EDITORIAL

Role of Routine Diagnostic Laparoscopy in the Investigation of Infertility¹

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Over the past two decades, endoscopic evaluation of the pelvis has become an integral part of the infertility workup (1). These procedures are expensive (in the United States), relatively invasive, and associated with potentially serious complications. If performed routinely on all infertile patients, there will be a large number of patients with normal findings or with relatively minor pathology that has no impact on pregnancy rates. The question that merits discussion, therefore, is: When should one perform endoscopy in an infertile patient? This very issue was addressed by Hovav *et al.* (2).

Hovav *et al.* retrospectively analyzed 206 laparoscopies that were performed over a 2-year period. They analyzed their data based on the patient's history and found a significantly higher incidence of normal findings in patients with primary infertility and no risk factor. This was not true in patients with secondary infertility, where the presence or absence of a risk factor did not correlate with the findings at laparoscopy. The authors therefore suggest that patients with primary infertility should undergo laparoscopy only if they have additional risk factors. On the other hand,

they suggest that all patients with secondary infertility should undergo diagnostic laparoscopy.

Dr. Marik, in his Letter to the Editor (this issue) suggests from his "experience" that, in addition to risk factors, one must consider length of exposure to conception in deciding who should have laparoscopy. Laparoscopy has the additional advantage of being able to detect incidental upper abdominal pathology. In their response to Dr. Marik's letter, Hovav *et al.* (Letter to the Editors; this issue) further state that the percentage of pathological findings also depends on the population on which it is performed. Both authors report the complete absence of any adverse outcomes in their series using procedures that have potential serious complications.

I would like to use this Editorial to draw attention to remarkable advances that have been made in the field of imaging which can further reduce the need for "routine" diagnostic laparoscopy in the care of infertile patients. These include the use of x-rays, ultrasound, Doppler ultrasound, and three-dimensional ultrasound. The evaluation of patients with these techniques is relatively noninvasive and not only evaluates the anatomy but also can assess the functional status of the pelvic structures.

At our center, since 1992, we have replaced hysterosalpingography (HSG) with a gynecoradiologic procedure (GRP). The details of this procedure have been published previously (3). Use of a standardized technique to perform HSG in combination with state-of-the-art x-ray machines has improved our ability to diagnose and/or rule out abnormalities. Newer x-ray machines have the ability to store images on hard disk, where one can review the entire study on a frame-by-

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frame basis or in real time via video. With the ability to zoom in on areas of interest, and other postprocessing capabilities, it is now possible to evaluate the pelvic structures in great detail with minimal radiation exposure (4). In addition to tubal patency testing, one can treat proximal tubal occlusion with the use of selective salpingography and tubal catheterization (5). It is also possible to evaluate the functional status of the tubes with the measurement of tubal perfusion pressures (6). Other therapeutic procedures such as lysis of intrauterine adhesions and resection of the uterine septum can also be performed under fluoroscopic control (7,8). HSG, however, is not a good modality for the detection of peritubal adhesions (9).

The newer ultrasound machines are capable of evaluating the pelvic structures with remarkable resolution. Evaluation of the uterine cavity by hysterosonography is now standard practice at many institutions (10). Tubal patency testing is relatively simple with the use of ultrasound contrast agents (Albunex, Echovist) or sterile saline with color Doppler (11,12). An advantage of ultrasound over x-ray is the ability to determine the relationship of intramural fibroids to the endometrial stripe (13). This could help in making a decision as to whether the fibroid needs to be surgically removed. With color Doppler it is now possible to differentiate between a septate and a bicornuate uterus (8). The detection of pelvic adhesions using ultrasound can be facilitated with the injection of fluid in the cul-de-sac (14).

Another advance in imaging techniques is three-dimensional ultrasound (15). The newer machines can acquire images without moving the vaginal probe. The data are stored as "voxels", that is, a three-dimensional (3D) pixel that has *x*, *y*, and *z* components. The images can then be viewed in 3D and the image can be rotated in the *x*, *y*, or *z* axis with a simple turn of the dial, providing an optimal diagnostic image. Live 3D scanning consists of continuous acquisition and instantaneous rendering of 3D anatomy. This makes it relatively easy to map fibroids or differentiate between a septate and a bicornuate uterus.

Ultrasound also helps determine the functional status of the pelvic structures. Measurements of endometrial thickness, subendometrial blood flow, ovarian stromal blood flow, ovarian volume, polycystic appearing ovaries, follicular blood flow, antral follicular count, and uterine artery blood flow all give functional information which is not possible to obtain with endoscopy (16–19).

The time has come to reevaluate the role of routine diagnostic laparoscopy and hysteroscopy as part of the infertility workup. A detailed history is still important

when evaluating a couple. The decision to proceed with diagnostic laparoscopy, however, should be based on more than just a history (e.g., secondary infertility, risk factors, prolonged duration of infertility). It is imperative that we update our imaging skills. Imaging techniques can give a very accurate picture of the pelvic structures with minimal complications and cost. Patients with a negative workup do not need endoscopy. On the other hand, patients with surgical problems should be taken to the operating room without further delay. Dr. Hovav very correctly concludes, in his reply to Dr. Marik, that the efficiency of laparoscopy should not be measured according to the number of pathologies it discovers, but according to the improvement in pregnancy rates.

REFERENCES

1. Jones HW, Toner J: The infertile couple. *N Engl J Med* 1993;329:1710–1715
2. Hovav Y, Hornstein E, Almagor M, Yaffe C: Diagnostic laparoscopy in primary and secondary infertility. *J Assist Reprod Genet* 1998;15:535–537
3. Karande VC, Pratt DE, Rabin DS, Gleicher N: The limited value of hysterosalpingography in assessing tubal status and fertility potential. *Fertil Steril* 1994;63:1167–1171
4. Karande VC, Pratt DE, Balin MS, Levrant SG, Morris RS, Gleicher N: What is the radiation exposure to patients during a gynecoradiologic procedure? *Fertil Steril* 1997;67:401–403
5. Gleicher N, Pratt D: Transvaginal procedures for infertility. In *Progress in Infertility*, 4th ed, SJ Behrman, GW Patton Jr, G. Holtz (eds). Boston, Little, Brown, 1994, pp 225–248
6. Karande VC, Pratt DE, Rao R, Balin M, Gleicher N: Elevated tubal perfusion pressures during selective salpingography are highly suggestive of tubal endometriosis. *Fertil Steril* 1995;64:1070–1073
7. Gleicher N, Pratt D, Levrant S, Rao R, Balin M, Karande V: Gynaecoradiological uterine resection. *Hum Reprod* 1995;10:1801–1803
8. Karande V, Gleicher N: Resection of uterine septum using gynecoradiologic techniques. *Hum Reprod* 1999;14:1226–1229
9. Opsahl MS, Miller B, Klein TA: The predictive value of hysterosalpingography for tubal and peritoneal infertility factors. *Fertil Steril* 1993;60:444–448
10. Parsons AK, Lense JJ: Sonohysterography for endometrial abnormalities: Preliminary results. *J Clin Urol* 1993;21:87–95
11. Deichert U, Shclief R, Van de Sandt M, Juhnke I: Transvaginal hysterosalpingo-contrast-sonography (Hy-Co-Sy) compared with conventional tubal diagnostics. *Hum Reprod* 1989;4:418–424
12. Peters AJ, Coulam CB: Hysterosalpingography with color Doppler ultrasonography. *Am J Obstet Gynecol* 1991;164:1530–1534
13. Cicinelli E, Romano F, Anastasio PS, Blasi N, Parisi C, Galantino P: Transabdominal sonohysterography, transvaginal sonohysterography, and hysteroscopy in the evaluation of submucous fibroids. *Obstet Gynecol* 1995;85:42–47

14. Guerriero S, Ajossa S, Lai MP, Mais V, Paoletti AM, Melis GB: Transvaginal ultrasonography in the diagnosis of pelvic adhesions. *Hum Reprod* 1997;12:2649–2653
15. Zaidi J, Campbell S, Pittrof R, Tan SL: Endometrial thickness, morphology, vascular penetration and velocimetry in predicting implantation in an in vitro fertilization program. *Ultrasound Obstet Gynecol* 1995;6:191–198
16. Jurkovic D, Geipel A, Gruboeck K, Jauniaux E, Natucci M, Campbell S: Three-dimensional ultrasound for the assessment of uterine anatomy and detection of congenital anomalies: A comparison with hysterosalpingography and two-dimensional sonography. *Ultrasound Obstet Gynecol* 1995;5:233–237
17. Chang M-Y, Chang Ch-H, Hsieh T-T, Soong YK, Hsu KH: Use of the antral follicle count to predict the outcome of assisted reproductive technologies. *Fertil Steril* 1998;69:505–510
18. Lass A, Skull J, McVeigh E: Measurement of ovarian volume by transvaginal sonography before ovulation induction with human menopausal gonadotrophin for in-vitro fertilization can predict poor response. *Hum Reprod* 1997;12:294–297
19. Engmann L, Sladkevicius P, Agarwal R, Bekir JS, Campbell J, Tan SL: Value of ovarian stromal blood flow velocity measurement after pituitary suppression in the prediction of ovarian responsiveness and outcome of in vitro fertilization treatment. *Fertil. Steril* 1999; 71: 22–29