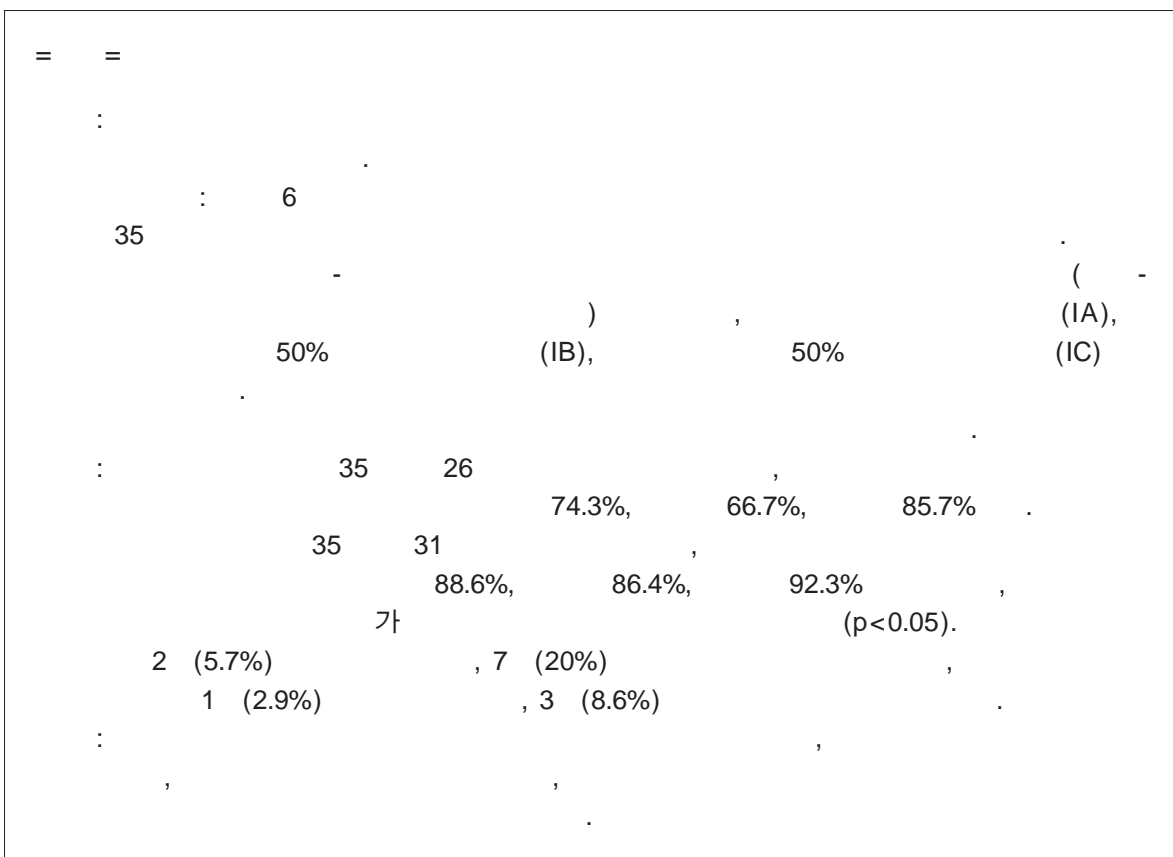


, \* , \*

. . \* , \* \*



: Uterus, endometrium  
 Uterus, myometrium  
 Uterus, US  
 Uterine neoplasms, staging  
 Uterine neoplasms, US

: 2001 8 2 , :2001 9 13 , :2001 9 21 , : 2001 12 5

: , (442 - 749) 5,  
 Tel. (031)219 - 5856 Fax. (031)219 - 5862

1 - 14

35

IA가 12 , IB가 13 , IC가 10  
(cell type) 27 ,

1 - 3%

2 , 2 , 3 ,  
1 (type) 16 가 1(

17% 가 .  
, 5

20 - 40%,

I(well differen - tiated)  
21 , II(moderately differentiated) 5 ,  
III(poorly differentiated) 9 .

Ultramark - 9 HDI (Advanced Techno - logy  
Laboratories, Bothell, Washington), 5 MHz

[1 - 4].

8 - French

75 - 95% 가

[5 - 9].

10 - 15 ml , 20 - 30

가

가

가

가

8

69 - 93%  
가

[10 - 14].

mm, 14 mm , 8 mm  
가  
4 mm, 7 mm , 4 mm  
[18 - 19].

[15 - 17].

가

(diffuse),  
(focal), (uniform), (polypoid),

가

1995 3 2001 2 6

%

35

% [10].

가

28 - 79 ( 52.1 ) , 19  
3

가

:  
 % (Fig. 1).  
 가  
 3  
 2 가  
 , 1988 surgical - pathologic  
 FIGO(International Federation of Gynecology and  
 Obstetrics) staging system  
 (IA), 50% (IB),  
 50% (IC)  
 (gold standard)  
 가  
 McNemar's test , (me -  
 asurement of agreement) Kappa value  
 Kappa value가 0.7 가 , 0.4 -  
 0.7

23 (65.7%) ,  
 11 - 43 mm( 22.3 mm) 8  
 (22.9%) , 4 (11.4%)



**Fig. 1.** Measurement of depth (%) of myometrial invasion by sonohysterography. Transverse sonohysterogram shows disruption of subendometrial halo and a 8 x 7 cm heterogeneous hypoechoic tumor (arrow) invading the myometrium in the right posterior corpus. The thickness of the intact remaining myometrium at the tumor mass is measured between the posterior margin of the mass and the serosa of the uterus (2). Depth of myometrial invasion is calculated as 44% (1.07-0.6/1.07 mm) of the total myometrial thickness (1), and classified as stage IB.

27 ,  
 6 , 2 , 18 , 17  
 13 (37.1%),  
 20 (57.1%) , 2 (5.7%)  
 가 6 - 40 mm( 12.7  
 mm) , 11 , 2  
 , 1 ,  
 , 14 , 1  
 12 , 3 , 7 ,  
 8 . 22 18 , 4  
 , 0.5 - 6.3 cm . 3  
 , 19 , 19  
 , 3 , 18 ( 10 ,  
 8 ) , 2 ( ) , 2 ( ) .  
 26

(Table 1).

35 26 ,  
 74.3%, 66.7%, 85.7%  
 35 31  
 86.4%, 92.3% , 88.6%,

(p=0.04),

가  
 Kappa value 0.49,  
 Kappa value 0.76 ,  
 가  
 2 (5.7%) , 7 (20%)  
 , 1

**Table 1.** Depth of Myometrial Invasion in Endometrial Cancer: Comparison of Staging Based on Transvaginal Sonography, Sonohysterography, and Histologic Findings.

Histologic Stage	TVS Stage			SH Stage		
	IA	IB	IC	IA	IB	IC
IA (n=12)	12	0	0	12	0	0
IB (n=13)	5	6	2	2	10	1
IC (n=10)	1	1	8	0	1	9
Total (n=35)	18	7	10	14	11	10

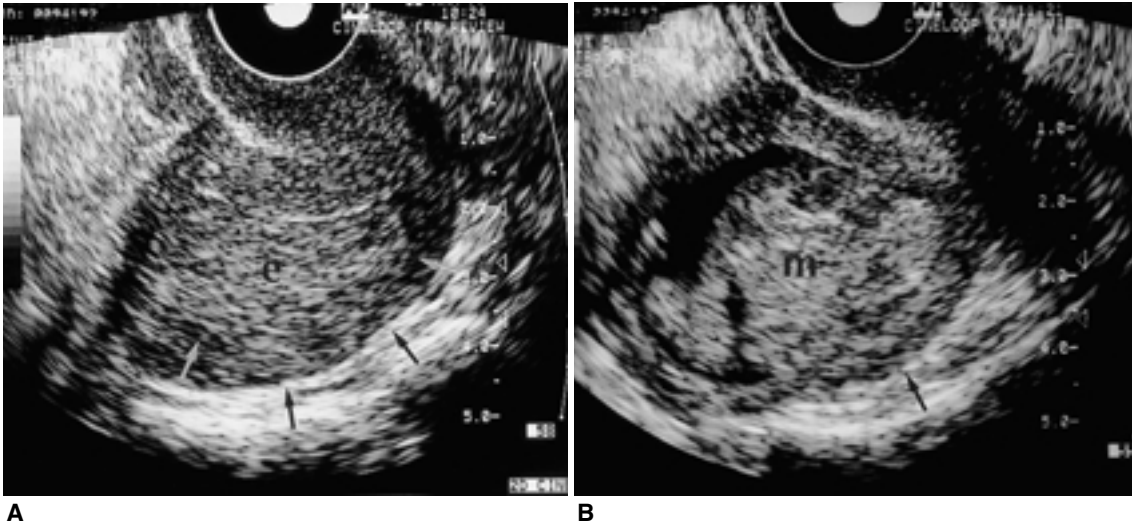
TVS: Transvaginal sonography, SH: Sonohysterography

IA: tumor limited to endometrium

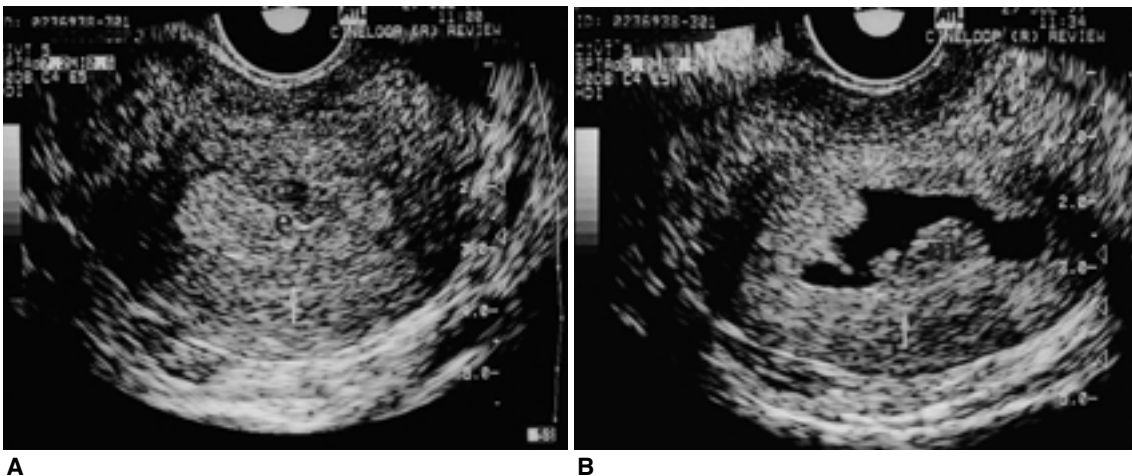
IB: superficial invasion(tumor invades up to 50% of myometrium)

IC: deep invasion(tumor invades more than 50% of myometrium)

(2.9%) , 3 (8.6%) , 1-5 mm 5 IB  
 . IB IC 2 IA , 5 mm 2 1mm  
 2/20 mm 4 cm 1 , 3  
 mm 5.2 cm (Fig. 2), 3/18 IA (Fig. 3), 1 mm  
 (Fig. 4A). 2 IA (Fig. 4B).  
 2 IC IA, IB ,



**Fig. 2.** A 69 year-old woman with stage IB endometrial carcinoma.  
**A.** Sagittal transvaginal sonogram shows an endometrial thickening(19 mm, e) with heterogeneous hyperechogenicity and a disrupted subendometrial halo in the posterior corpus (arrows). Depth of invasion is estimated to involve 60% (12/20 mm) of myometrial thickness, and classified as stage IC. **B.** Sagittal sonohysterogram shows a 4 x 3 cm polypoid endometrial mass (m) invading the myometrium in the left posterior corpus(arrows). The depth of invasion is estimated as 41.7%(12-7/12 mm) of myometrial thickness, and correctly classified as stage IB.

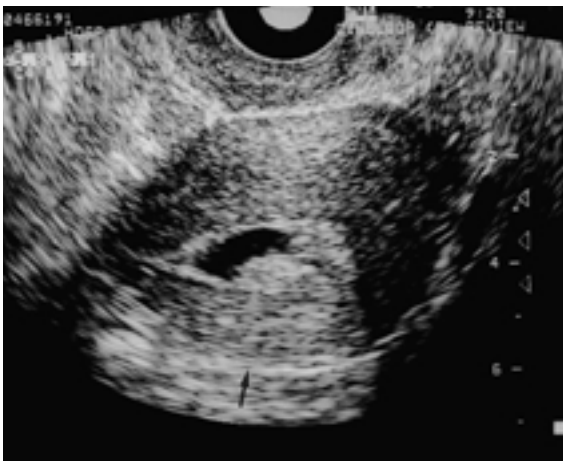


**Fig. 3.** A 49 year-old woman with stage IB endometrial carcinoma.  
**A.** Transverse transvaginal sonogram shows an endometrial thickening(e) with an intact hypoechoic subendometrial halo(arrow), classified as stage IA.  
**B.** Transverse sonohysterogram shows multiple polypoid endometrial masses (m) and partial disruption of subendometrial halo at the tumor mass in the posterior corpus (arrow). The estimated depth of myometrial invasion is 7.7%(13-12/13 mm) of myometrial thickness, and correctly classified as stage IB.

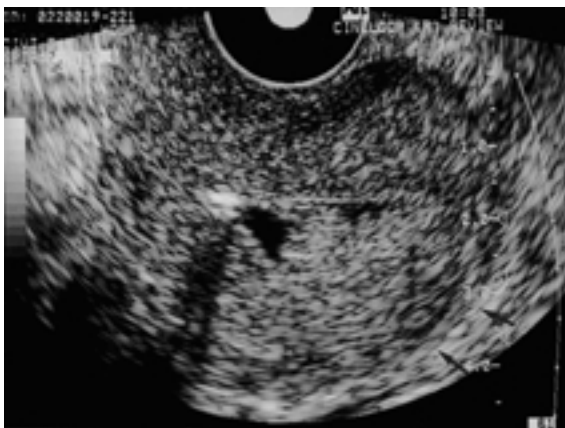
17/28 mm 1 97.5% ,  
 IC , 80% 1 [20 - 22].  
 - 가 46.7%  
 IB (Fig. 4C).  
 75 - 80% |  
 13 - 22% 가  
 [1, 5 - 6].  
 가  
 [5]. [7,  
 9].  
 가  
 [3]. 75 - 95% [5, 7 - 9].  
 (junctional zone)가  
 31 - 71% , 94 -



A



B



C

**Fig. 4.** Cases incorrectly staged on the basis of SH findings.  
**A.** A 55 year-old woman with stage IB endometrial carcinoma. Sagittal sonohysterogram shows a 5.2 × 4.5 cm hypoechoic fungating mass invading the myometrium in the anterior corpus and fundus (arrows). The depth of invasion is estimated as 66.4% (11-3.7/11 mm) of myometrial thickness(stage IC), but histologic examination reveals 3/18 mm (16.7%) invasion in the anterior wall. **B.** A 46 year-old woman with stage IB endometrial carcinoma. Transverse sonohysterogram shows a 3.2 × 1.5 cm polypoid endometrial mass in the posterior corpus. The subendometrial halo (arrow) at the tumor mass is intact (stage IA), but histologic examination reveals focal, 1mm invasion of myometrium. **C.** A 55 year-old woman with stage IC endometrial carcinoma. Transverse sonohysterogram shows a 2 × 1.2 cm mass and endometrial thickening, and depth of myometrial invasion is estimated to involve 46.7 % (15-8/15 mm) of myometrial thickness in the uterine fundus(arrows, stage IB). Histologic examination reveals 80% (12/15 mm) myometrial invasion in right corpus and anterior fundus.

가 74.3% [23].

68 - 88%

가 88.6%, 86.4%, 92.3%

가 5.7% 2.9%

가

T1 69 - 93% T2 80 - 97% [6, 10 - 14]. 3

가 68 - 88% [23], 7 - 19%, 3 - 20% 8.6%

11.8%

가 5 mm 1 mm

가

가 1 - 3

mm 가 [8, 10 - 14, 20].

가 86% [24].

가 가 85%

가 [23]. %

가

가 [24],

가

40 - 91%, 46 - 85%, 50 - 87% 가 III

Bonilla - Musoles

가

[15 - 17],

가

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= Abstract =

## Usefulness of Sonohysterography in the Assessment of Myometrial Invasion in Endometrial Carcinoma

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**PURPOSE :** To determine the usefulness of sonohysterography (SH) in assessing the presence and depth of myometrial invasion in endometrial carcinoma.

**MATERIALS and METHODS :** 35 patients with histologically confirmed endometrial cancer were prospectively evaluated with both TVS and SH for the last six years. The presence of myometrial invasion was determined by the disruption of subendometrial halo. The depth of myometrial invasion was estimated by measuring the distance from the tumor-myometrial junction to the uterine serosa (thickness of the remaining intact myometrium) and was classified into stage IA (tumor limited to the endometrium), IB (invasion of less than half of the myometrium), and IC (invasion of more than half the myometrium). These findings were correlated with pathologic findings, and both techniques were also compared for the assessment of the diagnostic accuracy in determining myometrial invasion.

**RESULTS :** TVS findings were accurate in 26 of 35 patients with a sensitivity of 66.7%, a specificity of 85.7%, and an accuracy of 74.3%. The results of SH were accurate in 31 of 35 patients and showed a sensitivity of 86.4%, a specificity of 92.3%, and an accuracy of 88.6%. The accuracy of SH in the assessment of myometrial invasion was significantly higher than those of TVS ( $p < 0.05$ ). The depth of myometrial invasion was underestimated in seven patients (20%) and overestimated in two patients (5.7%) on TVS, but underestimated in three patients (8.6%) and overestimated in one patient (2.9%) with SH.

**CONCLUSION :** SH was accurate in determining the presence, location, and depth of myometrial invasion in endometrial carcinoma, because the tumor and residual myometrium were clearly delineated. SH could be useful in the diagnosis and the assessment of myometrial invasion in endometrial carcinoma.

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