



Hysterosalpingography and Sonohysterography: Lessons in Technique

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OBJECTIVE. The objectives of this article are to review the examination techniques for hysterosalpingography and saline infusion sonohysterography and to present practical tips to enhance physician performance and minimize patient discomfort during these procedures.

CONCLUSION. Optimally performed hysterosalpingography and saline infusion sonohysterography can be relatively comfortable procedures for the patient that provide a great deal of useful diagnostic information.

Hysterosalpingography (HSG) and saline infusion sonohysterography (SIS) are well known to the radiologist and gynecologist as diagnostic procedures of great utility in the investigation of the female reproductive tract. Many excellent scientific and review articles have been written regarding image interpretation after these procedures have been performed. However, particularly for the novice physician who is not adept in the art of pelvic examination, often the most intimidating aspect of these studies is the simple question of how to place the catheter so it is well tolerated and the examination is comfortable for the patient. This article will draw on the considerable experience of a reproductive–endocrine gynecologist to point out easy, practical tips for making this examination as smooth and psychologically atraumatic as possible.

HSG is well known as a diagnostic procedure in which there is radiographic visualization of the endocervical canal, the endometrial cavity, and the lumina of the fallopian tubes by an injected radiopaque contrast medium. A wide variety of uterine and tubal abnormalities that cause infertility and other reproductive disorders such as abnormal uterine bleeding can be shown by this technique. A normal HSG obviates hysteroscopy and laparoscopy. The American Society for Reproductive Medicine has recognized HSG and laparoscopy as complementary procedures in the diagnostic evaluation of fallopian tubes and the determination of appropriate surgical treatment and prognosis in cases of distal tubal obstruction [1].

The instillation of saline, and potentially air bubbles or other echogenic contrast agents, into the uterine cavity and fallopian tubes during sonography has been known by many names including sonohysterography, hysterosonography, transvaginal sonography with fluid contrast augmentation, saline infused sonography, and finally as saline infusion sonohysterography (SIS) [2, 3]. This examination, performed with particular attention to the fallopian tubes, is sometimes known as sonosalpingography. SIS is increasingly being used as an alternative to HSG [4–7]. SIS has several advantages over HSG including simplicity, decreased cost, minimal invasiveness, lack of ionizing radiation, and a high level of diagnostic accuracy with an ability to more accurately characterize masses within the endometrial cavity [8].

However, the patient often has enormous trepidation about undertaking either SIS or HSG because of the embarrassment associated with a pelvic examination and worries of discomfort and pain that may accompany the procedure. Friends and acquaintances of the patient who have had a bad experience with the process increase the patient's anxiety by sharing their stories. This article will focus on alleviating patient fears and minimizing discomfort and pain during HSG and/or SIS.

Scheduling

In premenstrual patients, the HSG and SIS ideally should be scheduled between day 4 and day 7 of the menstrual cycle. This allows time for any residual blood from the menses

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to clear, yet is early enough so that the endometrium has not grown significantly. The normal endometrium in the late secretory phase may have a lumpy, irregular appearance, potentially leading to a false-positive diagnosis of an endometrial mass.

In the patient with irregular bleeding, it may be necessary to perform the examination without the benefit of optimal scheduling. In such cases, any residual, potentially confusing, blood within the endometrial cavity can be properly assessed during SIS using a combination of gentle catheter manipulation and saline flush during real-time sonographic visualization.

Psychological Components

Before turning to the technical aspects of the process, we wish to emphasize the psychological components. A calm, caring, quietly confident, and empathetic persona can significantly minimize patient apprehension. Introduce yourself and any other medical personnel in the room. Inform the patient about the examination. Often, the patient has minimal understanding of the procedure. Therefore, make sure all of her questions are fully answered. An explanation of the procedure, including that placement of the speculum and catheter may cause cramping, helps reduce anxiety. As much as possible, avoid negatively loaded suggestions or words of warning that include words of negative emotional content or pain. These have been shown to significantly increase pain and anxiety after potentially painful stimuli [9]. Explaining that the patient may watch the fluoroscopic or sonographic display and that she will be informed of the results of the procedure during or immediately at its conclusion will often have beneficial calming effects.

Preprocedure Medications

The gynecologist often considers prophylactic antibiotics for patients having a history of pelvic inflammatory disease (PID) and those who require systemic bacterial endocarditis (SBE) prophylaxis. While the risk of infection is rare and has been reported to be less than 1% [10], if the study results are suggestive of previous PID, antibiotic prophylaxis should be considered; some have even suggested routine prophylaxis in all infertile women [10]. One such specific regimen for routine prophylaxis is doxycycline, 100 mg twice a day for 5 days, beginning 2 days before the procedure; alternatively, if prophylaxis was not given but the tubes are shown to

be dilated at HSG, 200 mg of doxycycline is given after the procedure, followed by 100 mg twice a day for 5 days.

The question of whether to administer antibiotics for SBE prophylaxis is somewhat more controversial. Simple mitral valve prolapse without a leak is not an indication for prophylaxis; a summary of this complex issue is provided by the American Heart Association [11, 12]. Ask the patient if she has taken the recommended nonsteroidal antiinflammatory drug (NSAID), which should have been taken 30 min before the procedure to reduce discomfort. We tell the patient to take whatever she normally takes for menstrual cramping. If asked for a specific drug and dose, we recommend 400 mg of ibuprofen, although any similar NSAID should work well. If the patient has not taken an NSAID, provide one right away. Delaying the study for half an hour while the drug takes effect is well worth it, particularly to avoid a vasovagal response.

Examination Technique

Typically for gynecologic examinations, the patient will be lying in the lithotomy position, her thighs flexed and abducted, her feet resting in stirrups, and her buttocks extending slightly beyond the edge of the examining table. If you are fortunate enough to have a dedicated examination table that permits the full lithotomy position, make sure that the patient's perineum extends slightly beyond the edge of the table for ease of examination.

However, in many radiologic fluoroscopic suites where HSGs are performed, the tables do not have stirrups and the patient must be in the frogleg position to allow better access to the pelvis. Elevation of the pelvis in this situation is helpful and can be done with a pillow. Other practitioners have the patient sit on an overturned bedpan, giving a better angle of the vaginal vault; having the patient put her hands under her hips is a third option. Again, empathetically explaining this awkward position (which will only be for a couple of minutes) goes a long way toward maximizing patient comfort.

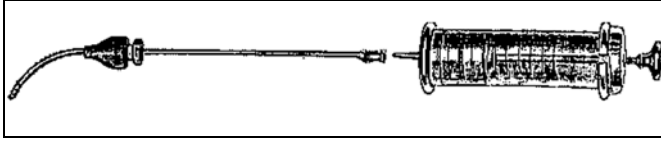
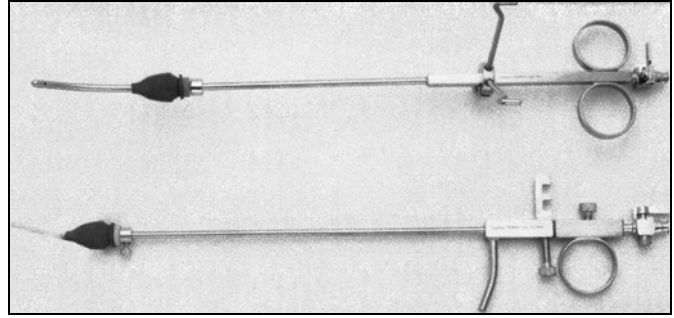
Achieving physical and mental relaxation for the patient is essential for an adequate examination. Supporting the patient's head with a pillow is a good start. To further help achieve this, the patient should empty her bladder. Her body should be draped appropriately. Some patients are more comfortable when the drape is extended over their thighs and knees. Others prefer to watch both the practitioner and the examination itself and

object to drapes that obscure their view. Ask the patient which method she prefers. The patient's arms should be positioned at her sides or folded across her chest.

The physician, regardless of sex, should always be attended by a female assistant. You should explain in advance each step in the examination and avoid any sudden or unexpected movements. You should have warm hands and a warm speculum. Monitor the examination when possible by watching the patient's face (if a drape is in place, depress it slightly so that you can make eye contact with the patient). Place equipment within reach and set it up to your standards. Include a good light. Use a vaginal speculum of appropriate size. Many trays have excessive instruments. Avoid clashing and clanking them together. Set ones that are used off to the side to avoid excessive noise that may alarm the patient during the procedure.

Before insertion of the speculum, inspect the patient's external genitalia. With a gloved hand, separate the labia and inspect the vaginal orifice and introitus. Note any induration, inflammation, or ulcerations making placement of a speculum difficult and painful. If inflammation is suspected, the examination should be put on hold and the patient's physician notified. The size of the vaginal opening can make placement of the speculum easy or difficult. Asking the patient how previous pelvic examinations have gone or if she has delivered any children may alert you to the possibility of a difficult examination. A digital examination with lubricated fingers is helpful in determining the position, depth, and orientation of the cervix and may be useful before inserting the speculum. The cervix should feel like the tip of a nose.

Selecting a speculum of appropriate size is critical to a comfortable and patient-friendly study. Specula come in two basic shapes (named for Pederson and Graves) and are made of metal or plastic; both Pederson and Graves specula are available in small, medium, and large sizes [13]. In general, a medium Pederson is a good place to start. It is relatively narrow and has straight blades. It is usually most comfortable for sexually active women. For patients with a relatively small introitus, such as virgins or elderly women, a small Pederson should be available. The medium Graves is a good choice for women who have had a vaginal delivery or who are obese. It is slightly wider than the Pederson and the end of the blades has a biconcave, duck-bill-like shape. For very obese women, or those with multiple

Fig. 1—Examples of Jarcho cannula.**A**, Original Jarcho cannula, named for Julius Jarcho who did early work on radiographic visualization of uterine cavity and tubes in 1920s.**B**, Modern commercial versions of the Jarcho cannula (Marina Medical).**A****B**

vaginal births or vaginal prolapse, a large Graves would be the place to start. For very obese patients (who often have redundant vaginal folds), a trick that may be helpful is to cut off the thumb part of a glove and place it over a large Graves speculum, thereby keeping the vaginal folds separated and allowing better access to the cervix. Lubricate and warm the speculum with warm water for comfort (ensure that the water is not too hot or cold). Gel can be also used as a lubricant, particularly in the peri- or postmenopausal woman where the vagina is atrophic.

So as not to startle the patient, start out at the knee with both your hand and the speculum so the patient can feel the speculum. Serially move to the inner thigh and then to the perineum. This avoids the suddenness and awkwardness of exposing the patient's genitalia. Any flinching allows you to anticipate difficult speculum placement.

You can ease speculum insertion and increase your efficiency by having the patient strain down (Valsalva maneuver) or by gently pressing down with your free hand on the perineal body (at the 6 o'clock position on entering the introitus). With your other hand, introduce the closed speculum past your fingers at a 45° angle downward. The blades should be held obliquely and pressure exerted toward the posterior vaginal wall to avoid the more sensitive anterior wall and urethra. Be careful not to pull on the pubic hair or to pinch the labia with the speculum. Holding the labia apart with the fingers of your free hand enables the speculum to be placed without dragging or pulling the labia into the vagina.

After the speculum has entered the vagina, remove your fingers from the introitus. Rotate the blades of the speculum into a horizontal position, maintaining the pressure posteriorly. Open the blades after full insertion and maneuver the speculum so that the cervix comes into

full view. Secure the speculum with the blades open by tightening the thumbscrew. Ask the patient if her doctor told her that her uterus was tilted to the front (where posterior displacement of the cervix can be anticipated) or the back (where anterior displacement is expected). In severe retroversion/flexion, placement of the speculum upside down often will make cervical access easier. If SIS is being performed, the initial sonogram before catheter insertion can be used to identify cervical position. For a comprehensive review of the technique for female pelvic examination, please refer to the chapter on female genitalia in Bates' *A Guide to Physical Examination* [13].

Several modifications in technique may be helpful in certain situations. If a posterior location to the cervix is suspected, sometimes having the patient push down on her uterus just above the pubic symphysis will aid in elevating the cervix into view. If the uterus is hard to bring into view, have the patient perform a Valsalva maneuver. This may be particularly useful in multiparous or grand multiparous patients, those with cystoceles or rectoceles, or those with redundant vaginal folds. Be alert for a müllerian anomaly, specifically a longitudinal vaginal septum. Sometimes the referring physician or the patient will alert you to this possibility; other times, you may suspect it when the patient states that during intercourse her partner must insert to one side or the other. In this situation, a pediatric speculum can be inserted on each side of the septum and a catheter inserted into each cervix.

Even though the instruments we use are small in diameter, they are long and can be overwhelming when seen. Their appearance can make an already apprehensive patient even more nervous. Always keep the instruments out of the patient's view. Although a common tendency is to hold the instruments up in the air for fear of bacterial contamina-

tion, try to keep them pointing down and out of the patient's view.

During traditional HSG, a tenaculum is placed on the anterior cervical lip of the external cervical os for traction. It is placed at the 12 o'clock position; cervical vascularity is greatest at the 3 o'clock and 9 o'clock positions, thus these positions should be avoided. A Jarcho cannula with a small acorn tip [14] (Fig. 1) is used for dye instillation [15]. Cervical traction is often necessary to completely evaluate the uterine cavity. The small acorn tip has historically been preferred over balloon-type catheters for HSG because the latter may obscure visualization of the cavity in the lower uterine segment.

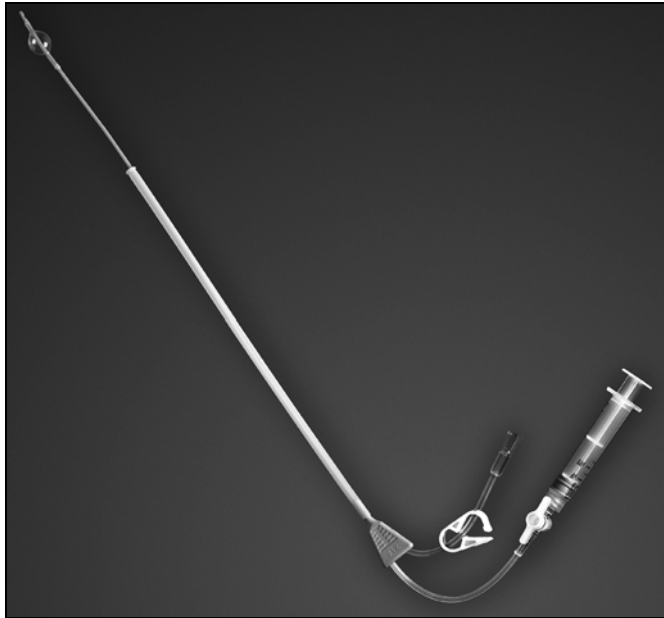
Proper usage of the tenaculum is important to minimize any discomfort the patient may experience. When using the tenaculum and the Jarcho cannula, only a small amount of tissue is necessary for adequate traction. Advise the patient that she may feel a bit of pressure so that she will not be startled. The more tissue that is grasped, the more discomfort the patient will feel. The tenaculum is a ratchetlike instrument; the more cogs engaged, the greater the closing force that is exerted. It is only necessary to click to the first pawl. Practice closing the tenaculum without having the ratchets audibly click because patients may find the noise of the instrument closing disturbing.

Place the Jarcho cannula in the external os just below the single-tooth tenaculum. Remember to have primed the cannula with the radiopaque contrast agent being used before inserting it to eliminate inadvertent air-bubble injection into the endometrial cavity because space-occupying bubbles may confuse interpretation and unnecessarily prolong the procedure. For patients with significant stenosis of the external os, displacement of the Jarcho cannula often occurs during removal of the speculum. In this situation, thought should be

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Fig. 2—Examples of catheters used in hysterosalpingography and saline infusion sonohysterography.

A, Elliptosphere balloon catheter (CooperSurgical).
B, Goldstein intrauterine catheter (Cook Ob/Gyn).



A



B

given to leaving the speculum in place during the HSG study.

Although many gynecologists and radiologists leave the speculum in place for the duration of the HSG, this practice sometimes obscures visualization of the pelvis, making the procedure longer. This is particularly appropriate with retroverted uteri. If you opt to remove the speculum, careful and slow removal is required to avoid dislodgment of the cannula. When the speculum clears the cervix—and not before—release the thumbscrew and maintain the speculum in its open position with your thumb. Close the blades as the speculum emerges from the introitus, avoiding both excessive stretching and also pinching of the mucosa. If the speculum is removed for the procedure, subsequent replacement is required after the study to make sure the tenaculum has not caused any cervical bleeding or lacerations. If present, these conditions require prompt attention. Often pressure at the site of bleeding for a few minutes (applied with a 2 × 2 or 4 × 4 sterile sponge at the end of a grasping instrument) or application of silver nitrate is all that is necessary to assure he-

mostasis. Be sure to remove any clots and/or blood with a sponge stick.

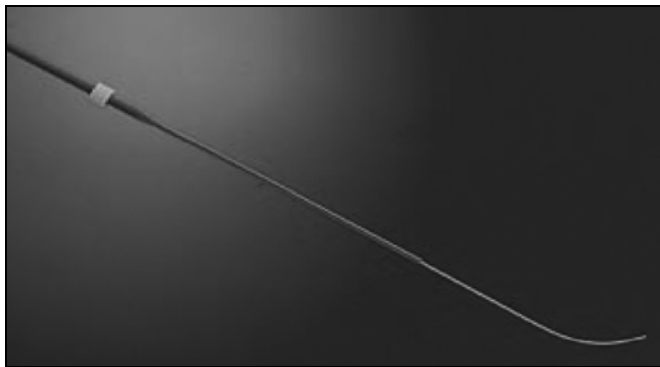
An increasing number of clinicians are using catheters typically reserved for SIS for the HSG procedure [16]. Balloon catheters (Fig. 2A) are advantageous in that they typically do not require tenaculum placement for cervical traction except in cases of cervical stenosis. You should advance the catheter just past the internal os; avoid touching the fundus of the uterus with the catheter tip because this can cause pain and/or produce a vasovagal response. The technique is similar to that used with the Jarcho cannula. Ensure that the balloon catheter is primed with the appropriate contrast agent (radiopaque dye for an HSG or saline for an SIS) to prevent the infusion of air bubbles that can cause image degradation and pain. Placement of the catheter in the cervical canal is acceptable, but great care must be taken to avoid overzealous traction in attempting to make sure the catheter doesn't dislodge during the procedure.

There are many catheter systems including rigid systems or flexible catheters with and without a balloon system (Fig. 2B). However,

patients with a patulous and/or an incompetent cervix or those with an enlarged uterus are best examined with the balloon systems or an 8-French pediatric Foley catheter. The balloon should be filled with fluid to avoid artifact. Many beginners inadvertently fill the balloon with air, thereby completely obscuring visualization of posterior structures on a sonogram. After upper fundal (and tubal, if applicable) assessment, decompress the balloon while injecting more fluid to ensure adequate visualization of the lower uterine segment. SIS and HSG studies with a balloon catheter are usually performed with the speculum removed before the actual imaging is performed.

A recent clinical trial in 610 women compared the characteristics of 6 different catheters for performing SIS, seeking to identify those that offered the best compromise between reliability, tolerability, and cost [17]. Ninety-three percent of studies were correctly performed and no differences were found between the catheter systems. The Foley cath (Wembley Rubber Products) was the most difficult for the physician to use and required

Fig. 3—Echosight Patton Coaxial Catheter (Cook Ob/Gyn) has proven useful in patients with severe cervical stenosis.



the most time to position correctly. The Goldstein Catheter (Cook Ob/Gyn) (Fig. 2B) was the best tolerated by the patients. The Foley-cath was the cheapest, and the PBN Balloon (PBN Medicals) was the most expensive. Overall, given the good utility of all of the catheters, the choice of a particular catheter may be directed by operator preference.

Often overlooked in the performance of HSG or SIS is a readily obtainable assessment: the condition of the cervical canal. Easy placement of the catheter through the internal os to the uterine cavity should be noted. This is valuable information, particularly for women undergoing intrauterine insemination or in vitro fertilization. Use of the Jarcho cannula will not give such information.

An often challenging issue is the stenotic cervix. When the patient is nulliparous, has had previous cone biopsies or loop electrosurgical excision procedures, or is peri- or postmenopausal, the physician should be alert to such a possibility. Sometimes a metal stylet can be introduced through the catheter to add firmness. Gentle traction with a single-tooth tenaculum may aid in such cases. Whereas a tenaculum is required for countertraction when a Jarcho cannula is used for a conventional HSG, we almost never use one during SIS procedures. Although proper technique minimizes the discomfort associated with their use, we prefer to avoid using the tenaculum if at all possible.

Stylets (sounds) have been used to attempt to dilate the cervix in patients with severe cervical stenosis. If used, select the smallest possible sound initially, make sure that you are not creating a false tract or perforation, and be aware that use of a sound can be uncomfortable for the patient. Our personal preference is to use an Echosight Patton Coaxial Catheter (Cook Ob/Gyn), which has proven to be very helpful in these instances [18] (Fig. 3). This catheter system consists of two parts fitted coaxially. The outer sheath of the catheter (which

has echogenic characteristics to facilitate imaging at the time of sonography if being used for SIS) is 5.7 French, through which passes an inner guidewire 0.018 inches in diameter with a coudé tip. The inner wire is firm yet flexible, allowing for maneuvering through strictured or narrowed canals. Because of the severe stenosis, the need for a balloon to prevent cervical egress of fluid media is highly unlikely.

When the examination is complete, replace and withdraw the speculum slowly in patients requiring cervical reassessment (e.g., tenaculum placement to assess for bleeding). For the balloon systems, ensure that the balloon is empty before withdrawing the catheter. The balloon is usually already deflated because you should have emptied it earlier to adequately assess the lower uterine segment.

At this point the procedure is almost finished, but the end is just as important as the previous parts. Slow, controlled removal of the speculum (if it was left in place for the imaging part of the procedure) is key to avoid both excessive stretching or, conversely, pinching of the mucosa. Assist the patient up from the semirecumbent position to end the examination on a positive tone. Inform the patient of the examination results if asked. This is easy and the humane thing to do in the case of a normal or nearly normal examination. Multiple surveys have shown that patients prefer to be told the results of their examination at the time of the study by the radiologist [19–22].

For significant abnormal results, use your best judgment. Knowledge of the disease physiology, experience, and a close working relationship with the referring clinician all make it easier to convey preliminary results to the patient. Make sure, however, that the information conveyed is appropriate and does not extend to treatment and that the patient understands that a full and complete discussion will be forthcoming shortly from her clinician. Remind the patient of possible cramps

that can be treated with NSAIDs as necessary, spotting that may occur, and to avoid intercourse for a few days so as to minimize the (already small) risk of infection.

What should you include in your report? Besides discussing the morphology of the endometrial cavity, the referring physician will appreciate mention of the ease of cervical cannulation and whether there was internal or external cervical stenosis. Describe uterine morphology (size, position, fibroids, etc.). For HSG, mention not only tubal patency but also whether there was free spill into the surrounding bowel or whether the contrast was loculated at one site. Compare the results with old reports if available.

Conclusion

Many patients come to us with fear and trepidation regarding the dreaded HSG/SIS. You can change that image with slow, empathetic, and correct technique. Not only will this make for a happy patient, but proper technique will increase your technical efficiency and success rate, allowing you to obtain more useful diagnostic information and thereby better assist the patient and her clinician.

References

- [No authors listed] The American Fertility Society classifications of adnexal adhesions, distal tubal occlusion, tubal occlusion secondary to tubal ligation, tubal pregnancies, müllerian anomalies and intrauterine adhesions. *Fertil Steril* 1988; 49:944–955
- Berridge DL, Winter TC. Saline infusion sonohysterography: technique, indications, and imaging findings. *J Ultrasound Med* 2004; 23:97–112; quiz 114–115
- Goldstein RB, Bree RL, Benson CB, et al. Evaluation of the woman with postmenopausal bleeding: Society of Radiologists in Ultrasound–Sponsored Consensus Conference statement. *J Ultrasound Med* 2001; 20:1025–1036
- Parsons AK, Lense JJ. Sonohysterography for endometrial abnormalities: preliminary results. *J Clin Ultrasound* 1993; 21:87–95
- Ayida G, Chamberlain P, Barlow D, Kennedy S. Uterine cavity assessment prior to in vitro fertilization: comparison of transvaginal scanning, saline contrast hysterosonography and hysteroscopy. *Ultrasound Obstet Gynecol* 1997; 10:59–62
- Kim AH, McKay H, Keltz MD, Nelson HP, Adamson GD. Sonohysterographic screening before in vitro fertilization. *Fertil Steril* 1998; 69:841–844
- Lindheim SR, Sauer MV. Upper genital-tract screening with hysterosonography in patients receiving donated oocytes. *Int J Gynaecol Obstet*

Hysterosalpingography and Sonohysterography

- 1998; 60:47–50
8. Hill A. Sonohysterography in the office: instruments and technique. *Contemp Obstet Gynecol* 1997; 42:95–110
 9. Lang, EV, Hatsiopoulou O, Koch T, et al. Can words hurt? Patient-provider interactions during invasive procedures. *Pain* 2005; 114:303–309
 10. Bonnamy L, Marret H, Perrotin F, Body G, Berger C, Lansac J. Sonohysterography: a prospective survey of results and complications in 81 patients. *Eur J Obstet Gynecol Reprod Biol* 2002; 102:42–47
 11. Dajani AS, Taubert KA, Wilson W, et al. Prevention of bacterial endocarditis: recommendations by the American Heart Association. *Clin Infect Dis* 1997; 27:1794–1801
 12. Dajani AS, Taubert KA, Wilson W, et al. Prevention of bacterial endocarditis. Recommendations by the American Heart Association. Available at: <http://circ.ahajournals.org/cgi/content/full/96/1/358>. Accessed November 1, 2005
 13. Bates B. *A guide to physical examination*. Philadelphia, PA: JB Lippincott Co, 1979:230–248
 14. Jarcho J. Uterosalpingography: roentgenological visualization of the cavity of the uterus and fallopian tubes after the injection of iodinated oils. *Surg Gynecol Obst* 1927; 45:129–142
 15. Marshak RH, Poole CS, Goldberger MA. Hystero-graphy and hysterosalpingography: an analysis of 2,500 cases with special emphasis on technique and safety of the procedure. *Surg Gynecol Obst* 1950; 91:182–192
 16. Lindheim SR, Morales AJ. Comparison of sonohysterography and hysteroscopy: lessons learned and avoiding pitfalls. *J Am Assoc Gynecol Laparosc* 2002; 9:223–231
 17. Dessole S, Farina M, Capobianco G, Nardelli GB, Ambrosini G, Meloni GB. Determining the best catheter for sonohysterography. *Fertil Steril* 2001; 76:605–609
 18. Lindheim SR. Echosight Patton coaxial catheter-guided hysteroscopy. *J Am Assoc Gynecol Laparosc* 2001; 8:307–311
 19. Levitsky DB, Frank MS, Richardson ML, Shneidman RJ. How should radiologists reply when patients ask about their diagnoses? a survey of radiologists' and clinicians' preferences. *AJR* 1993; 161:433–436
 20. Schreiber MH. Direct disclosure by radiologists of imaging findings to patients: a survey of radiologists and medical staff members. *AJR* 1996; 167:1091–1093
 21. Schreiber MH, Leonard M Jr, Rieniets CY. Disclosure of imaging findings to patients directly by radiologists: survey of patients' preferences. *AJR* 1995; 165:467–469
 22. Valley SR, Mills JO. Should radiologists talk to patients? *BMJ* 1990; 300:305–306

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