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Opinion

Fear no pain: uterine cavity and tubal patency assessment tests should be pain free

Introduction

Women should not fear pain from tests performed for the evaluation of the uterine cavity and tubal patency. While pain is an unpleasant sensation or emotion, it is part of the body's natural mechanism to warn of cellular or tissue damage. A fear of pain may activate an immediate withdrawal reflex in order to avoid the painful experience and the expected harm. Hysterosalpingography (HSG) has a longstanding reputation for being a painful test. The modern ultrasound-based procedures that are currently used instead of HSG to evaluate the uterine cavity and/or Fallopian tubes – sonohysterography (SHG) and hysterosalpingo-contrast sonography (HyCoSy) – have 'inherited' the fear of pain. Yet, several recent randomized controlled trials (RCT) have failed to demonstrate a significant benefit of various pharmacological strategies available to reduce pain during any of these procedures. If different medications fail to reduce the sensation of pain in multiple RCTs, is it possible that the 'fear of pain', rather than tissue damage is a major factor in determining patients' perception during these procedures? Using gentle technique and modern thin flexible catheters, I am able to routinely perform hundreds of pain-free tests each year. Here I will discuss the evidence-based data supporting my opinion and experience and suggest that it is time for a change. Women naturally may feel embarrassed and uncomfortable with any gynecological examination. Nevertheless, they should no longer fear pain from procedures such as SHG, HyCoSy and HSG.

Pain perception in gynecological procedures

While not all women visit their gynecologists regularly, all agree that gynecological checkups are necessary[1]. Szymoniak *et al.*[1] recently asked 100 women about their opinion of gynecological examination. 70% of them found it embarrassing and stressful. Interestingly, the most embarrassing events were climbing into the gynecological chair (47%) and preparation for the examination (30%), whereas the least embarrassing component was the gynecological examination itself (21%). Speculum insertion is the common initial step for all gynecological procedures. Fear of pain with speculum insertion has been shown to be a barrier to patient compliance with routine examination for cervical cytology screening[2]. In order to decrease anxiety and pain during gynecological examinations and to improve patient comfort, different types of speculum, patient position, speculum self-insertion and the use of lubricating gel or water have been investigated[3–8]. The effectiveness of the routine use of lubricating gel for pain reduction during vaginal speculum insertion was compared to use of water[8]. This 2012 RCT[8] demonstrated that inserting a speculum with lubricating gel significantly reduced the sensation of pain by 0.74 cm on a visual analog pain scale. However, it is important to remember that while the difference was significant statistically, a difference smaller than 0.9 cm is not considered to be significant clinically[9]. Further RCTs are needed in order to clarify this relatively simple, yet very important issue of pain with speculum insertion.

The respondents in the study of Szymoniak *et al.*[1] preferred doctors to be nice, good-tempered and communicative. Unfortunately, not all of us are like that at some parts of the day. Do we notice when the patient is stressed or relatively relaxed? When needed, do we spend the extra minute to try to calm her down? Do we adjust the speculum size to the woman we are about to examine? Do we use a cold metal speculum, or do we warm it first? Do we insert the speculum slowly and gently or quickly? Do we use a tenaculum for uterine traction? There are no RCTs (evidence level I) to answer all of these fairly pertinent questions. For now, we have to use our common sense and good bedside manner and learn from experts' opinion (evidence level III) on how to improve our technique and patient care.

The fear of pain

HSG is still widely used as a first-line procedure for evaluation of female infertility. When HSG was originally performed, with rigid metal cannulae and oil-based or ionic contrast media, moderate to severe pain was a common complaint[10]. HSG, therefore, earned the reputation of being a painful test, which in turn increased the fear of pain from this type of procedure. The main technical advances in recent years have been aimed at reducing radiation exposure in patients, reducing patient pain and discomfort, and providing maximum technical ease in performing the procedure. In order to achieve these goals, contrast media that are less ionic have been developed and disposable thin catheters were introduced to replace the traditional metal cannulae[10–15]. We performed a prospective, randomized, blinded study to compare HSG with a balloon catheter versus HSG with a metal cannula[13], and demonstrated that using a balloon catheter induces less pain, requires significantly less fluoroscopic time and smaller amounts of contrast medium, and is easier for the physician to perform. Other

RCTs have demonstrated balloon catheters to be better tolerated than are cervical caps[16] and the use of oral non-steroidal premedication provided no additional pain reduction over the use of thin balloon catheters[15]. While RCTs found that the use of new catheters significantly reduced discomfort and pain sensation among women undergoing HSG, the 'rumor' that it is a painful procedure nevertheless remains.

Thanks to ultrasound, the role of HSG as the most common source of information about the uterus has evolved to a more minor one. SHG (also called saline infusion sonography (SIS) or hysterosonography (HSN)) has become a routine test for the evaluation of the uterine cavity in the investigation of infertility and abnormal uterine bleeding[10,17–21]. The use of contrast media such as saline/air or Echovist-200® (Schering AG, Germany) with HyCoSy has permitted the additional evaluation of Fallopian tubal patency[10,22–28]. Several studies have documented the reliability of HyCoSy, using air mixed with saline or a solution of galactosemicroparticle with air microbubble suspension (Echovist-200), in diagnosing tubal patency by comparing it to HSG and/or laparoscopy and dye studies[10]. Saunders *et al.*[10] concluded that HyCoSy is an acceptable screening method for infertility since it permitted comprehensive evaluation of the uterus and Fallopian tubes, while remaining a simple, cost effective and short procedure. Hamilton *et al.*[26] examined the performance of HyCoSy as a first-line outpatient investigation of tubal patency in 500 consecutive infertile women. The procedure was completed successfully in 92.6% of patients, with only 4.8% of the tubes not being assessed after the first 100 procedures. The concordance rate of HyCoSy with previous laparoscopic findings was 85.8%. About 50% of patients described only mild discomfort and there were no significant post-procedural complications. The authors concluded that HyCoSy appears to be an acceptable first-line screening test for tubal infertility. We investigated the implementation and learning curve of HyCoSy as a new medical procedure to assess tubal patency in 215 women in 12 medical centers[27]. HyCoSy had 83% and 87% concordance with HSG and laparoscopy, respectively. In the first 10 sequential cases, 26% of women reported pain compared with only 7% among cases 11–20 ($P < 0.001$). Logistic regression analysis revealed that both the case order and the volume of Echovist used (13.1 ± 5.9 mL in cases 1–10 vs 8.9 ± 5.5 mL in cases 11–20; $P < 0.001$) significantly contributed to the reporting of pain ($P < 0.01$). These two studies clearly demonstrate the critical role of the operator learning curve and the volume of contrast medium injected in pain sensation by patients. Ultrasound imaging has been used not only for diagnostic purposes but also for guidance of transcervical tubal catheterization (TTC) to open proximal tubal obstruction, which is usually performed under fluoroscopic or hysteroscopic guidance[29–34]. HyCoSy can also be used to visualize opening of the Fallopian tubes when TTC is performed under ultrasound guidance[33,34].

With advances in ultrasound imaging, SHG and HyCoSy have replaced HSG for evaluation of the uterine cavity and Fallopian tubal patency in many centers worldwide[10,19,20,23,25]. These ultrasound-based procedures appear to have inherited the fear of pain associated with the HSG procedure that they replaced. The issue now is whether this fear is justified. If it is, then I contest that pain medication should help; if it is not, then it is time for a change in the culture of patient expectation.

Changing the culture of patient expectation

Pain is a subjective feeling composed of emotional and cognitive elements and its evaluation as a symptom may therefore be complicated. Tolerance of, and response to pain differ between individuals. However, a peripheral stimulation will usually cause pain at the same level in most people. The self-assessed visual analog scale and RCT methodology may overcome difficulties in pain research[35,36]. In order to assess whether the fear of pain, rather than the pain itself, is a major factor in determining patient's perception during SHG, HyCoSy and HSG, two questions should be answered. First, what is the relationship between the preprocedural emotional fear-of-pain state of the patients and their pain tolerance? Second, do pain medications reduce the sensation of pain?

Apprehension and pain

Sohail[37] investigated variables affecting the immediate pain tolerance of 250 women undergoing HSG performed by the same radiologist. Apprehension was significantly associated with intolerable pain during the procedure, while calm emotional state and self motivation were associated with good pain tolerance.

The impact of anxiety on pain perception was also investigated in 102 patients undergoing periodontal or implant surgery[38]. Patients with high pretreatment anxiety reported that the surgery was more uncomfortable than did patients with low anxiety levels.

Do pain medications reduce pain?

Pain killers such as anti-prostaglandins, acetaminophen, local anesthetics and opiates decrease pain sensation by several mechanisms: acting primarily in the periphery by reducing prostaglandin production, intercepting nerve pain signals, blocking the transfer of pain signals from the spinal cord to the brain, and/or blocking pain impulses in the brain itself. The question is whether or not to treat women with pain medication before SHG, HyCoSy or HSG.

Most recent large RCTs failed to demonstrate a significant benefit of various pharmacological strategies to reduce pain during these procedures[35,36]. A 2007 Cochrane review[35] on pain relief for HSG summarized eight RCTs involving 570 women. Overall, the conclusion was that there was no evidence of significant benefit in using any analgesia compared to placebo for pain

relief during HSG. Four RCTs ($n = 270$) demonstrated evidence of benefit for pain relief more than 30 min after HSG. They recommended that further RCTs consider the role of non-steroidal anti-inflammatory agents and intrauterine anesthetic during HSG[39,40]. A 2011 systematic review and meta-analysis found no beneficial effect of any pharmacological interventions for pain relief during HSG[36].

Although it has been found that women better tolerate SHG and HyCoSy compared to HSG[41,42,43], should we expect painkillers to significantly reduce pain during SHG and HyCoSy or will there be no effect, as with HSG? In a large double-blind RCT in this issue of the Journal, Moro *et al.*[44] demonstrated no significant pain reduction with an antispasmodic drug compared with placebo in patients undergoing HyCoSy with 30 mL 1 : 1 saline and air. In this study, 816 patients undergoing HyCoSy were randomized to receive 10 mg hyoscine-N-butylbromide or placebo. A 6-Fr (2-mm diameter) Foley catheter was inserted into the uterine cavity and the balloon of the catheter was inflated with 1.5–2 mL sterile saline to secure the catheter. There was no significant difference in pain scores between the groups; 84.7% of women in the placebo group and 79% of those in the study group felt no discomfort or had only slight pain. Similar to other studies, statistically significant differences emerged in pain scoring according to Fallopian tubal patency, regardless of whether the patient received drug or placebo treatment ($P < 0.0001$). Tubal patency appeared to be closely related to pain perception during HyCoSy, since women with bilateral tubal stenosis experienced higher rates of severe discomfort, pain and/or vagal effects compared with patients with patent tubes in both groups. Jareethum *et al.*[45] compared two different analgesic drugs, hyoscine-N-butylbromide and mefenamic, versus placebo for pain relief during SHG in a double-blind RCT. No statistically significant differences were found in pain reduction between the three groups, similar to the results of Moro *et al.*[44].

The technique

The technique used and the experience of the physician performing the procedure significantly affect patient discomfort and pain[46–54]. The American College of Obstetricians and Gynecologists recently published a Technology Assessment in Obstetrics and Gynecology on SHG[17,18], developed jointly with the American College of Radiology and the American Institute of Ultrasound Medicine. It stated: 'Physicians who perform or supervise diagnostic SHG should be skilled in vaginal ultrasonography and transcervical placement of catheters; should have training, experience, and demonstrated competence in gynecologic ultrasonography and SHG; and should keep careful records'.

It would take less than a minute to remind the patient that, as she was told at the time of scheduling the procedure, she need not fear pain, but she may expect slight pressure or discomfort, similar to or less than that experienced during menstruation. While this may not concur with what she has read on the Internet, it is still the case.

We have previously discussed factors that may affect pain sensation during speculum insertion. I believe that size does matter, and that the speculum size should be adjusted to the woman and be inserted *slowly*. If the speculum is cold, we should not be surprised that it will be a very uncomfortable experience for the patient. Unless one still uses a metal cannula, the use of tenaculum for uterine traction may only rarely be needed.

There is no such thing as a 'difficult' cervix; there is no need to 'struggle' with it. With a sharp angle between the cervix and the uterus, it may be difficult for the physician to insert the catheter. Flexible catheters are easier to insert than rigid ones in this situation. If they are curved slightly (the cervix is not a straight line) they should always glide into the cervix. If a balloon catheter is used, intracervical inflation of the balloon is easier to perform compared with intrauterine inflation and has been shown by an RCT to result in significantly less pain and in a decreased volume of medium needed to complete the SHG[47].

An important lesson, learned from accumulated experience with embryo transfer under ultrasound guidance, is that the angle between the cervix and the uterus will straighten when the bladder is moderately full and this will significantly ease catheter insertion. It is simple to ask the patient not to empty her bladder before the procedure. This is contrary to routine practice in most centers worldwide, where women are asked to empty their bladder before gynecological procedures. Admittedly, the patient may feel slight pressure and discomfort because of a full bladder, but that does not compare to the pinch of the tenaculum.

If a tenaculum is still required to complete the procedure, Lidocaine spray or injection of 0.5–1.0 mL 1% Lidocaine into the cervix (small needle size, #22 or #23) immediately before grasping it may eliminate the pain completely. When pulling the cervix, the patient should be warned and the operator should be gentle, avoiding sharp movement.

With the catheter *in situ* and the speculum removed, the patient should be warned that the vaginal ultrasound probe is about to be inserted. I usually ask the patient to look at the ultrasound screen or monitor as a distraction. The patient should be informed that she may feel pressure with the injection of the medium. Most importantly, the medium should be injected slowly and constantly. The uterus is pressure sensitive. The pressure inside the uterine cavity depends on the rate and volume injected and whether the Fallopian tubes are open or blocked. Once the required clinical information has been obtained, injection should cease. For HSG, non-ionic medium should be used. SHG or HSG can usually be completed with only 3–7 mL medium, as with gel instillation[21,51,52]. With balloon catheters, we prepare a 10-mL syringe of medium for the procedure. With other non-balloon cannula/catheters, a 20-mL syringe may be needed since the cervix may not be completely sealed. Larger syringes should be avoided in

order to prevent the temptation to use all of the prepared medium. On completing the test, my favorite question to my patients is: 'Can I begin the procedure?' Most of them will simply answer, 'Yes, sure. . . .'

Conclusion

While women naturally may feel embarrassed and uncomfortable with any gynecological examination, they should not fear pain from tests such as SHG, HyCoSy and HSG for uterine cavity and tubal patency assessment. In order to rebut the reputation of a painful test, all those who perform these procedures should incorporate a more gentle and modern technical approach. Resetting patients' expectations for a pain-free procedure may be achieved by continuous medical education in improving our technique. Patients will, of course, feel pressure and discomfort, as expected, and some may still feel mild pain, but in 99% of cases, they should feel no more than that. Whether you are a gynecologist or a radiologist, improving your technique, using thin flexible catheters and gentle movements, inflating the balloon intracervically and injecting warm medium slowly, will establish SHG, HyCoSy and HSG as essentially painless procedures.

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