

# Role of NOTES in the Diagnosis of Women Pelvic Pathologies

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## Abstract

Standard diagnostic laparoscopy is considered the gold standard to investigate pelvic pathologies (tubal pathology, endometriosis, and adhesions...). It gives a panoramic view of the pelvis. But the invasiveness of diagnostic laparoscopy has almost eliminated its pure diagnostic role from contemporary management of common pelvic pathologies. It consequently appears interesting to propose an endoscopy diagnostic procedure as powerful as the laparoscopy but less invasive which doesn't require general anesthesia and full operative facilities. This is the case of transvaginal hydrolaparoscopy (THL) which proved its efficiency while being as precise as standard diagnosis laparoscopy.

**Keywords:** Laparoscopy, transvaginal hydrolaparoscopy, NOTES, pelvic pathologies, fertiltoscopy, infertility.

## AIMS AND OBJECTIVES

The aim of the present review is to evaluate the usefulness and to establish the diagnostic accuracy of the transvaginal hydrolaparoscopy as an alternative method to investigate the woman pelvis in comparison of standard laparoscopy in the same patient, using different parameters like: patient selection, operative technique, operating time, intraoperative and postoperative complications, postoperative pain and amount of narcotic used, time until resumption of diet, postoperative morbidity, hospital stay, cost effectiveness and quality of life analyses.

## MATERIAL AND METHODS

A literature search was performed using Google, Yahoo, AltaVista and Highwire press. The following search terms were used: "diagnostic laparoscopy and pelvic pathologies almost 3000 citations were found. When we have searched "the role of NOTES in the diagnostic of pelvic pathologies" 0 citation was found. Then we're used the terms of "transvaginal hydro-laparoscopy" more than 20 articles were founded.

## INTRODUCTION

Pelvic inflammatory disease (PID) is a common and costly condition among women of reproductive age that can lead to infertility, ectopic pregnancy, and chronic pelvic pain. Patients often have lower abdominal pain, fever, an elevated blood C-reactive protein level, and adnexal tenderness, but the clinical diagnosis of PID has serious limitations because the symptoms vary in large scale and may be atypical. Gastroenterologic problems, urinary tract infections, and other gynecologic problems may simulate PID. Thus, the clinical diagnosis of PID on the basis of symptoms and signs is often inaccurate. The delay of care increases the risk of long-term complications. Laparoscopy has long been the standard of reference in the diagnosis of PID, but it requires general anesthesia. Laparoscopy is usually performed in patients with moderate to severe pelvic pain. Laparoscopy performed to diagnose PID is an invasive procedure and may lead to complications. Endometrial biopsy is less invasive than laparoscopy, but the results are not readily available.

Transvaginal ultrasonography (US) is a noninvasive bedside procedure that is routinely performed in patients with pelvic pain. Earlier studies have shown that transvaginal US performs well in the diagnosis of PID when the criteria include thickened fluid-filled tubes. Transvaginal US is superior to transabdominal US in the diagnosis of endometrial abnormalities, pelvic masses, and PID.

One option for the noninvasive diagnosis of PID is magnetic resonance (MR) imaging but we don't have the direct view and the same result as in diagnostic laparoscopy<sup>1</sup> (Table 1). It consequently appears interesting to propose an endoscopy diagnostic procedure as powerful as the laparoscopy but less invasive which doesn't require general anesthesia and full operative facilities. This is the case of transvaginal hydrolaparoscopy (THL) which proved its efficiency while being as precise as standard diagnosis laparoscopy.

**Table 1:** Summary of MR imaging, transvaginal US, laparoscopic, and histologic<sup>1</sup>

Patient No.	MR Imaging finding	Transvaginal US finding	Laparoscopic finding	Histologic finding*
<b>Patients with PID</b>				
1.	Abscess and pyosalpinx	Pyosalpinx 1.a.	Pyosalpinx, bilateral	Chronic salpingitis
2.	Abscess	Ovarian tumor	Abscess	Salpingoophoritis
3.	Abscess	Abscess	Abscess	Positive culture†
4.	Abscess and fluid-filled tube	Abscess	Abscess	Salpingoophoritis
5.	Abscess and pyosalpinx	Endometrioma and salpingitis	Abscess and salpingitis	Positive culture†
6.	Fluid-filled tube and polycystic-like ovaries	Abscess	Salpingitis	Salpingoophoritis
7.	Endometrioma and pyosalpinx	Endometrioma	Endometrioma and pyosalpinx	Positive culture†
8.	Abscess	Pyosalpinx	Abscess	Abscess
10.	Pyosalpinx	Pyosalpinx	Pyosalpinx	NA
11.	Pyosalpinx, bilateral	Pyosalpinx, bilateral	Pyosalpinx, bilateral	NA
12.	Abscess	Pyosalpinx	Pyosalpinx	Salpingitis
13.	Fluid-filled tube and polycystic-like ovaries	Salpingitis	Salpingitis	Positive culture†
16.	Abscess	Ovarian tumor	Abscess	NA
17.	Fluid-filled tube and hemorrhagic cyst	Endometrioma and salpingitis	Endometrioma and salpingitis	NA
18.	Endometrioma and hemorrhagic cyst	Endometrioma and salpingitis	Endometrioma and salpingitis	Endometrioma
22.	Abscess, bilateral	Abscess, bilateral	Abscess, bilateral	NA
23.	Cyst, free fluid, and polycystic-like ovaries	Cyst	Salpingitis	Salpingitis
24.	Abscess, bilateral	Abscess	Pelvic peritonitis	Salpingitis
25.	Abscess	Abscess	Abscess	NA
26.	Fluid-filled tube, endometrioma, and polycystic-like ovaries	Salpingitis	Endometrioma and peritonitis	Endometrioma with infection
27.	Pyosalpinx	Salpingoophoritis	Pyosalpinx	NA
<b>Patients without PID</b>				
9.	Dermoid cyst	Ovarian tumor	Dermoid cyst	Dermoid cyst
14.	Free fluid	Free fluid	Rupture of a cyst	Cyst
15.	Tubal torsion and pyosalpinx	Tubal torsion	Tubal torsion and hydrosalpinx	Necrosis
19.	Endometrioma, bilateral	Abscess	Endometrioma, bilateral	Endometrioma
20.	No signs of gynecologic disorder	No signs of gynecologic disorder	No signs of gynecologic disorder	NA
21.	Tubal torsion	Tubal torsion	Tubal torsion	Necrosis
28.	Cyst	Cyst	Cyst	Cyst
29.	Tubal torsion	Abscess	Tubal torsion	Necrosis
30.	Free fluid	No signs of gynecologic disorder	Free fluid	NA

\*NA = Not applicable, histologic examination was not performed.

†Culture of the abscess fluid showed bacterial growth.

## CONTENT

Endoscopic examination of the female genital tract may be performed via either the abdominal or vaginal route. The vaginal approach was initially proposed in the USA (Decker, 1944) and was subsequently described (Kelly and Rock, 1956) using the term ‘Culdoscopy’, a technique in which the endoscope is introduced through the posterior vaginal fornix.

This procedure was later abandoned because transabdominal laparoscopy provided a panoramic view of not only the pelvic cavity but also the abdominal cavity, in addition to obviating the need for the knee-chest position, providing better access for surgical treatment, and also reducing the risk of infection. More recently, the concept of hydroculdoscopy was introduced (Odent, 1973); the technique was then modified

(Mintz, 1987) to allow a dorsal decubitus position, and the procedure of transvaginal hydrolaparoscopy (THL) was described<sup>8,9</sup> with abdominal distension with saline and exploitation of the newly developed smaller endoscopes (Tables 2 and 3). The patients were placed in the dorsolithotomy position. Following disinfection, a Foley catheter number 8 was introduced into the bladder and another catheter was introduced into the uterus. The posterior lip of the cervix was grasped by a tenaculum in order to expose the posterior fornix. The insertion of the Veress needle was facilitated by a stab incision in the posterior fornix, 1.5 cm below the cervix. A 3 mm blunt trocar was introduced into the posterior fornix. A 2.7 mm diameter semirigid endoscope was used, with an optical angle of 30°. Normal saline solution (250 ml) was instilled into the pouch of Douglas under gravity. Illumination was provided by a high-intensity cold-light source (250 W) via a fiber-optic lead. The images were viewed on a high-resolution color monitor. Examination started at the posterior wall of the uterus, and by rotation and deeper insertion of the endoscope, the tubes and the ovaries were evaluated.

Evaluation by THL was defined as complete when the pouch of Douglas, the posterior wall of the uterus, the uterosacral ligaments (USL), the tubes and the fimbriae, the ovaries from all sides and fossae were all visible (Table 4). After examination of the whole pelvic cavity, tubal patency was evaluated using dye injection through the uterine catheter. At the end of the examination the instruments were removed and the posterior fornix was sutured using 3/0 absorbable suture. All procedures were followed by hysteroscopy to evaluate the uterine cavity.

The patient is fully conscious. She can follow the procedure on the video screen as it is explained to her and her partner. The transvaginal access with hydrofloatation has the advantage of exposing the tubo-ovarian structures in their natural position.

The more global concept of fertiloscopy (which includes THL as well as salpingoscopy, microsalingoscopy and hysteroscopy) was introduced in 1998.<sup>12,14</sup> An examination of the cul-de-sac (pouch of Douglas) in which the ovaries and their relation to the fimbriae of the fallopian tubes are easily visualized, was the primary purpose of the investigation, as this is where the major event in reproduction, oocyte retrieval by the fimbria, occurs.<sup>7,13</sup>

Consequently, fertiloscopy was proposed as an alternative to diagnostic laparoscopy as the primary endoscopic procedure in the routine assessment of an infertile woman.<sup>12,14</sup> Laparoscopy is currently considered to be the 'gold standard' of pelvic endoscopic procedures as it provides not only a panoramic view of the pelvic and abdominal cavities but also the opportunity to perform extensive surgery. More recently, it was emphasized<sup>4,5</sup> that transvaginal hydrolaparoscopy, from which

fertiloscopy was derived, provides the opportunity to demonstrate fine periovarian and peritubal adhesions, which are not easily detected using transabdominal laparoscopy (Table 5). This statement could be interpreted to mean that laparoscopy should no longer be considered as a 'gold standard'.

As a result of these suggestions, it was felt appropriate to review whether laparoscopy should remain the primary diagnostic endoscopic procedure in the routine surgical assessment of women pelvic.

**Table 2:** Successful evaluation of the pelvis and its structures by transvaginal hydrolaparoscopy (THL) versus standard laparoscopy<sup>2</sup>

Characteristics	Laparoscopy (n = 54)	THL (n = 54)
Pouch of Douglas	54 (100)	54 (100)
Posterior wall of the uterus and USL	54 (100)	54/54 (100)
Tubes and fimbriae	108 (100)	94/108 (87.0)
Ovaries	108 (100)	97/108 (89.8)
Ovarian fossae	108 (100)	72/108 (66.7)

USL = Uterosacral ligament.

Values in parentheses are percentages.

**Table 3:** Tubal findings by transvaginal hydrolaparoscopy (THL) versus standard laparoscopy<sup>2</sup>

Characteristics	Laparoscopy (n = 54)	THL (n = 54)
Normal	40/54	41/54
Abnormal (%)	14/54 (25.9)	13/14 (92.9)
Proximal obstruction		
• Unilateral	2/54	2/2
• Bilateral	1/54	1/1
Tubal phimosis		
• Unilateral	3/54	3/3
• Bilateral	2/54	2/2
Hydrosalpinx		
• Unilateral	6/54	5/6
• Bilateral	0/54	0

**Table 4:** Evaluation of the endometriosis by transvaginal hydrolaparoscopy (THL) versus standard laparoscopy. Most patients had endometriosis lesions in more than one location<sup>2</sup>

Characteristics	Laparoscopy (n = 54)	THL (n = 54)
Normal	43/54	48/54
Abnormal (%)	11/54 (20.4)	6/11 (54.6)
Posterior wall of uterus and/or USL	8/54	3/8
Pouch of Douglas	1/54	1/1
Ovarian fossa		
• Unilateral	4/54	1/4
• Bilateral	1/54	0/1

Contd...

Contd...

Characteristics	Laparoscopy (n = 54)	THL (n = 54)
Ovarian surface		
• Unilateral	4/54	1/4
• Bilateral	2/54	0/2
Endometrioma		
• Unilateral	2/54	0/2
• Bilateral	0	0

USL = Uterosacral ligament.

**Table 5:** Evaluation of the adhesions by transvaginal by hydro-laparoscopy (THL) versus standard laparoscopy. Most patients had adhesions in more than one location<sup>2</sup>

Location of adhesions	Laparoscopy (n = 54)	THL (n = 54)
Normal	33/54	38/54
Abnormal (%)	15/54 (27.8)	10/15 (66.7)
Pouch of Douglas	8/54	8/8
Periovarian		
• Unilateral	3/54	1/3
• Bilateral	4/54	1/4
Ovarian fossa		
• Unilateral	5/54	1/3
• Bilateral	6/54	1/6
Peritubular		
• Unilateral	7/54	4/7
• Bilateral	3/54	1/3
Other locations	7/54	2/7

## DISCUSSION

### Disadvantages

THL has limitations when compared with laparoscopy. First, the view is limited to the posterior part of the true pelvis. Second, most gynecologists are more familiar with the panoramic view of the pelvis and its organs as seen at laparoscopy. Third, without manipulating the adnexa not all the pathologies are seen. Furthermore, the range of interventions that can be performed is limited in comparison to laparoscopy. The current practice in most centers is to treat pathologies such as endometriotic lesions, or adhesions, surgically, whenever seen during laparoscopy. This cannot yet be performed by THL. However, using this method will allow a more critical selection of patients likely to benefit from laparoscopy.

Transvaginal access may fail to diagnose endometriosis of the vesicouterine fold, but endometriosis is found exclusively in the anterior compartment in only, 4% of cases, when it is usually associated with a severely anteverted uterus.<sup>3</sup> Nonobstructive proximal tubal lesions may also be missed, but in any case surgical or medical therapy is not indicated if the tubes are patent.

Other procedures have shown that the transvaginal access carries a low risk of complications.<sup>2,6</sup> Transvaginal ovum

retrieval procedures carry a risk of infection, which is estimated at 0.4%, whether or not vaginal disinfection is performed (Dicker et al, 1993; Roest et al, 1996). Culdocentesis in developing countries is accepted as a safe procedure for the diagnosis of ectopic pregnancies (Falfoul et al, 1991). Bowel perforation is a risk, but the perforation is usually extraperitoneal and if caused by a small diameter instrument can be managed expectantly.<sup>10,11</sup>

### Advantages

The main advantage of THL is the ability to perform the procedure on an outpatient basis with local anesthesia, as was reported previously.<sup>8,9</sup> When local anesthesia is used, the procedure is associated with minimal discomfort and is well accepted and tolerated by the patients. Another important advantage of the THL by local anesthesia is that the patient can follow the procedure on the video screen, and this allows it to be explained to her and her partner.<sup>4</sup>

THL is a safe and reproducible method. Retroverted uterus should be considered as a relative contraindication to THL. When a complete evaluation by THL is available, it is a highly accurate technique in comparison with the laparoscopy.

These results confirm fertiloscopy as a minimally invasive safe procedure that may be considered as an alternative to diagnostic laparoscopy in the routine assessment of women without clinical or ultrasound evidence of pelvic disease. On the basis of the additional advantages of fertiloscopy, namely salpingoscopy or microsalingoscopy, it is considered that fertiloscopy could replace laparoscopy as a routine procedure in such women.

Additional advantages of THL include the ability to perform concurrent procedures such as conscious pelvic pain mapping.

The appendix can also be explored for pathology and pain reaction. The abdominal wall can be inspected and transvaginal endoscopy has been suggested for safe abdominal entry in standard laparoscopy when bowel adhesions are suspected (van Lith et al, 1979). Even the upper abdominal wall including the liver can be inspected via the transvaginal route if the patient is anesthetized. For these reasons the transvaginal approach has been termed laparoscopy rather than Culdoscopy.

## CONCLUSION

Laparoscopy is an invaluable diagnostic tool especially for symptomatic patients. Apart from establishing a definitive diagnosis, laparoscopy has been found to be a safe procedure, and one of considerable cost effectiveness in terms of hospital stay. The safety of transvaginal hydrolaparoscopy is founded on the use of local anesthesia, transvaginal access, Veress needle technique, peritoneal distension by warm saline and small diameter optical system. The transvaginal approach therefore merits to be revisited as a new, safe technique of diagnostic laparoscopy with better patient health condition.

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