CT

CT

[1]

.   .   [2]

:   CT
(2D) CT   .
:   50   .
CT   .
.   ,   .
150 mL   3 mL   ,
70   . 2D CT

.
: 50   2D CT   36 (72%)   ,   44
(88%)   ($p < 0.05$).
2D CT   8   .
1 ,   3 ,   1 ,   2 ,   (Type IIa+IIc) 1   .
6 ,   1 ,   1   .   6
4 ,   1 ,   1   2 ,   3
,   1   .
:   CT   2D CT
.
.

CT   20%-56%   (8-17).
.   CT (Multi-detector CT, MDCT)

.   5   20%   .   3
90%   .   CT
(1-6).   1 cm
(endoscopic mucosal resection)
(minimally invasive surgery)

(7, 8).   (18-20).
CT   CT   3
(16, 17)
.   ,
CT   3
2D CT

(21-27).

CT

(Virtual gastrography)

2D CT

: CT CT

(Top, Taejoon Pharmaceuticals, Kyungkido, Korea) 6 g
5mL , CT
scanogram

CT . CT
scanogram

,

(Iopamiro 300; Bracco,
Milano, Italy or Ultravist 370; Schering, Berlin, Germany)
150 mL 3 mL ,
70

. CT 5
.

2002 11 2003 4
50 .
35:15, 45 67 , 58
. (34) (16)
.
. CT
(Sensation 4, Siemens Medical System, Forchheim,
Germany) . 2.5 mm ,
6 , 15 mm , 1.5 mm .
8 . CT
Scopolamine-N-butylbromide(buscopan;
Boehringer Ingelhein Korea, Seoul, Korea) 20 mg
. CT

(Leonardo,
Siemens Medical System, Forchheim, Germany)
.

2D CT
.

2D CT
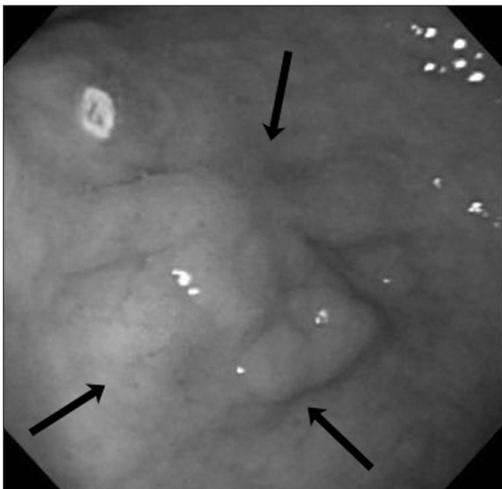
A
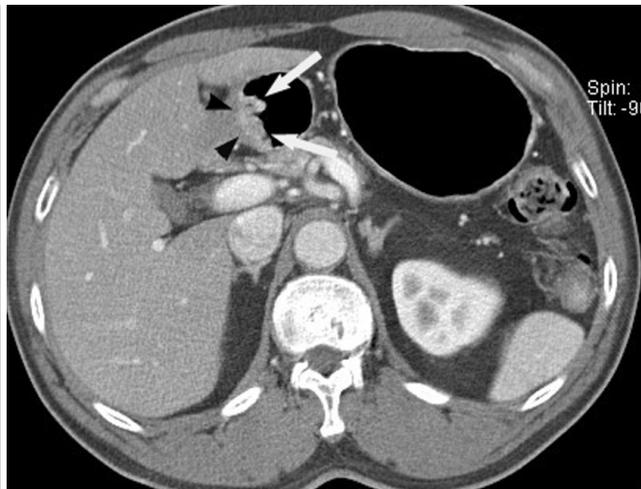
B
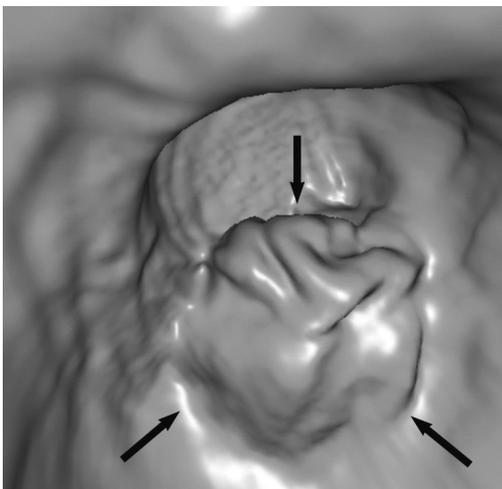
C

Fig. 1. Early gastric cancer with type I.
A. Gastroscopy shows a polypoid lesion in the prepyloric antrum of the stomach (arrows).
B. Two-dimensional CT shows focal polypoid enhanced lesion in the prepyloric antrum (arrows) with preservation of the low-attenuation stripe, corresponding submucosal layer (arrowheads).
C. Virtual gastrography shows a similar polypoid lesion located in the prepyloric antrum (arrows). This finding closely corresponds to the conventional gastroscopic image.

6 mm   (72%)   ,   44 (88%)

,   .   2D CT

.   (p < 0.05).

                                        50   7 ,

.   10 ,   5 ,   12 ,   (Type IIa+

                Japanese Research Society   IIc) 11 ,   5   .   50

for Gastric Cancer   Type I   , Type IIa   2 ,   3 ,   12 ,   9 ,   24

, Type IIb   , Type IIc   , Type III   (Fig. 1).

,   (28, 29).   2D CT

,   ,   ,   ,   .   6 mm

        2D CT   ,

        (McNemar test)   . 2D CT   14

,   0.05   1 ,   3 ,   5 ,

.   3 ,   (Type IIa + IIc) 1 ,   1

                                                ,   3 ,   4 ,   7   (Fig. 2).

                                                  5 mm

    50   6

    . 50   2D CT   36   2D CT   ,
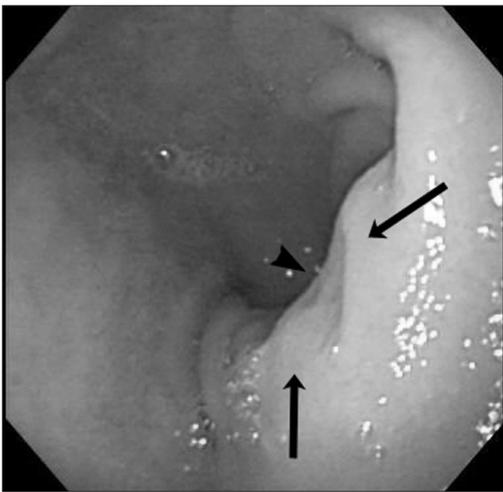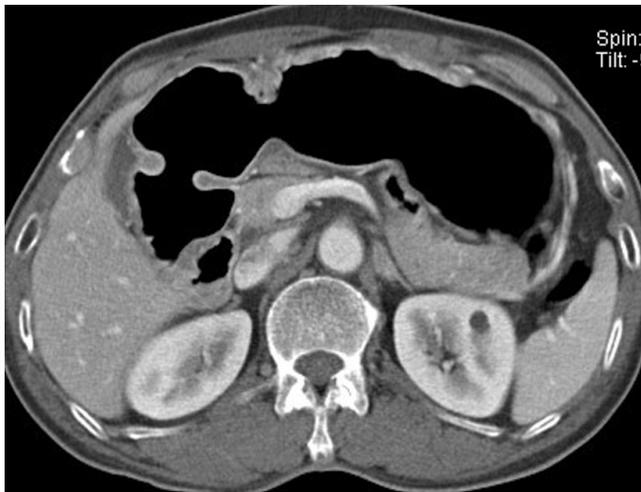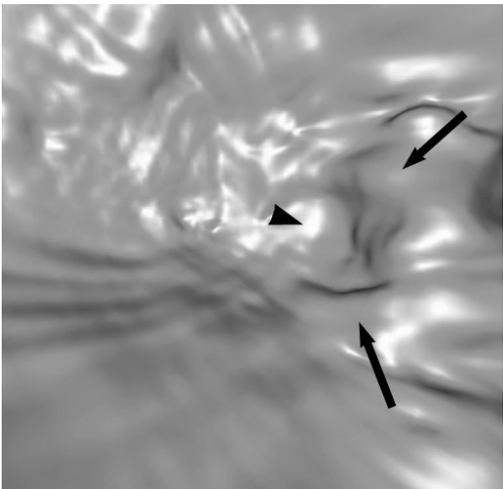
Fig. 2. Early gastric cancer with type IIc.
A. Gastroscopy shows a superficial elevated lesion (arrows) with a central depression (arrowhead) in the gastric antrum.
B. Two-dimensional CT shows no abnormal wall thickening of the stomach.
C. Virtual gastrography shows a similar superficial elevated lesion (arrows) with central depression (arrowhead) in the gastric antrum. It was not demonstrated on the two-dimensional CT.

: CT CT

4 , 1 , 1 88% .
2 , 3 , 1 (Fig. 3). 2D
CT 8 . . 2D
1 , 3 , 1 CT
, 2 , (Type IIa+ IIc) 1 . .
6 , 1 , 1 (Fig. 4).

.

,
.

CT (16). ,

,
CT 65- 85% ,
(8- 17). 2D CT ,
26- 53% CT .
41%- 96%
(21- 27). .
2D CT 72% CT
, (8- 17, 21- 27).
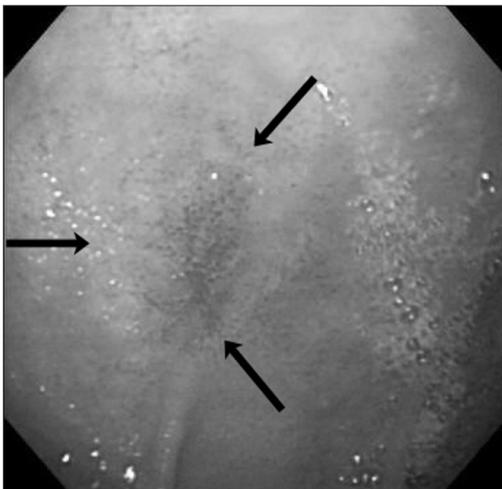
A

B
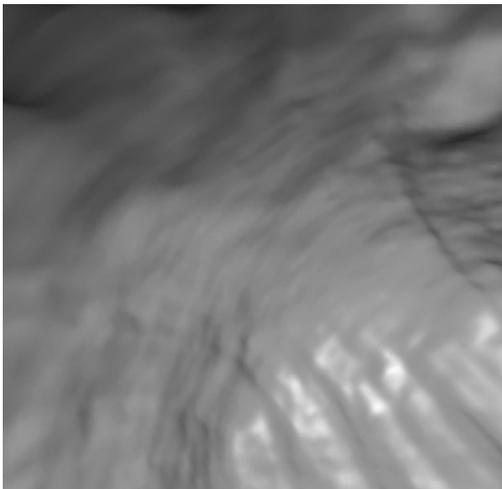
C

Fig. 3. Early gastric cancer with type IIb.
A. Gastroscopy shows a superficial flat lesion (arrows) with a erythematous change in the gastric angle.
B. Two-dimensional CT shows no abnormal wall thickening of the stomach.
C. Virtual gastrography shows no abnormal mucosal lesion.
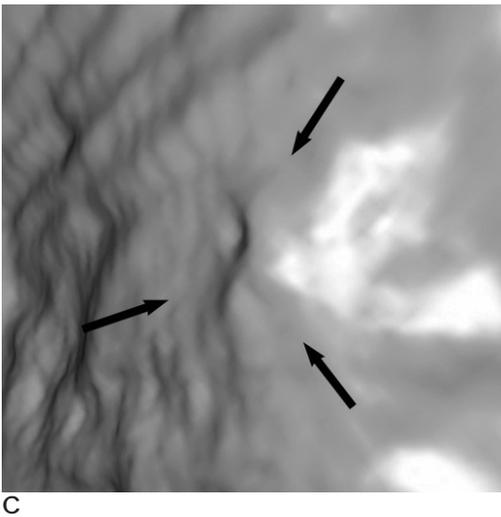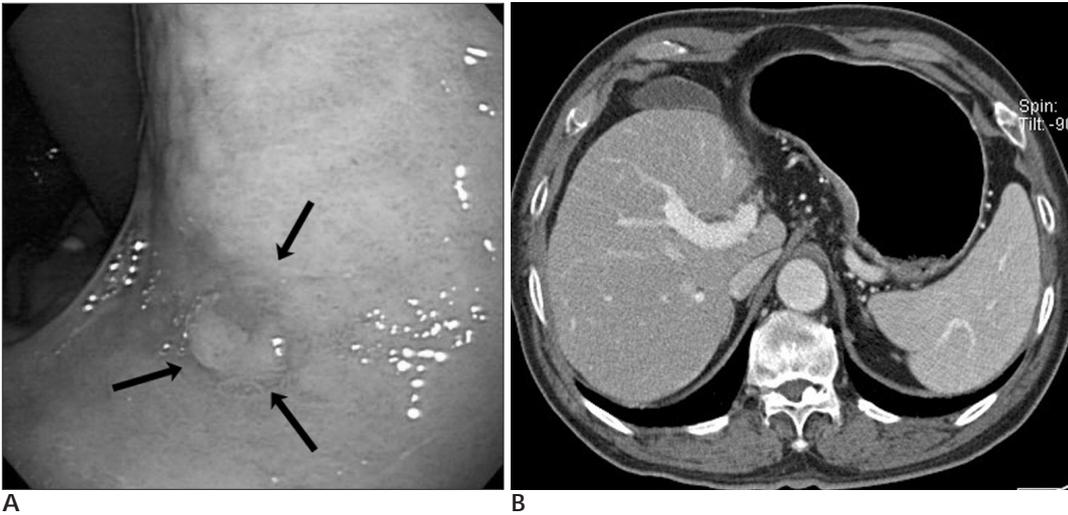
Fig. 4. Early gastric cancer with type IIa.
A. Gastroscopy shows a superficial elevated lesion located in the gastric body (arrows).
B. No abnormal wall thickening of the stomach is demonstrated on the two-dimensional CT.
C. Virtual gastrography shows a similar superficial elevated lesion located in the gastric body (arrows). Virtual gastrography depicts the same findings of the early gastric cancer as gastroscopy.

7.2%-14%
(30, 31).

(11, 14, 27).

Shimizu (27)

96.2%

41.1% .

20   30

CT   3

77%-96%   CT

(24-26).

88%

CT

2D CT

.

.

1. Hohenberger P, Gretschel S. Gastric cancer. *Lancet* 2003;362:305-315

2. Everett SM, Axon AT. Early gastric cancer in Europe. *Gut* 1997;41:142-150

3. Terry MB, Gaudet MM, Gammon MD. The epidemiology of gastric cancer. *Semin Radiat Oncol* 2002;12:111-127

4. Fuchs CS, Mayer RJ. Gastric carcinoma. *N Engl J Med* 1995;333:32-41

5. Shimizu S, Tada M, Kawai K. Early gastric cancer: its surveillance and natural course. *Endoscopy* 1995;27:27-31

6. Evans DM, Craven JL, Murphy F, Cleary BK. Comparison of early gastric cancer" in Britain and Japan. *Gut* 1978;19:1-9

7. Kim AY, Han JK, Seong CK, Kim TK, Choi BI. MRI in staging advanced gastric cancer: is it useful compared with spiral CT? *J Comput Assist Tomogr* 2000;24:389-394

8. Allum WH, Griffin SM, Watson A, Colin-Jones D. Association of Upper Gastrointestinal Surgeons of Great Britain and Ireland, British Society of Gastroenterology, et al. Guidelines for the management of oesophageal and gastric cancer. *Gut* 2002;50 supple 5:v1-v23

9. Kim HS, Han HY, Choi JA, Park CM, Cha IH, Chung KB, et al. Preoperative evaluation of gastric cancer: value of spiral CT during gastric arteriography (CTGA). *Abdom Imaging* 2001;26:123-130

10. Minami M, Kawauchi N, Itai Y, Niki T, Sasaki Y. Gastric tumors: radiologic-pathologic correlation and accuracy of T staging with dynamic CT. *Radiology* 1992;185:173-178

11. Tsuda K, Hori S, Murakami T, Nakamura H, Tomoda K, Nakanishi K, et al. Intramural invasion of gastric cancer: evaluation by CT with water-filling method. *J Comput Assist Tomogr* 1995;19:941-947

12. Cho JS, Kim JK, Rho SM, Lee HY, Jeong HY, Lee CS. Preoperative assessment of gastric carcinoma: value of two-phase dynamic CT with mechanical iv. injection of contrast material. *AJR Am J Roentgenol* 1994;163:69-75

13. Minami M, Kawauchi N, Itai Y, Niki T, Sasaki Y. Gastric tumors: radiologic-pathologic correlation and accuracy of T staging with dynamic CT. *Radiology* 1992;185:173-178

14. Mani NB, Suri S, Gupta S, Wig JD. Two-phase dynamic contrast-enhanced computed tomography with water-filling method for staging of gastric carcinoma. *Clinical Imaging* 2001;25:38-43

15. Rossi M, Broglia L, Graziano P, Maccioni F, Bezzi M, Masciangelo R, et al. Local invasion of gastric cancer: CT findings and pathologic correlation using 5-mm incremental scanning, hypotonia, and water filling. *AJR Am J Roentgenol* 1999;172:383-388

16.　　　，　　　，　　　，　　　，　　　．
CT　　　　　　　　．　　　　　　1998;39:947-952

17. Lee DH, Ko YT. Advanced gastric carcinoma: the role of three-dimensional and axial imaging by spiral CT. *Abdom Imaging* 1999;24:111-116

18. Fenlon HM, Nunes DP, Schroy PC 3rd, Barish MA, Clarke PD, Ferrucci JT. A comparison of virtual and conventional colonoscopy for the detection of colorectal polyps. *N Engl J Med* 1999;341:1496-1503 Erratum in: *N Engl J Med* 2000;342:524

19. Luboldt W, Bauerfeind P, Wildermuth S, Marincek B, Fried M, Debatin JF. Colonic masses: detection with MR colonography. *Radiology* 2000;216:383-388

20. Macari M, Bini EJ, Jacobs SL, Lange N, Lui YW. Filling defects at CT colonography: pseudo- and diminutive lesions (the good), polyps (the bad), flat lesions, masses, and carcinomas (the ugly). *Radiographics* 2003;23:1073-1091

21. Horton KM, Fishman EK. Current role of CT in imaging of the stomach. *Radiographics* 2003;23:75-87

22. Ba-Ssalamah A, Prokop M, Uffmann M, Pokieser P, Teleky B, Lechner G. Dedicated multidetector CT of the stomach: spectrum of diseases. *Radiographics* 2003;23:625-644

23. Hopper KD, Iyriboz AT, Wise SW, Neuman JD, Mauger DT, Kasales CJ. Mucosal details at CT virtual reality: surface versus volume rendering. *Radiology* 2000;214:517-522

24. Kim SH, Han JK, Lee KH, Chung JW, Yang HK, Choi BI. Computed tomography gastrography with volume-rendering technique: correlation with double-contrast barium study and conventional gastroscopy. *J Comput Assist Tomogr* 2003;27:140-149

25. Bhandari S, Shim CS, Kim JH, Jung IS, Cho JY, Lee JS, et al. Usefulness of three-dimensional, multidetector row CT (virtual gastroscopy and multiplanar reconstruction) in the evaluation of gastric cancer: a comparison with conventional endoscopy, EUS, and histopathology. *Gastrointest Endosc* 2004;59:619-626.

26. Kim HJ, Kim AY, Oh ST, Kim JS, Kim PY, Lee MG, et al. Gastric cancer staging at multi-detector row CT gastrography: comparison of transverse and volumetric CT scanning. *Radiology* 2005;236:879-885

27. Shimizu K, Ito K, Matsunaga N, Shimizu A, Kawakami Y. Diagnosis of gastric cancer with MDCT using the water-filling method and multiplanar reconstruction: CT-histologic correlation. *AJR Am J Roentgenol* 2005;185:1152-1158

28. Japanese Research Society for Gastric cancer. The general rules for gastric cancer study in surgery and pathology. Part I: Clinical classification. *Jpn J Surg* 1981;11:127-139

29. Japanese Research Society Committee on Histological Classification of Gastric Cancer. The general rules for gastric cancer study in surgery and pathology. Part II: histological classification of gastric cancer. *Jpn J Surg* 1981;11:140-145

30. Yalamarthi S, Witherspoon P, McCole D, Auld CD. Missed diagnoses in patients with upper gastrointestinal cancers. *Endoscopy* 2004;36:874-879

31. Amin A, Gilmour H, Graham L, Paterson-Brown S, Terrace J, Crofts TJ. Gastric adenocarcinoma missed at endoscopy. *J R Coll Surg Edinb* 2002;47:681-684

Comparison of Two-dimensional CT with Virtual Gastrography Using Multi-detector CT in the Diagnosis of Early Gastric Cancer[1]

Jee Eun Lee, M.D., Hyo Won Eun, M.D., Jung Hoon Kim, M.D.[2]

[1]Department of Radiology, Ewha Womans University Dongdaemoon Hospital
[2]Department of Radiology, Soon Chun Hyang University Hospital

Purpose: We compared the performance of virtual gastrography (VG) using multi-detector (MDCT) with two-dimensional (2D) CT in the diagnosis of early gastric cancer (EGC).

Materials and Methods: We performed conventional gastroscopy and MDCT examination after gaseous distension of the stomach in 50 consecutive patients who were confirmed as EGC by surgery and endoscopic mucosal resection. Unenhanced images were obtained in the prone position and contrast enhanced images were obtained in the supine position. Contrast enhanced imaging was done 70 seconds after intravenous injection of 150 mL of ionic contrast material at the rate of 3 mL/sec. 2D CT and VG images were analyzed by two radiologist with consensus to assess the location and gross morphologic type of EGC. Crosstabs were used to determine the diagnostic accuracy of EGC on 2D CT and VG.

Results: The diagnostic specificity for 50 patients with EGC was significantly higher with VG (72%) than with 2D CT (88%) ($p < 0.05$). VG depicted EGC in eight patients (type I = 1; type IIa = 3; type IIb = 1; type IIc = 2; type IIa + IIc = 1) that were missed on the 2D CT. The lesions were located in the antrum ($n = 6$), angle ($n = 1$), and body ($n = 1$). However, VG frequently misdiagnosed EGCs of type IIb ($n = 4$), IIc ($n = 1$), and III ($n = 1$), as well as the location at the angle ($n = 3$), antrum ($n = 1$), and body ($n = 1$).

Conclusion: VG showed excellent result in the detection of EGC compared with 2D CT. However, it had limitations in the diagnosis of EGC type IIb or gastric angle tumor.

Index words : Abdomen, CT
Stomach, neoplasms
Computed tomography (CT), comparative studies

Address reprint requests to : Hyo Won Eun, M.D., Department of Radiology, Ewha Womans University Dongdaemoon Hospital
70, Jongro 6 ga, Jongro gu, Seoul 110-783, Korea.
Tel. 82-2-760-5144/5562   Fax. 82-2-760-5046   E-mail: ehw@ewha.ac.kr