Transvaginal Ultrasonography Combined with Pelvic Examination in the Diagnosis of Ovarian Endometrioma

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Abstract

The aim of this retrospective study was to evaluate the efficacy of TVS and TVS combined with pelvic examination for the diagnosis of ovarian endometrioma. Three hundred and five ovarian masses of 244 patients with either pre-operative or post-operative diagnosis of ovarian tumor and received TVS between January 1, 1996 and December 31, 1998 were included in the study. Of 305 masses, 221 endometriomas of 164 patients were diagnosed histologically. The efficacy of TVS was 84.9 per cent with a sensitivity of 92.3 per cent and specificity of 70.2 per cent. LR+ and LR- were 3.1 and 0.1 respectively. The combination of TVS and pelvic examination with either positive test had a higher sensitivity (98.8%) but lower specificity (26.6%). This combination dramatically improved NPV (97.5%) and LR- (0.05), whereas, the combination with both positive tests had a sensitivity of 78.1 per cent, and specificity of 81.5 per cent. LR+ and LR- were not different from those using TVS alone.

In conclusion, the study has shown the role of TVS in the diagnosis of ovarian endometrioma. The combination of TVS and pelvic examination may be useful in ruling out the disease. However, a further prospective study should be performed to confirm the efficacy of the combination.

Key word : Endometrioma, Diagnosis, Transvaginal Sonography, TVS, Pelvic Examination

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Endometriosis is a common disorder involving growth of endometrial tissue outside the uterus[1]. The common sites of ectopic endometrial implants are pelvic peritoneum, the surface of ovaries, uterus and cul de sac[2]. Pathology of endometriosis varies widely from different types of implants, adhesions to endometrioma. Ovarian endometrioma is a cystic form of ovarian endometriosis. It is believed that the pathogenic process originates at a free endometriotic implant which directly contacts with the ovarian surface and is sealed off by adhesion. With the collection of menstrual debris, pseudocyst is formed, resulting in an invagination of the ovarian cortex[3].

The main clinical symptoms of endometriosis are dysmenorrhea, dyspareunia and infertility. Cul de sac induration, nodularity and fixed uterus, and ovarian mass are the important signs of endometriosis that can be found in 60-70 per cent of patients[4].

Because the treatment of choice for endometrioma is surgery, the correct diagnosis preoperatively is important. Several studies have shown the role of ultrasonography in the pre-operative diagnosis of endometrioma[5-9]. Kupfer et al have shown the spectrum of transvaginal sonography (TVS) finding of endometrioma and demonstrated the picture of homogenous hypoechoic "tissue" of low level echoes as the typical appearance[9]. The following papers have also shown the high efficacy of TVS in the diagnosis of endometrioma[6-8,10-12].

Since patients with endometriosis have some specific clinical signs, the combination of these characteristics to TVS may increase the diagnostic efficacy of ovarian endometrioma.

The aim of this study was to evaluate the efficacy of TVS alone and TVS combined with findings from pelvic examination for the diagnosis of ovarian endometrioma.

MATERIAL AND METHOD

The data of this retrospective study were compiled from the medical records of all patients with either pre-operative or post-operative diagnosis of ovarian tumor between January 1, 1996 and December 31, 1998. All patients who received TVS pre-operatively were included in the study. The clinical signs, ultrasonographic findings and preoperative diagnosis were recorded. Clinical positive signs were defined as the posterior fixation of uterus and/or nodularity at cul de sac detected by pelvic and rectovaginal examinations. The histological diagnosis was used as the gold standard. All surgical specimens were reconfirmed by the same pathologist (M.R). Endometrioma was diagnosed when there was presence of two or more of the following findings: endometrial epithelium, glands, or stroma, or hemosiderin-laden macrophages[13].

To analyze the predictive value of TVS in differentiating endometrioma from other adnexal masses, the sensitivity, specificity, positive and negative predictive value (PPV, NPV), and efficacy of ultrasonographic diagnosis were calculated for each ovarian mass according to Mais et al[6].

To analyze the accuracy of the combination of TVS and clinical signs in differentiating endometrioma from other adnexal masses, the sensitivity, specificity, and PPV, NPV were calculated using combination testing approaches[14].

To assess the diagnostic value of each test or procedure, likelihood ratios of positive test (LR+) and negative test (LR-) were used[15].

Analysis of data was carried out according to the normal test (Z statistics) for the comparison of two proportions[16].

RESULTS

There were 894 patients diagnosed with ovarian tumor either pre-operatively or post-operatively. Two hundred and forty-four of these patients received pre-operative TVS. The mean age was 36.9±8.1 years (range of 19-72). The duration between the date of TVS performed and operation performed was 48.9±37.2 days (range 1-185). Bilateral adnexal masses were found in 61 patients, so 305 masses were included in the study with the mean diameter of 4.8±2.4 cm (range of 1-22.8). Two hundred and twenty-one endometriomas of 164 patients were diagnosed histologically. With the diagnosis of ultrasonography, true positive, true negative, false positive and false negative were 204, 59, 25 and 17 respectively (Table 1). The efficacy of TVS in the diagnosis of adnexal mass was 84.9 per cent.

Of 25 false positive masses, 4 masses were diagnosed as endometriomas pre-operatively, but no mass was found at surgery. Of the remaining 21 masses, the most common pathological diagnosis was corpus lutuem, followed by par-ovarian and dermoid cysts respectively (Table 1).

Of 17 false negative masses, ultrasonographic diagnosis were 11 non-specific ovarian tumors, 5 no mass detected and 1 subserous myoma.

Table 1. Efficacy of sonography in diagnosis of 305 adnexal masses.

	TVS diagnosis		Histologic diagnosis	
True positive	204	Endometriomas	204	Endometriomas
True negative	59	Non-endometriomas	59	Non-endometriomas
False positive	25	Endometriomas	7	Corpus luteal, follicular cysts
			5	Par-ovarian cysts
			4	Dermoid cysts
			4	No mass
			2	Cystadenomas
			2	Pseudocysts
			1	Hydrosalpinx
False negative	11	Non-specific ovarian tumors	17	Endometriomas
	5	Normal ovaries		
	1	Myoma		

Table 2. The predictive capacity of TVS alone and combined with pelvic examination in the diagnosis of endometrioma.

	A.TVS alone	B.Fixed uterus and/or nodularity	A or B	A and B
Sensitivity	92.3	84.6†	98.8*	78.1*
Specificity	70.2	37.9*	26.6*	81.5†
PPV	89.1	43.3	43	70.3
NPV	77.6	81.1	97.5	86.9
LR+	3.1	1.4	1.3	4.2
LR-	0.1	0.4	0.05	0.3

† Not significant
* Significant, critical value (α) = 0.05

One hundred and eighty-one patients (74.2%) had records of pelvic examination results. Positive signs of the pelvic examinations were found in 127 (70.2%) out of 181 patients.

Sensitivity, specificity, PPV, NPV, LR+ and LR- are shown in Table 2. The sensitivity of using TVS alone was similar to that of using the positive sign alone, while specificity was higher in using TVS alone. The LR+ was 3.1, indicating a patient with endometrioma to be 3.1 times more likely to have a positive test than a patient without disease. The LR- was 0.1, indicating a patient with endometrioma to be 0.1 times as likely to have a negative test as a patient without disease.

The combination of TVS and positive pelvic examination with either positive test had a higher sensitivity, but lower specificity. This combination dramatically improved NPV and LR-.

The combination with both positive tests of TVS and pelvic examination decreased the sensitivity significantly, and increased the specificity, but not significantly.

DISCUSSION

Ultrasonography is a non-invasive examination widely used in the diagnosis of several gynecolgical disorders. However, the transabdominal ultrasonography has a limited role in the diagnosis of endometriosis and endometrioma[7]. After the improvement of TVS, Kuffer et al[9] showed the higher efficacy of ultrasonography in the diagnosis of endometrioma and demonstrated the typical picture of endometrioma. This typical picture has been used as the standard criteria for the diagnosis of endometrioma in the following study[6-8]. In general, the efficacy of TVS is high, the accuracy is

93-98 per cent with sensitivity and specificity of 83-86.5 per cent and 90-99 per cent respectively (6-8). In this study the sensitivity of 92.3 per cent is compatible with, but the efficacy of 84.9 per cent and specificity of 70.2 per cent are lower than those of the others. The lower efficacy and specificity is due to a higher false positive rate. In the routine service condition that ultrasonography performance by several gynecologists with varying experience and no setting in standard criteria for diagnosis of endometrioma may be the cause of the high false positive cases. In general, the ultrasonographic appearances of some false positive cases such as par-ovarian cyst, pseudocyst and hydrosalpinx are not the same as the typical endometrioma picture in shape, and echoes that could be discriminated without difficulty by an experienced gynecologist.

In addition, there were 4 false positive cases, the mass of which had disappeared at the time of operation. This condition could be avoided if the TVS was performed to confirm the presence of the cyst twice in different cycles and at the day or within a few days before surgery like the other prospective studies(6,10).

In this study, there were 17 false negative cases. Most of them were non-specific ovarian tumors, the ultrasonographic appearance of which were homogeneous, homoechoic or anechoic and round-shaped mass. This ultrasonographic picture was atypical for endometrioma that was also common in other studies(8,9). Another false negative cause was the condition that there was no mass detected by ultrasonography pre-operatively, but endometrioma was found during operation. This might be due to a cyst which was too small to be detected by ultrasonography(9). The other possibility is the mass developed before the operation. In this study, the duration between the date of TVS performance and the operation was almost 2 months.

Differentiating endometrioma from the other cysts, particularly, hemorrhagic and corpus luteal cysts is important in clinical practice. Because surgery alone or the combination of pre-operative medical and surgical treatments for these diseases could be avoided. So, to improve the efficacy of TVS in the diagnosis of endometrioma is significant to avoid unnecessary operation. To reach this purpose, some tests and procedures were added to TVS in the diagnosis of endometrioma. However, only using the multiscoring system composed of symptoms, signs, TVS, CDS and CA-125 levels can improve the accuracy in endometrioma diagnosis (12), but are costly and not practical(11,12).

This retrospective study aimed to assess whether the combination of pelvic examination which is a simple procedure, and TVS can improve the efficacy of TVS in the diagnosis of endometrioma.

In general, with combination of either positive test (parallel testing), the sensitivity is higher than that of each test, but specificity is lower. Thus, this combination is used for ruling out the disease. In combination with both positive tests (serial testing), on the other hand, higher specificity but lower sensitivity are achieved. The aim of this combination is to confirm the disease. In this study, the sensitivity was significantly increased with the parallel testing, whereas, the specificity was increased, but not significantly with the serial testing. This non-improvement in the specificity may be due to the negative effect of the very low specificity of pelvic examination. These results, however, imply that the combination of TVS and pelvic examination could be the tool for exclusion rather than confirmation of the disease.

Apart form the sensitivity and specificity, LRs are the other important parameters of the testing. The LRs indicate by how much a given test result will raise or lower the pretest probability of the disease. If LR+ greater than 10 means that the probability of the disease existence is very high. If, on the contrary, LR- less than 0.1 means that the probability of the disease existence is quite low. With these LR+ and LR- values, in other words, the diagnostic test can be used for confirming or ruling out the disease respectively(15). In this study, only using the combination with either positive test gave the clinically conclusive change with the LR- of 0.05. Therefore, endometrioma could be ruled out when negative results of both tests were achieved. The high NPV (97.5%) confirms this tendency with application of the tests to the studied population.

In conclusion, this study has shown the role of TVS in the diagnosis of ovarian endometrioma. The combination of TVS and pelvic examination may be useful in clinical practice, especially, in ruling out the disease. However, a further prospective study should be carried out to confirm the accuracy of this combination.

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การใช้คลื่นเสียงความถี่สูงทางช่องคลอดร่วมกับการตรวจภายใน เพื่อการวินิจฉัยก้อนเยื่อบุโพรงมดลูกเจริญผิดที่ของรังไข่ (ovarian endometrioma)

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การศึกษาย้อนหลังนี้มีจุดมุ่งหมายเพื่อประเมินประสิทธิผลของการใช้คลื่นเสียงความถี่สูงทางช่องคลอดและการใช้คลื่นเสียงความถี่สูงทางช่องคลอดร่วมกับการตรวจภายใน ในการวินิจฉัยก้อนเยื่อบุโพรงมดลูกเจริญผิดที่ของรังไข่ ผู้ป่วยจำนวน 244 ราย ที่มีเนื้องอกรังไข่ จำนวน 305 ก้อน ได้รับการตรวจคลื่นเสียงความถี่สูงทางช่องคลอด ตั้งแต่วันที่ 1 มกราคม 2538 ถึง 31 ธันวาคม 2541 เนื้องอกรังไข่ 221 ก้อน ในผู้ป่วย 164 ราย ได้รับการวินิจฉัยทางพยาธิวิทยาว่าเป็นก้อนเยื่อบุโพรงมดลูกเจริญผิดที่ ความแม่นยำของคลื่นเสียงความถี่สูงทางช่องคลอดในการวินิจฉัยเท่ากับ ร้อยละ 84.9 โดยมีความไวและความจำเพาะของการทดสอบเท่ากับร้อยละ 92.3 และ 70.2 ตามลำดับ ค่าดัชนี LR+ และ LR- เท่ากับ 3.1 และ 0.1 ตามลำดับ การใช้คลื่นเสียงความถี่สูงทางช่องคลอดร่วมกับการตรวจภายในด้วยวิธีการทดสอบแบบขนาน (Parallel testing หรือ combination with either of positive test) ให้ความไวและความจำเพาะของการทดสอบเท่ากับร้อยละ 98.8 และ 26.6 ตามลำดับ นอกจากนี้ค่าการทำนายโอกาสที่จะไม่เป็นโรค (NPV) สูงขึ้น (ร้อยละ 97.5) และค่า LR- ดีขึ้น (0.05) สำหรับการใช้คลื่นเสียงความถี่สูงทางช่องคลอดร่วมกับการตรวจภายในด้วยวิธีการทดสอบแบบอนุกรม (serial testing หรือ combination with both positive tests) ให้ค่าความไวและความจำเพาะในการทดสอบเท่ากับร้อยละ 78.1 และ 81.5 ตามลำดับ ส่วน LR+ และ LR- มีค่าใกล้กับการใช้คลื่นเสียงความถี่สูงเพียงอย่างเดียว

การศึกษานี้แสดงให้เห็นประสิทธิผลของการใช้คลื่นเสียงความถี่สูงทางช่องคลอดและการใช้คลื่นเสียงความถี่สูงทางช่องคลอดร่วมกับการตรวจภายใน ในการวินิจฉัยก้อนเยื่อบุโพรงมดลูกเจริญผิดที่ของรังไข่ การใช้วิธีการตรวจสองวิธีร่วมกันน่าจะมีประโยชน์ในการปฏิบัติทางคลินิกโดยเฉพาะความสามารถในการแยกโรคก้อนเยื่อบุโพรงมดลูกเจริญผิดที่ออกได้ถ้าการตรวจให้ผลลบทั้งสองวิธี

คำสำคัญ : ก้อนเยื่อบุโพรงมดลูกเจริญผิดที่ของรังไข่, การวินิจฉัย, คลื่นเสียงความถี่สูงทางช่องคลอด, การตรวจภายใน

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