.

PROCEDURE

- After an antiseptic clean of the external genital area, a vaginal speculum is inserted with the patient in the lithotomy position; the cervix is cleaned with an aseptic solution.
- Catheterisation of the cervix is then performed; the type of device used depends on local practice preferences e.g. 6 Fr Foley catheter with balloon inflation, or any one of a range of available HSG catheters or metal cannulas. Whatever the device, it should be primed with contrast prior to commencing to avoid the introduction of gas bubbles which may provide a false positive appearance of a filling defect.
- Water soluble iodinated contrast is subsequently injected slowly under fluoroscopic guidance.
• A typical fluoroscopic examination includes preliminary frontal view of the pelvis, as well as subsequent spot images that demonstrate uterine endometrial contour, filled fallopian tubes and bilateral intraperitoneal spill of contrast, to establish tubal patency.

CONTRAINDICATIONS

• Pregnancy
• Active pelvic infection
• Recent uterine or tubal surgery

COMPICATIONS

• Abdominal cramping
• PV spotting
• Pelvic infection
• Contrast reaction

PATHOLOGIES DETECTED

A) UTERINE

• Congenital anomalies
• Submucosal uterine fibroids / uterine polyps
• Uterine malignancies
• Adenomyosis
• Adhesions

B) TUBAL

• Occlusion of the fallopian tubes: Usually secondary to previous pelvic inflammation. It must be differentiated from incomplete tubal opacification due to tubal spasm, or underfilling of the uterus with contrast
• Tubal malignancies
• Hydrosalpinx
• Tubal spasm

II) HYSTEROSCOPY

Diagnostic hysteroscopy is used to evaluate the endocervical canal, endometrial cavity, and tubal ostia. The procedure is often coupled with sight-directed biopsy or followed by endometrial curettage to evaluate for endometrial pathology.
**INDICATIONS**

- Abnormal premenopausal or postmenopausal uterine bleeding
- Removal of foreign body (intrauterine device, retained fetal bone)
- Confirmation of abnormal test findings (abnormal HSG or thickened endometrial lining on sonography)
- Suspected Müllerian anomalies

**ANAESTHESIA**

**Paracervical block**

Infiltration of the paracervical tissue with a local anesthetic is commonly used for hysteroscopic anesthesia. A paracervical block can decrease the pain of tenaculum placement, cervical dilation, and hysteroscope insertion through the cervix. However, paracervical anesthesia has less effect on the pain of uterine distension. One must balance the expected pain of the hysteroscopic procedure with the pain and potential side-effects of the paracervical block, which include bradycardia and hypotension. For these reasons, many providers choose to forgo this step, especially for brief diagnostic procedures. Common anesthetic agents are 1% lidocaine, mepivacaine, prilocaine, ropivacaine, bupivacaine, and etidocaine.

**Nonsteroidal anti-inflammatory drug**

Despite the lack of strong evidence to encourage the use of NSAIDs, the use of oral or intravenous analgesics in the preoperative period is common. Smaller studies of NSAID use has been shown to reduce only postoperative pain with minimal effect on intraoperative pain and still may be a good choice for select patients. Tramadol IV is one option in the intraoperative and postoperative period for women undergoing diagnostic hysteroscopy and endometrial biopsy without cervical dilation.

**Misoprostol**

Patients with cervical stenosis may require some cervical dilation for diagnostic hysteroscopy, especially after menopause. The administration of analgesia does not decrease the number of aborted procedures due to cervical stenosis. Misoprostol, a synthetic prostaglandin E1 analogue, may be administered orally or vaginally for cervical ripening to improve the likelihood of successful cervical dilation and decrease intraoperative pain with few adverse events.

**PREOPERATIVE IMAGING**
Occasionally, diagnostic hysteroscopy may be used to locate and remove a foreign body. When doing so, obtaining preoperative imaging is prudent to rule out the possibility of migration out of the uterus and into the peritoneum, thereby necessitating laparoscopy.

**TIMING OF THE PROCEDURE**

Diagnostic hysteroscopy should be performed in the proliferative phase of the menstrual cycle after cessation of menstrual flow. The procedure is typically performed prior to cycle day 12 in ovulatory women not using contraception for the theoretical concern of affecting oocyte or embryo transport or implantation. Examinations during the secretory phase should be avoided to allow for optimal views of the cavity since secretory endometrium can mimic intrauterine pathology.

**PREPARATION**

Endometrial preparation is more typically performed prior to operative hysteroscopy but may be necessary prior to diagnostic hysteroscopy, especially in anovulatory patients. Pharmacologic thinning of the endometrium can be done with a course of progestins, oral contraceptives, danazol, or GnRH agonists.

**METHODS**

- Diagnostic hysteroscopy does not require operative instrumentation except for the potential use of graspers for foreign body removal and electrocautery for hemostasis.
- Proper positioning is vital to the success of hysteroscopy. The patient should be prepared and draped in the dorsal lithotomy position with her legs in adjustable stirrups.
- Aseptic technique should be observed throughout the entirety of the case. A preoperative bimanual examination should be performed to ascertain the position and mobility of the uterus.
- Trendelenburg positioning should be avoided during hysteroscopy because it may increase the risk of gas or air embolism. Once a patient has been selected for hysteroscopy, a history and physical examination should be performed to evaluate comorbidities.
- After informed consent, the patient is taken to the procedure room and placed in the dorsal lithotomy position.
- The patient should have voided prior to the procedure, or a catheterization of the bladder can be performed following the surgical preparation. After a bimanual examination, a bivalved or weighted speculum is used to bring the cervix into view. The cervix should be cleaned with an antiseptic solution.
- A single-toothed tenaculum is then applied to the anterior lip of the cervix. A small amount of local anesthetic can be used prior to applying the tenaculum. In order to achieve an adequate paracervical block for the
nonpregnant female, 10-20 mL of anesthetic should be injected 10 mm deep at the 4 o’clock and 8 o’clock position in the cervicovaginal junction with a 25-gauge spinal needle. Another option is the intracervical block, which involves injections at the 2, 4, 8, and 10 o’clock or 3, 6, 9, and 12 o’clock positions of the cervical stroma and has been shown to control pain similarly to paracervical anesthesia.

• As with all local anesthetic techniques, the site should first be aspirated and the injection made while slowly withdrawing the needle to avoid intravenous injection. Because diagnostic hysteroscopy is generally a short procedure with minimal blood loss, CO2, NS, and LR are all appropriate distention media choices. Once equipment for distention media is activated and functional, the flow of the medium can be started.

• The tubing must be flushed with either CO2 or liquid prior to insertion into the cervix. As the hysteroscope is introduced to the external cervical os and advanced into the endocervical canal, attention should be turned to the video monitor or eyepiece. The distal tip of the hysteroscope is then gently advanced through the length of the cervix, taking care to keep the endocervical canal central on the viewing field if using a 0º scope. Maintaining visualization of the endocervical canal when applying forward pressure to prevent cervical lacerations is important. Continuous gentle counter-traction via the tenaculum while advancing the hysteroscope allows the instrument to slowly slide into the uterine cavity. The flow of media should function to "wedge” a path to uterine entry. Some advocate vaginoscopic “no-touch” hysteroscopy as a more painless technique. Such an approach forgoes the speculum and tenaculum and begins with vaginal and cervical disinfection followed by the intravaginal introduction of a rigid hysteroscope. The external cervical os is identified using the instrument light, and the examination is conducted as usual. If a liquid distention media is used, intrauterine placement and orientation can be confirmed by visualizing bubbles at 12 o’clock. Once the distal tip of the hysteroscope is just inside the uterine cavity, allow the media to expand the intrauterine space. Adjustments to the rates of media inflow and outflow are done to expand the cavity, optimize image quality, and create smooth laminar flow. The intrauterine space is then ready for systematic inspection.

• The first evaluation should be a panoramic view of the intrauterine cavity. Next, careful inspection of the following areas should be done: lateral uterine walls, superior uterine cavity, and anterior and posterior uterine walls. Gentle movement of the hysteroscope is imperative. Excessive trauma to the endometrial surface causes bleeding that obscures the view, increases systemic fluid absorption, and risks perforation. Any pathology should be inspected and documented. If the hysteroscope lens is greater than 0º, twisting the bridge and barrel of the hysteroscope while keeping the camera perpendicular to the floor enables wide-angle viewing of the tubal ostia and other lateral structures. Flexible hysteroscopes have controls to maneuver the
tip of the telescope. Pictures of the endocervical canal, pathology, and bilateral tubal ostia may be taken if desired.

- If hysteroscopy is being performed to evaluate endometrial polyps or other intrauterine pathology, tissue samples can be obtained with hysteroscopic forceps followed by a dilation and curettage (D&C) after hysteroscopy. The hysteroscopy can be repeated after the D&C to confirm complete tissue removal. When the diagnostic survey is complete, the hysteroscope is slowly withdrawn. Careful inspection during removal provides one final chance to inspect the endocervical canal.
- A complete diagnostic hysteroscopy should take approximately 10-15 minutes. Recovery after diagnostic hysteroscopy is prompt. If no anesthesia is used, patients can return to their usual diet and activities later that operative day. Some mild postoperative bleeding is normal and typically stops within 2-3 days.

**COMPLICATIONS**

- Uterine perforation
- Cervical laceration
- Visceral trauma
- Hemorrhage
- Serum chemistry disturbances
- Pulmonary edema
- Arrhythmia
- CO2 and air embolism
- Infection
- Insufficient procedure

Images for this section:
Fig. 1: Hysterosalpingography of a normal uterus
Fig. 2: Hysteroscopy of a normal uterus
Fig. 3: Hysterosalpingography demonstrating a well defined filling defect in the uterus.
Fig. 4: Hysteroscopic confirmation of a submucous fibroid.
Fig. 5: Hysterosalpingography of a bicornuate uterus
Fig. 6: Hysteroscopy of a bicornuate uterus
Results

In this prospective study, 150 patients (mean age: 29±13 years, range: 21-46 yrs.) investigated for infertility underwent HSG and subsequently hysteroscopy. Radiologic findings were evaluated and compared with hysteroscopy, which was considered the reference standard. Paired t test was used to compare the techniques. Agreement between the procedures was calculated by kappa value.

As compared to hysteroscopy, HSG had a sensitivity of 88.4% and a specificity of 73.8%, with a positive predictive value of 70.4% and a negative predictive value of 83.2%. HSG had a false-negative rate of 42.4% and a false-positive rate of 12.2%. Agreement between the two procedures was 74.8%.

### PATHOLOGY

<table>
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<tr>
<th></th>
<th>HYSTEROSCOPY</th>
<th>HYSSTEROSALPINGOGRAGHY</th>
</tr>
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<tbody>
<tr>
<td>NONE</td>
<td>69 (46%)</td>
<td>99 (66%)</td>
</tr>
<tr>
<td>FIBROID/POLYP</td>
<td>45 (30%)</td>
<td>33 (22%)</td>
</tr>
<tr>
<td>ADHESIONS</td>
<td>12 (8%)</td>
<td>14 (9.3%)</td>
</tr>
<tr>
<td>HYPERPLASIA</td>
<td>18 (12%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>MULLERIAN ANOMALIES</td>
<td>6 (4%)</td>
<td>4 (2.7%)</td>
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</tbody>
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Conclusion

HSG is a useful investigation for infertility patients with a suspected uterine factor. Further, it provides information of tubal morphology and patency. However a negative HSG does not rule out intrauterine pathology and may warrant endoscopic evaluation.

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References

