SHORT COMMUNICATIONS

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Intraoperative Applications of Saline Infusion Ultrasonography

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INTRODUCTION

The use of abdominal or transvaginal sonography combined with the introduction of saline into the upper genital tract, called sonohysterography (SHG), has become a routine gynecologic procedure for diagnostic evaluation of uterine cavity pathology. Its use has been applied in the evaluation of women with infertility, recurrent miscarriage, and abnormal uterine bleeding, as well as the assessment of tubal anatomy (1). Newer applications continue to be described including therapeutic intervention with ultrasound-guided fallopian tube cannulation for proximal tubal obstruction (2) and intrauterine biopsy and resection using concomitant transvaginal SHG (3).

Intraoperative ultrasonography has been described for procedures such as dilation and evacuation for cervical stenosis and assuring complete removal of products of conception, removal of impacted foreign bodies, operative hysteroscopy, and placement of intrauterine tandem apparatus for intracavitary radiation to avoid uterine perforation (4–6). We now report the use of SHG as an adjunct to operative hysteroscopy and laparotomy and discuss its role for intrauterine, endoscopic procedures.

MATERIALS AND METHODS

From January 1998 to September 1998, 20 cases of ultrasonography which were performed in conjunction

with surgery were logged. Twelve of these cases had instillation of normal saline while performing ultrasound (SHG). We report on five selected cases to demonstrate its applicability. Each case had pathology detected preoperatively by SHG in four patients and by hysterosalpingogram (HSG) in the other as described previously (1). One patient was scheduled for an abdominal myomectomy, while four patients were referred for office hysteroscopy.

Office hysteroscopy was performed with either paracervical block anesthesia supplemented with mild intravenous sedation plus sedation or light general anesthesia by face mask or laryngeal mask airway. A MicroSpan Hysteroscopy System (Gynecare Inc., Menlo Park, CA) or an HysteroSys Flexible Hysteroscope System (BEI Medical Systems, Hackensack, NJ) was used for operative purposes.

Intraoperative SHG was performed using either a 2-mm H-S catheter (Ackrad Labs, Cranford, NJ) or a 9-Fr cervical access catheter (CAC) with a 3-ml balloon (BEI Medical Systems, ZSI Gynecology Products Division, Chatsworth, CA), which was placed and distended in the cervical canal or lower uterine segment. The uterine cavity was distended with 5 to 10 ml of sterile saline and visualized using transvaginal sonography. For resection, a curette, loop, or finger-like biopsy grasper was then placed adjacent to an HS catheter or passed through the CAC with resection under ultrasound guidance (3). Biopsied samples were sent to pathology for definitive diagnosis.

Tubal cannulation was performed using a tubal access catheter system (TAC) (BEI Medical Systems, ZSI Gynecology Products Division). The latter entails the placement of a 32-cm 9-Fr catheter with a 0.035-in.-diameter inner curved guidewire introduced through the operative port and directed toward the uterine cornua with back-and-forth movements of the guidewire. The guidewire was then removed and 20 ml of contrast material [Albunex; 5% albumin (human), sonicated; Malincrodt Inc., St. Louis, MO] was injected through the TAC. Concomitant vaginal or

abdominal sonography (Siemens Medical Systems, Inc., Issaquah, WA) was performed.

RESULTS

Case 1

A 49-year-old female G1 P1 with secondary infertility was to undergo ovum donation. Preoperative evaluation revealed diffuse, intramural leiomyomata with apparent submucosal involvement. She was consented for abdominal myomectomy. Following removal of her grossly enlarged myoma(s), intraoperative SHG demonstrated smaller intramural leiomyomas, some with submucosal involvement, that could not be appreciated by gross palpation (Fig. 1). These were removed and the patient is currently in her second trimester of pregnancy.

Case 2

A 28-year-old female G1 P0 with secondary infertility had an HSG revealing proximal tubal occlusion. She was referred for attempted proximal tubal cannula-

tion after having failed fluoroscopic cannulation. Options included hysteroscopic tubal cannulation with laparoscopic visualization or ultrasound-guided visualization using Albunex. The patient chose the latter. Figures 2 and 3 demonstrate the left tubal ostia being cannulated with a TAC, while concomitant ultrasound with Albunex demonstrated persistent cornual obstruction. The patient was referred for in vitro fertilization.

Case 3

A 52-year-old female G0 P0 had a history of IUD use and Ashermans syndrome. Ultrasound and SHG revealed a severely attenuated myometrium (<5 mm from basalis to serosal layer) on the left side of her uterine wall and intrauterine adhesions. Laparoscopy was entertained during operative resection due to concern over lateral wall perforation into the uterine vessels. Instead, intraoperative SHG was concomitantly performed for reassurance during intrauterine resection. She is currently in her second trimester of pregnancy.

Case 4

A 42-year-old female G4 P0 presented with secondary infertility. Preoperative SHG demonstrated a lower

Fig. 1. Intraoperative SHG with submucosal myoma.

Fig. 2. Hysteroscopic tubal cannulation.

uterine segment polyp. Office hysteroscopy was attempted, but adequate distention to allow for resection was unsuccessful due to a patulous cervix. Multiple attempts to occlude the cervical canal were tried. An H-S catheter was placed in the lower uterine segment with balloon distention. Under ultrasound visualization, a sharp curette removed the polyp.

Case 5

A 44-year-old female G3 P1021 presented with secondary infertility and increasing dysmenorrhea and dyspareunia. Pelvic exam revealed a normal size uterus. SHG on the fourth day of her menstrual cycle demonstrated a sac-like structure. The catheter was immediately removed. Following a negative serum β -human chorionic gonadotropin, the study was repeated demonstrating the same presumed submucosal filling defect. Hysteroscopy revealed a normal cavity (Fig. 4). Intraoperative SHG showed the same finding that confirmed the suspicion of adenomyosis or a myometrial inclusion cyst (Fig. 5). The patient is now undergoing ovum donation.

Fig. 3. Albunex with cornual occlusion.

Fig. 4. Normal hysteroscopy.

Fig. 5. Adenomyosis or myometrial inclusion cyst.

DISCUSSION

Intraoperative ultrasound is not a new application for gynecologic procedures and has been utilized for difficult dilation and curettage and hysteroscopic resection for lysis of adhesions and assessing the depth of dissection during myomectomy (4–6). SHG has further aided in the delineation of intrauterine pathology, which can often be obscured by a compressed and thickened endometrium, and allows for better three-dimensional imaging than ultrasonography alone.

SHG has been an important tool in evaluating and treating intrauterine and proximal tubal pathology. The ease of this technique as well as the information that it provides has enabled its application in many ways. We have found it valuable as an intraoperative tool in both a diagnostic and a therapeutic manner, though not all cases utilizing intraoperative ultrasound necessarily required an SHG.

An increasing number of hysteroscopies are being performed to treat submucosal abnormalities, while many are performed under laparoscopic visualization to avoid inadvertent uterine perforation and assess tubal patency. The use of intraoperative SHG allows for three-dimensional imaging of the myometrium and tubal anatomy, which provides information that may allow one to avoid laparoscopy. In Cases 2 and 3, laparoscopy was avoided altogether, representing an enormous cost reduction and a less morbid approach.

While for Case 1, SHG may have added an extra 10 min to the procedure, it highlights the importance of assuring removal of all myomas that are close to or impinging on the uterine cavity. Palpation often fails to delineate pathology and SHG often identifies missed intramural and submucosal lesions that can even be missed with ultrasound alone.

In conclusion, we describe the adjunctive use of SHG in the operating room to help delineate intrauterine pathology. The technique is easy to use, adds little time or cost, and may direct surgery in cases where pathology is too small to palpate easily.

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Steven R. Lindheim¹

Suzanne Kavic

Mark V. Sauer

Department of Obstetrics and Gynecology
Division of Reproductive Endocrinology
Columbia Presbyterian Medical Center
College of Physicians and Surgeons
Columbia University
New York, New York

¹ To whom correspondence should be addressed at Columbia Presbyterian Medical Center, Department of Obstetrics and Gynecology, 622 West 168th Street, New York, New York 10032.