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= Abstract =

**A Comparison of Endoscopic Ultrasonography with Transabdominal Ultrasonography of Water-Filled Stomach in the Accuracy of Staging of Gastric Cancer**

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**Background/Aims:** There was no single method satisfying accuracy, patient compliance and cost in preoperative staging of gastric cancer. A transabdominal ultrasonography of water-filled stomach (TUS) was compared with endoscopic ultrasonography (EUS) for TN staging in operated gastric cancer. **Methods:** We performed EUS conventionally and TUS immediately after 600 mL deaerated water ingested in 40 patients with gastric cancer prior to operation. All the cases were operated and the histological findings were compared with the results of preoperative TN staging. **Results:** The overall T-staging accuracy rate of TUS was 62.5% and 55.0% for EUS. Both TUS and EUS could differentiate EGC from AGC in 85.0%. There was no statistical difference in the accuracy for the depth of cancer invasion between EUS and TUS. Differentiation of the cancer defined within the gastric wall (T3) from the cancer invading adjacent organs (T4) was possible in 92.5% for TUS and 87.5% for EUS. The accuracy of determining the depth of invasion was tent to be lower in fundus than in antrum and body. Lymph node metastasis was correctly diagnosed

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in 67.5% for TUS and in 70.0% for EUS. **Conclusions:** TUS may be a considered to be a relatively accurate and simple method for preoperative staging of gastric cancer in the absence of available EUS. (**Korean J Gastrointest Endosc 19: 721 729, 1999**)

**Key Words:** Gastric cancer, Staging, Endoscopic ultrasonography, Transabdominal ultrasonography of water-filled stomach

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.1) 1990 1 1994 12

가 가  
, 가

40

2)

가 가 가 , 가

8 SSA-  
27A (Toshiba, Japan) Ultramark 9 (ATL, USA)  
3.5 MHz

.2)

, 600 mL

.3)

가 가

.4)

가 가

가

.5)

8  
Buscopan 2 mL Demerol 50 mg  
Olympus  
(GF-UM3) (EU-M3)  
7.5 MHz

(balloon method),

(deae-

rated water filled method) Chi-square test, ANOVA, Mann-Whitney test

9.10) Yasuda 9) 가 1 cm

가

가

1)

TNM 가

1) Japanese Research T 62.5%

Society for Gastric Cancer 2) 55.0% 가 . T1

66.7%, T3 75.0%, T4 33.3% 가

, T2 50.0%, T

25%

(Table 1, 2).

22.2%, 44.4% 가

**Table 1.** Accuracy of Transabdominal Ultrasonography of Water-Filled Stomach in the Local Staging of Gastric Carcinoma According to the Different T Stages

Pathologic stage	TUS stage				Total	Accuracy (%)
	T1	T2	T3	T4		
T1	6	2	1	—	9	66.7
T2	2	6	4	—	12	50.0
T3	1	2	12	1	16	75.0
T4	—	—	2	1	3	33.3
Total	9	10	19	2	40	62.5

TUS, transabdominal ultrasonography of water-filled stomach.

**Table 2.** Accuracy of EUS in the Local Staging of Gastric Carcinoma According to the Different T Stages

Pathologic stage	EUS stage				Total	Accuracy (%)
	T1	T2	T3	T4		
T1	6	2	—	1	9	66.7
T2	2	3	7	—	12	25.0*
T3	1	1	12	2	16	75.0*
T4	—	1	1	1	3	33.3
Total	9	7	2	4	40	55.0

EUS, endoscopic ultrasonography; \*,  $p < 0.05$ .

**Table 3.** Accuracy of Transabdominal Ultrasonography of Water-Filled Stomach and Endoscopic Ultrasonography in Differentiation between Early and Advanced Gastric Carcinoma as well as between Localized and Infiltrating Tumor Growth

Differentiation between	n	Accuracy (%)	
		EUS	TUS
Mucosa and submucosa infiltration in early gastric carcinoma	9	22.2	44.4
Early (T1) and advanced (T2-T4) gastric carcinoma	40	85.0	85.0
Localized (T1-T3) and infiltrative (T4) gastric carcinoma	40	87.5	92.5

EUS, endoscopic ultrasonography; TUS, transabdominal ultrasonography of water-filled stomach; T1, mucosa, submucosa involved; T2, muscularis propria, subserosa involved; T3, tumor penetration through the serosa; T4, tumor invasion of adjacent structure (liver pancreas, colon).

**Table 4.** Cases of Over-staging and Under-staging of Gastric Carcinoma in T Staging

Pathologic stage	n	EUS stage		TUS stage	
		Understaging	Overstaging	Understaging	Overstaging
T1	9	—	3	—	3
T2	12	2	7	2	4
T3	16	2	2	3	1
T4	3	2	—	2	—
Total	40	6	12	7	8

EUS, endoscopic ultrasonography; TUS, transabdominal ultrasonography of water-filled stomach.

85.0% 가  
87.5%,  
92.5% 가  
(Table 3). T 가  
6 가 , 12 가  
, 7 가 , 8  
가 (Table 4).  
2)

**Table 5.** Accuracy of Transabdominal Ultrasonography of Water-Filled Stomach in the Local Staging of Gastric Carcinoma According to the Different N Stages

Pathologic stage	TUS stage			Total	Accuracy (%)
	N0	N1	N2		
N0	12	10	—	22	54.5
N1	3	13	—	16	81.3
N2	—	—	2	2	100.0
Total	15	23	2	40	67.5

TUS, transabdominal ultrasonography of water-filled stomach.

가 (p=0.09),  
가 54.5%, 77.3% 가  
83.3%, 61.1% 가 .

가 67.5%, 70.0% (Table 5, 6).

3)

T Borrmann  
61.5 100.0%, 33.3 100.0%

**Table 6.** Accuracy of EUS in the Local Staging of Gastric Carcinoma According to the Different N Stages

Pathologic stage	EUS stage			Total	Accuracy (%)
	N0	N1	N2		
N0	17	5	—	22	77.3
N1	7	9	—	16	56.3
N2	—	—	2	2	100.0
Total	24	14	2	40	70.0

EUS, endoscopic ultrasonography.

**Table 7.** Accuracy of T Staging of Gastric Carcinoma According to the Macroscopic Types

Macroscopic types	N	Accuracy (%)	
		TUS	EUS
EGC			
IIa	3	66.7	100.0
IIc	3	100.0	66.7
III	3	33.3	33.3
AGC			
Borrmann I	1	100.0	100.0
Borrmann II	14	64.3	57.1
Borrmann III	13	61.5	53.8
Borrmann IV	3	66.7	33.3

EUS, endoscopic ultrasonography; TUS, transabdominal ultrasonography of water-filled stomach; EGC, early gastric cancer; AGC, advanced gastric cancer.

(Table 7).

4)

가 60.0% 70.0%,  
가 53.3% 60.0%  
가 (Table 8).

5)

50.0 66.7%  
(Table 9).

6)

**Table 8.** Accuracy of T Staging of Gastric Carcinoma in Correlation to the Ulcer

Ulcer	n	Accuracy (%)	
		TUS	EUS
Absent	10	70.0	60.0
Present	30	60.0	53.3

EUS, endoscopic ultrasonography; TUS, transabdominal ultrasonography of water-filled stomach.

**Table 9.** Accuracy of Transabdominal Ultrasonography of Water-Filled Stomach and Endoscopic Ultrasonography in the T Staging of Gastric Carcinoma According to Histologic Types

Histologic types	n	Accuracy (%)	
		TUS stage	EUS stage
Well differentiated	3	66.7	66.7
Moderately differentiated	9	66.7	66.7
Poorly differentiated	18	61.1	50.0
Signet ring cell	10	50.0	50.0

EUS, endoscopic ultrasonography; TUS, transabdominal ultrasonography of water-filled stomach.

**Table 10.** Accuracy of T Stage According to the Direction in Gastric Carcinoma

Direction	n	Accuracy (%)	
		TUS	EUS
Anterior wall	3	66.7	66.7
Posterior wall	12	58.3	33.3
Lesser curvature	16	75.0	68.8
Greater curvature	4	75.0	100
Encircling	5	20.0	20.0

EUS, endoscopic ultrasonography; TUS, transabdominal ultrasonography of water-filled stomach.

**Table 11.** Accuracy of T Stage According to the Location in Gastric Carcinoma

Location	n	Accuracy (%)	
		TUS	EUS
Cardia/fundus	6	33.3	33.3
Body	13	61.5	46.2
Antrum	18	77.8	72.2
Long segment	3	33.3	33.3

EUS, endoscopic ultrasonography; TUS, transabdominal ultrasonography of water-filled stomach.

,13)  
 가 가 , 가 ,  
 가 가 ,27,14)  
 가 가 ,  
 ,4) 가  
 .48,15,16)  
 가 T ,5,17)  
 가 67 91% 18) 가 .  
 가 41  
 79% .7,16,19)  
 T  
 74%, 46% ,  
 86%, 가  
 61% 가  
 가 , .8)  
 가 (Table 11). 62.5%, 55.0%  
 가 , T  
 가  
 가  
 T  
 가 T2  
 .1) 5

(Table 10).

가 ,

가 (Table 11).

T4 .17,1820) 가 T2 T .

가 T 50% T 가 가 가 .23) T

가 T 가가 .

87.5% 92.5%, 83.3% 33.3%

가 가 가 2) 가 .67)

가 T .7)

가 가 가 가 가

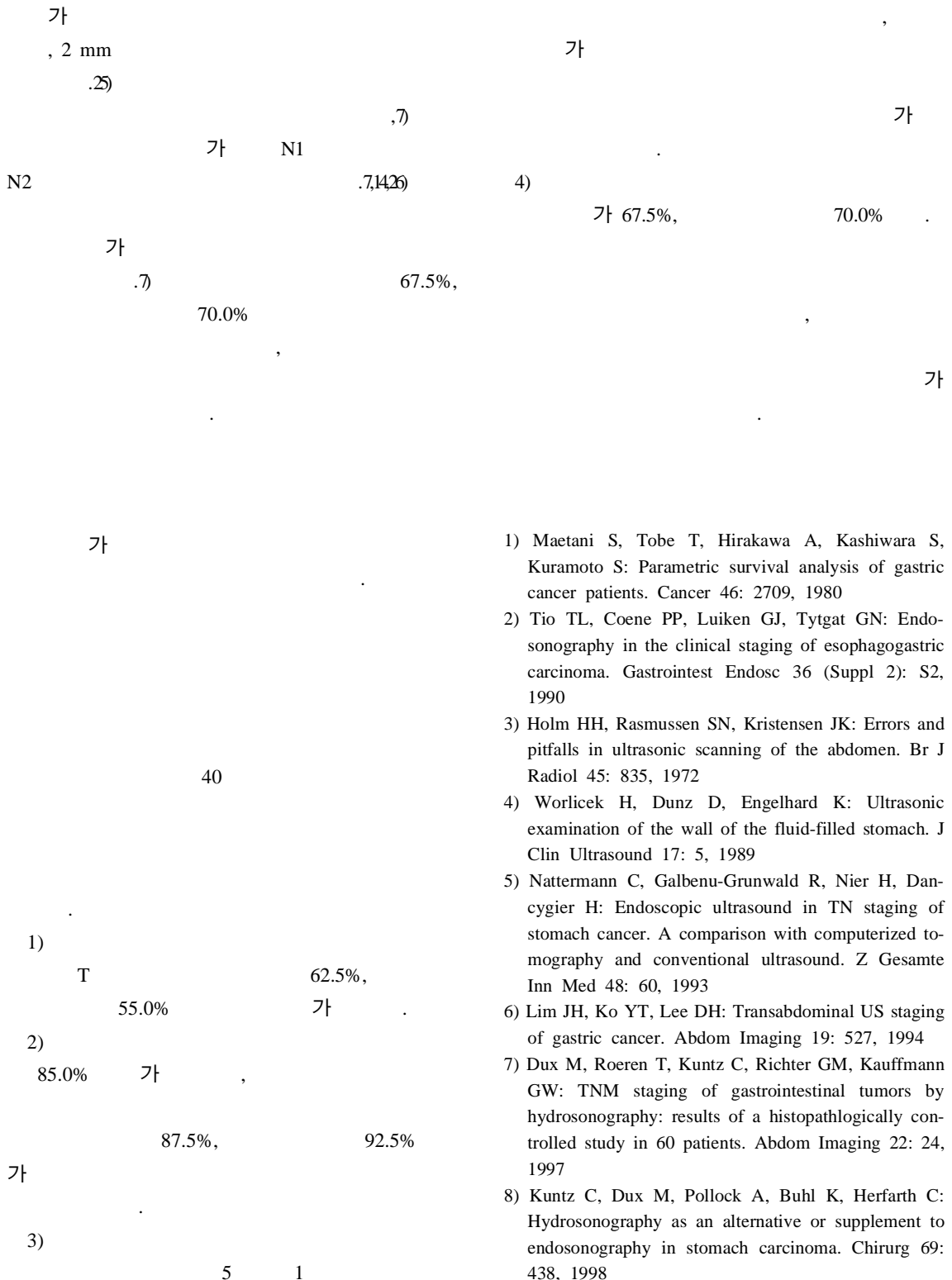
.16) 18 12 , 15 8 , .2425)

가 84 90%616) 가 3.5 MHz 가 가 T1 가

.17,18)

가 85% 50 87% 18) , (N1)

가 50%



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