

# CT 1

. . . . . 2 . 2 .

: CT 19 CT  
 : CT 17 (89%) 가  
 2 (11%) 가 . 6 (32%)  
 (encapsulating wall) . 17 13  
 (haziness) , 6 (32%) . 18 (95%)  
 MR (sequence) 가 . MR 1  
 : CT 가

가 , , CT (14 - 17). CT  
 (mottled) 가 가 가  
 (1, 2). , ,  
 (14, 15). (high - grade)  
 가 (3 - 7). CT  
 (truncal vagotomy) (10, 14, 18, 19). ,  
 가  
 (2). 가  
 (8, 9). CT  
 , , , MR  
 (1, 8).

1991 10  
 49  
 23 , 22 ,  
 4  
 26 19 CT (18 ) , CT  
 . CT  
 MR (1 )  
 MR 8  
 , 2 (enteroclysis) .  
 19 가 6 가 13 ,  
 2000 6 19 2000 12 11 .

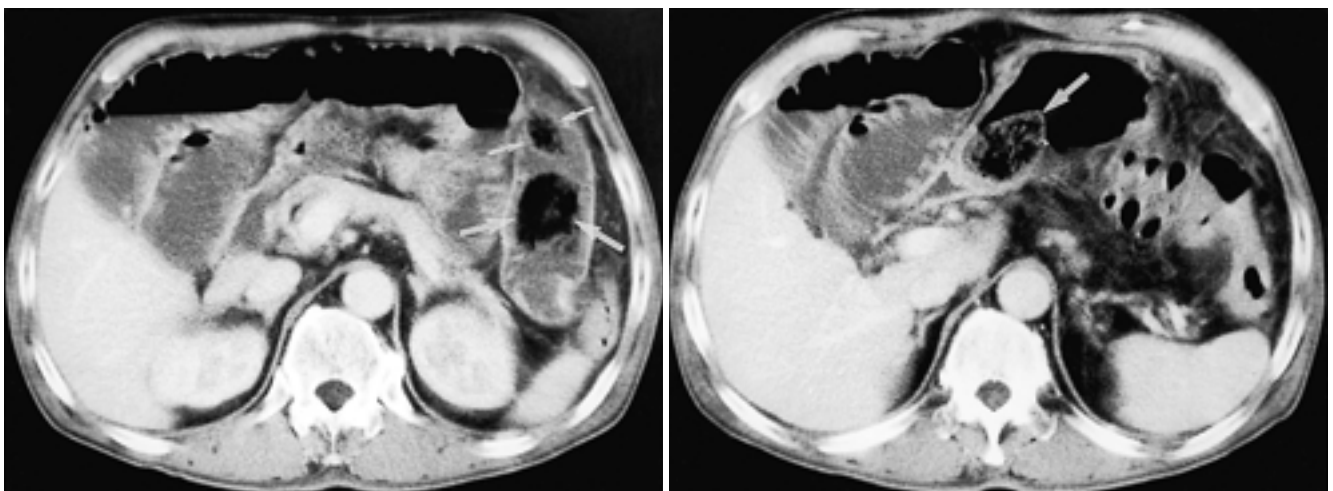
CT

(two-dimensional fast low-angle shot, FLASH) T2 (half-Fourier acquisition single-shot turbo spin-echo, HASTE)

가 (round), (ovoid), (tubular) 가 (5 cm) (5-10 cm) (10 cm) (20). (haziness) 가 가 가 가 (21).

CT 9800 Quick System (General Electric Medical Systems, Milwaukee, U.S.A.) scanner Somatom Plus-S and Plus-4 (Siemens, Erlangen, Germany) scanner 8-10 mm, 8-10 mm 8 1 600-900 ml (E-Z-CAT; E-Z-EM, Westbury, U.S.A.) 11 가 120 ml (Iopamiro 300; Bracco, Milan, Italy or Ultravist; Schering, Berlin, Germany) 3 ml/sec MR (body phased-array coil) 1.5-T superconductive unit (Magnetom Vision; Siemens, Erlangen, Germany) T1

12, 7 13 (68%), 6 (32%) (Fig. 1); 4 2, 1 3, 1 4 가 6 가 1, 가 1, 가 2 2.1-5.2 cm ( ; 3.2 cm) 2.2-11.0 cm ( ; 5.2 cm) 9



**Fig. 1.** 56-year-old man with small intestinal obstruction due to phytobezoar after endoscopic fragmentation of gastric phytobezoar. **A.** Contrast-enhanced CT scan shows ovoid masses (arrows) containing gas bubbles in dilated proximal jejunal loop. Encapsulating wall is noted in smaller phytobezoar (small arrows) **B.** Contrast-enhanced CT scan 2 cm cephalad to (A) shows residual phytobezoar (arrow) in prepyloric antrum of stomach.

, 6 , 4 . ( ; 3.6 cm) . 17 (89%)  
 가 가 가 19 17 (89%), 가 가 - 가  
 가 2 (11%) (Fig. 2). 6 (32%) 17 13 (76%) , 11  
 (Fig. 3). ; 7  
 가 5 - 10 mm ( 8 mm)  
 3 - 5cm . 1



A



B

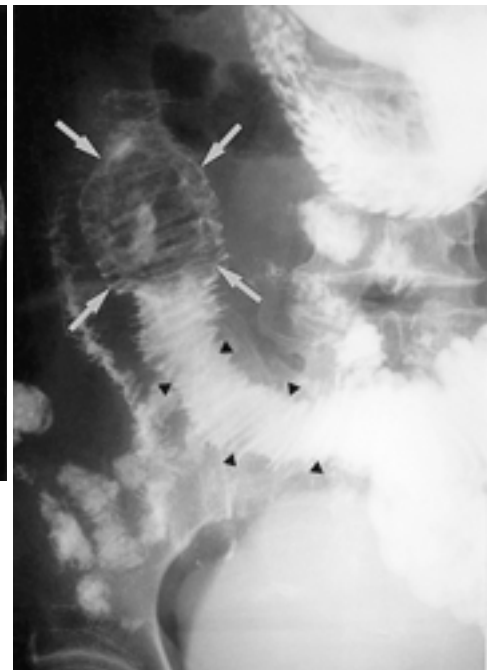
**Fig. 2.** 46-year-old man with phytobezoar mimicking small bowel tumor.

**A.** Contrast-enhanced CT scan shows a solid-appearing mass (arrow) in distal ileum. Note bowel wall thickening at obstructed site and regional mesenteric haziness (arrowheads).

**B.** Enteroclysis 1 week after CT scanning shows no evidence of intraluminal mass and small bowel obstruction.



A

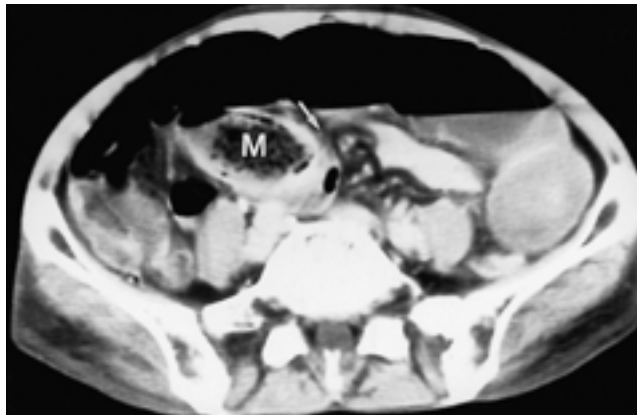


B

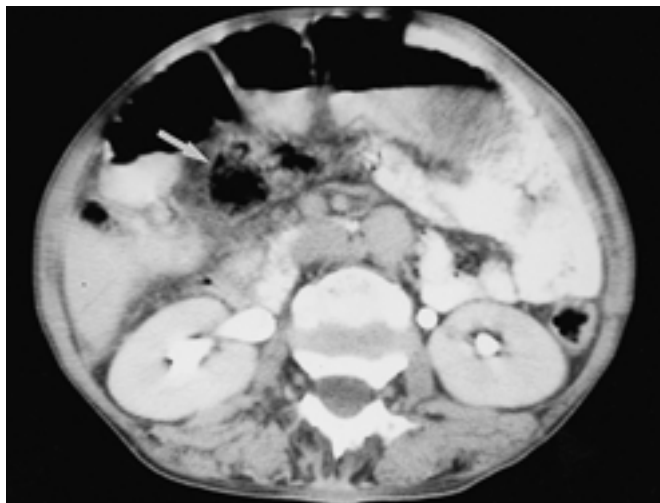
**Fig. 3.** Phytobezoar in 68-year-old man who had a recent history of persimmon ingestion.

**A.** Contrast-enhanced CT scan shows ovoid mass (M) containing mottled gas along with encapsulating wall (arrows) at distal jejunum. Note diffuse concentric bowel wall thickening (arrowheads) at obstructed site as well as at small bowel loop proximal to obstructed site.

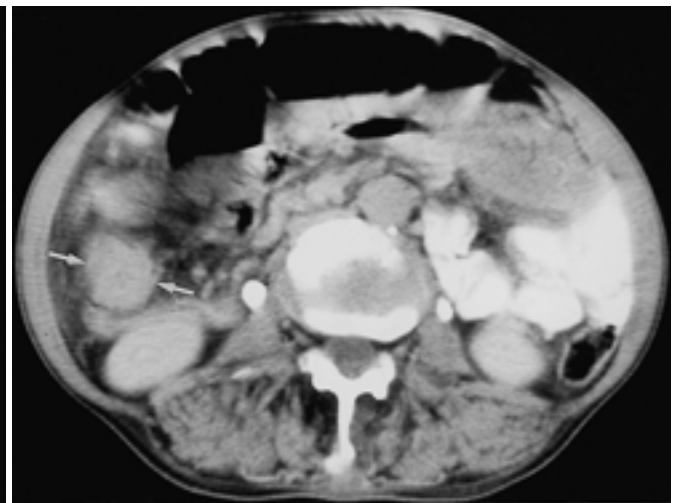
**B.** Small bowel follow-through shows low-grade small bowel obstruction with polypoid intraluminal filling defect (arrows) at obstructed site. Also note diffuse small bowel fold thickening (arrowheads) in the loop proximal to obstruction. A phytobezoar was found at surgery.



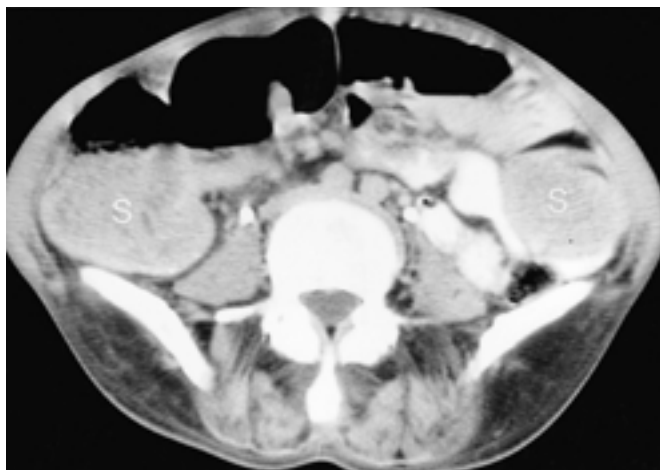
**Fig. 4.** Phytobezoar in 53-year-old man with small-bowel obstruction due to adhesions and bands. Contrast-enhanced CT shows a gas-containing mass (M) in dilated small bowel loop proximal to obstructed site (arrow). At surgery, gas-containing mass was proved as a phytobezoar.



A



B



C

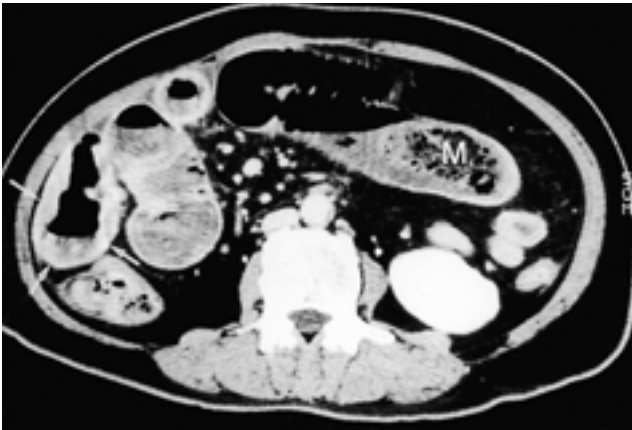
**Fig. 5.** 62-year-old woman with phytobezoar associated with tuberculous strictures.

**A.** Contrast-enhanced CT scan shows round, gas-containing mass (arrow) in jejunum. Note diffuse bowel dilatation due to tuberculous stricture of distal ileum.

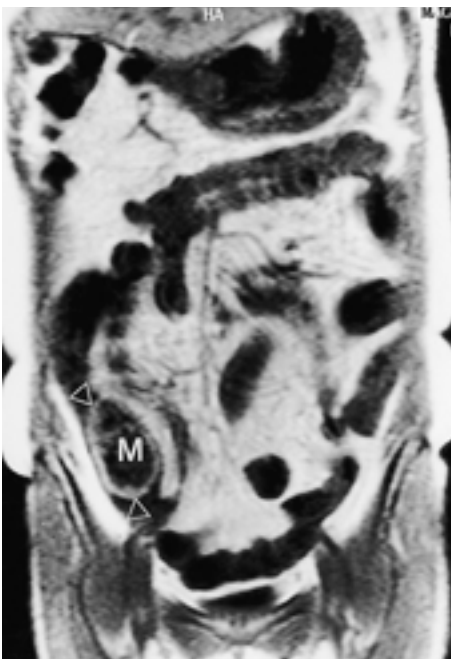
**B.** Contrast-enhanced CT scan 5 cm caudad to (A) shows concentric bowel wall thickening (arrows) of distal ileum with severe luminal narrowing. Right hemicolectomy was performed and multiple phytobezoars were found in small intestine at surgery.

**C.** Contrast-enhanced CT scan shows diffuse dilatation of the proximal small bowel loops (S).

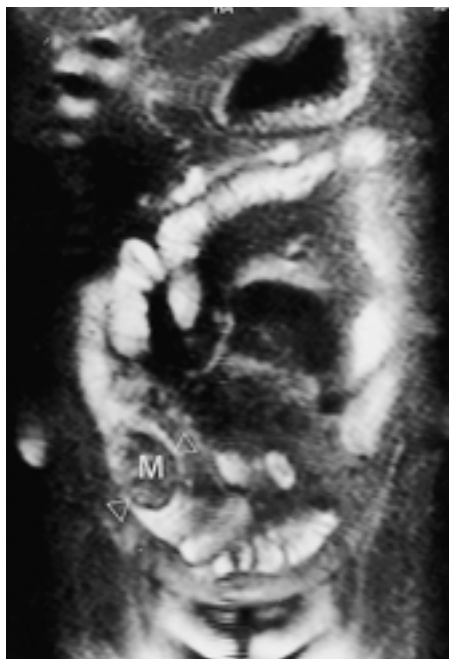
가 (enterolith)  
 가 (22). 가 (23). CT 가  
 가 (14, 15). 가 가  
 가 가 CT (encapsulating  
 wall) 가 CT  
 CT (5).  
 (24).  
 (24, 25) CT  
 CT 가 가 가  
 17 13  
 11



A



B



C

**Fig. 6.** 58-year-old woman with small bowel obstruction due to phytobezoar.

**A.** Contrast-enhanced CT scan shows ovoid, gas-containing mass (M) at obstructed site. Note bowel wall thickening (arrows) at proximal loop remote from obstructed site.

**B, C.** Coronal two-dimensional FLASH (117/4 [TR msec/TE msec], 70 ° flip angle) and HASTE (4/59 [TR msec/TE msec], 140 ° flip angle) MR images obtained 4 days after CT scan show hypointense intraluminal mass (M) in ileum. Note thin-rim of encapsulating wall (arrowheads) with hyperintensity on FLASH MR image (B) and hypointensity on HASTE MR image (C).

가 2

가

가

가

CT

가

(10, 14, 18, 19),

CT

가

MR

가

MR

T1 -

T2 -

가 가

T1

, T2

MR

가

(26).

MR

CT

가

가

CT

MR CT

, CT

가

1. Krausz MM, Moriel EZ, Ayalon A, et al. Surgical aspects of gastrointestinal persimmon phytobezoar treatment. *Am J Surg* 1986; 152:526-530
2. Escamilla C, Campos RR, Paricio PP, et al. Intestinal obstruction and bezoars. *J Am Coll Surg* 1994;178:285-288
3. Shocket E, Simon SA. Small bowel obstruction due to enterolith (bezoar) formed in a duodenal diverticulum: a case report and review of the literature. *Am J Gastroenterol* 1982;77:621-624
4. Frazzini VI, English WJ, Bashist B, Moore E. Small bowel obstruction due to phytobezoar formation within Meckel diverticulum:

CT findings. *J Comput Assist Tomogr* 1996;10:390-392

5. Herbetko J, Brunton FJ. Enteroliths of small bowel diverticula. *Clin Radiol* 1991;43:311-313
6. Lorimer JW, Allen MW, Tao H, et al. Small-bowel carcinoid presenting in association with a phytobezoar. *Can J Surg* 1991;34:331-333
7. Herschman A. Ileal obstruction due to adhesions and phytobezoar following gastrectomy. *Radiology* 1969;92:1307-1308
8. Robles R, Parrila P, Escamilla C, et al. Gastrointestinal bezoars. *Br J Surg* 1994;81:1000-1001
9. Brady PG. Gastric phytobezoars consequent to delayed gastric emptying. *Gastrointest Endosc* 1978;24:159-961
10. Frager CH, Baer JW. Role of CT in evaluating patients with small-bowel obstruction. *Semin Ultrasound CT MR* 1995;16:127-140
11. Megibow AJ, Balthazar EJ, Cho KC, Medwid SW, Birnbaum BA, Nov ME. Bowel obstruction: evaluation with CT. *Radiology* 1991; 180:313-318
12. Fukuya T, Hawes DR, Lu CC, Chang PJ, Barloon TJ. CT diagnosis of small-bowel obstruction: efficacy in 60 patients. *AJR Am J Roentgenol* 1992;158:765-769
13. Gazelle GS, Golderg MA, Wittenberg J, Halpern EF, Pinkney L, Muller PR. Efficacy of CT in distinguishing small-bowel obstruction from other causes of small-bowel dilatation. *AJR Am J Roentgenol* 1994; 162:43-47
14. Ko SF, Lee TY, Ng SH. Small bowel obstruction due to phytobezoar: CT diagnosis. *Abdom Imaging* 1997;22:471-473
15. Quiroga S, Alvarez-Castells A, Sebastia MC, Pallisa E, Barluenga E. Small bowel obstruction secondary to bezoar: CT diagnosis. *Abdom Imaging* 1997;22:315-317
16. Licht M, Gold BM, Katz DS. Obstructing small-bowel bezoar: diagnosis using CT. *AJR Am J Roentgenol* 1999;173:500-501
17. . Phytobezoars in the small intestine: CT and US appearances 1997;36:113-116
18. Mayo-Smith WW, Wittenberg J, Bennett GL, Gervais DA, et al. The CT small bowel faces sign: description and clinical significance. *Clin Radiol* 1995;50:765-767
19. Catalano O, Nunziata A. A computerized tomography sign of small bowel occlusion: the feces-like content. *Radiol Med* 1996;92:731-732
20. Verstanding AG, Klin B, Bloom RA, Hadas I, Libson E. Small bowel phytobezoars: detection with radiography. *Radiology* 1989;172: 705-707
21. James S, Balfe DM, Lee JKT, Picus D. Small bowel disease: Categorization by CT examination. *AJR Am J Roentgenol* 1987;148: 863-868
22. Javors BR, Bryk D. Enterolithiasis: a report of four cases. *Gastrointest Radiol* 1983;8:359-362
23. Berry DF, Willing SJ, Beers GJ. Small bowel obstruction due to enterolith: CT appearance. *J Comput Assist Tomogr* 1987;11:707-708
24. Rogers LF, Davis EK, Harle TS. Phytobezoar formation and food boli following gastric surgery. *Am J Roentgenol Radium Ther Nucl Med* 1973;119:280-290
25. Buchholz RB, Haisten AS. Phytobezoars following gastric surgery for duodenal ulcer. *Surg Clin North Am* 1972;52:341-352
26. Regan F, Beall DP, Bohlman ME, et al. Fast MR imaging and the detection of small-bowel obstruction. *AJR Am J Roentgenol* 1998; 170:1465-1469

## CT Imaging Features of Phytobezoar Associated with Small Bowel Obstruction<sup>1</sup>

Myeon Jun Yang, M.D., Hyun Kwon Ha, M.D., Ji-Hoon Kim, M.D.,  
Min Jee Sohn, M.D., Pyo Nyun Kim, M.D., Moon-Gyu Lee, M.D., Suck-Kyun Yang, M.D.<sup>2</sup>,  
Hoon Yong Jeong, M.D.<sup>2</sup>, Yong Ho Auh, M.D.

<sup>1</sup>Department of Radiology, Asan Medical Center University of Ulsan, College of Medicine

<sup>2</sup>Department of Internal Medicine, Asan Medical Center University of Ulsan, College of Medicine

**Purpose:** The purpose of this study was to evaluate the CT findings of phytobezoar associated with small bowel obstruction.

**Materials and Methods:** In 19 patients with phytobezoar associated with small bowel obstruction, two of whom had underlying small bowel disease, we analyzed the morphological characteristics of phytobezoars and changes in the bowel and perienteric regions, as revealed by abdominal Ct imaging.

**Results:** On CT, phytobezoars appeared as single or multiple, gas-containing masses in 17 patients (89%) and as a solid mass without gas in the remaining two (11%). An encapsulating wall was noted in six patients (32%). Among the 17 without underlying small bowel disease, the bowel wall was thickened in 13 (76%) at the obstructed site and/or the bowel proximal to the obstruction. Mesenteric vascular engorgement and haziness were seen in 18 patients (95%) and a small amount of ascites in six (32%). MR images of one patient showed the phytobezoar as a hypointense mass on all sequences.

**Conclusion:** CT imaging is useful for the diagnosis of phytobezoar associated with small bowel obstruction.

**Index words :** Bezoar

Intestines, stenosis or obstruction

Address reprint requests to : Hyun Kwon Ha, M.D., Department of Radiology, Asan Medical Center

388-1, Poongnap-dong, Songpa-gu, Seoul 138-736, Korea.

Tel. 82-2-2224-4371 Fax. 82-2-476-4791 E-mail: hkha@www.amc.seoul.kr

1945 10

가

가

1. :

2. :

1) - 100,000

2) - 50,000

3. 1)

2)

3)

4)

5)

4. :

5. : 1) ( 228page )

2)

6. :